Driving and Inhibiting Factors in the Adoption of Open Source Software in Organisations

A thesis submitted to the University of Hertfordshire in partial fulfilment of the requirements for the degree of Doctor of Business Administration

Neil Frederick Greenley

SRN07170058

Business School

University of Hertfordshire

October 2014

Abstract

The aim of this research is to investigate the extent to which Open Source Software (OSS) adoption behaviour can empirically be shown to be governed by a set of self-reported (driving and inhibiting) salient beliefs of key informants in a sample of organisations. Traditional IS adoption/usage theory, methodology and practice are drawn on. These are then augmented with theoretical constructs derived from IT governance and organisational diagnostics to propose an artefact that aids the understanding of organisational OSS adoption behaviour, stimulates debate and aids operational management interventions.

For this research, a combination of quantitative methods (via Fisher's Exact Test) and complimentary qualitative method (via Content Analysis) were used using self-selection sampling techniques. In addition, a combination of data and methods were used to establish a set of mixed-methods results (or meta-inferences). From a dataset of 32 completed questionnaires in the pilot study, and 45 in the main study, a relatively parsimonious set of statistically significant driving and inhibiting factors were successfully established (ranging from 95% to 99.5% confidence levels) for a variety for organisational OSS adoption behaviours (i.e. by year, by software category and by stage of adoption). In addition, in terms of mixed-methods, combined quantitative and qualitative data yielded a number of factors limited to a relatively small number of organisational OSS adoption behaviour.

The findings of this research are that a relatively small set of driving and inhibiting salient beliefs (e.g. Security, Perpetuity, Unsustainable Business Model, Second Best Perception, Colleagues in IT Dept., Ease of Implementation and Organisation is an Active User) have proven very accurate in predicting certain organisational OSS adoption behaviour (e.g. self-reported Intention to Adopt OSS in 2014) via Binomial Logistic Regression Analysis.

Acknowledgements

To my wife, Helen.

To my mum and dad, Don & Mary.

To my brother, Steve.

To all my friends, colleagues and associates who have offered words of encouragement and inspired me to complete this project.

My special thanks to my fellow Hertfordshire DBA students, the DBA staff, supervisory team (Prof Jyoti Choudrie and Dr Marija Cubric) and most of all those who elected to respond and participate in this research; without whom none of this would have been possible.

To the late Spencer Bell, "How hard can it be?"

Table of Contents

Table of Tables

Table of Figures

List of Acronyms

Acronym	Description
A	*Attitude*
ACT	*Actor Network Theory*
ALT	*Adaptive Learning Theory*
AUDA	*Adoption, Usage, Diffusion and Acceptance*
BB-DA	*Behavioural Beliefs Driving Adoption*
BB-IA	*Behavioural Beliefs Inhibiting Adoption*
BDM	*Bass Diffusion Model*
BOS	*Bristol On-line Survey*
BPM	*Business Process Management*
BSA	*Business Software Alliance*
BY	*By Attribution*
BY-NC	*By Attribution Non-Commercial use only*
BY-NC-ND	*By Attribution, Non-commercial, No-derivative*
BY-NC-SA	*By Attribution, Non-Commercial, Share Alike*
BY-ND	*By Attribution, No Derivatives*
BY-SA	*By Attribution, Share Alike*
CA	*Competitive Advantage*
CAQDAS	*Computer-aided Qualitative Data Analysis Software*
CBPP	*Commons-based Peer Production*
CC	*Creative Commons*
CIM	*Collective Innovation Model*
CIO	*Chief Information Officer*
CL	*Confidence Level*
CoT	*Contingency Theory*
COTS	*Custom-off-the-Shelf*
CrT	*Critical Theory*
CSV	*Comma-separated Values*
CV	*Curriculum Vitae*
DBA	*Doctor of Business Administration*
DoI	*Diffusion of Innovations*
DP	*Demand Pull*
DTPB	*Decomposed Theory of Planned Behaviour*
EC	*European Commission*
EPO	*European Patent Office*
ERP	*Enterprise Resource Planning*
ET	*Expectancy Theory*
FFA	*Force Field Analysis*

FOSS	*Free/Open Source Software*
FSF	*Free Software Foundation*
FTSE	*Financial Times Stock Exchange*
FTSE500	*FTSE Top 500 UK PLCs*
GDP	*Gross Domestic Product*
GNU	*GNU is Not Unix*
GPL	*General Public License*
H1	*The First Hypothesis*
H2	*The Second Hypothesis*
H3	*The Third Hypothesis*
H4	*The Fourth Hypothesis*
H5	*The Fifth Hypothesis*
HTML	*Hyper Text Mark-up Language*
IBM	*International Business Machines*
ICT	*Information and Communications Technology*
IDM	*Inhibitor Determination Model*
InstM	*Institutional Motivations*
InstT	*Institutional Theory*
InterM	*Interactive Model*
IOIS	*Inter-organisational Information Systems*
IP	*Intellectual Property*
IPR	*Intellectual Property Rights*
IRT	*Information Richness Theory*
IS	*Information Systems*
IT	*Information Technology*
ITG	*IT Governance*
ITT	*Institution-based Trust Theory*
KM	*Knowledge Management*
KSIF	*Kelman's Social Influence Framework*
MBA	*Master of Business Administration*
MS	*Microsoft*
MS	*Mutual Shaping*
NAICS	*North American Industry Classification System*
NAPCS	*North American Product Classification System*
NC	*National Culture*
NE	*Network Externalities*
OBB	*Organisational Buying Behaviour*
OEF	*Organisation, Enterprise and Firm*
OSD	*Open Source Definitions*
OSI	*Open Source Initiative*
OSS	*Open Source Software*
PBC	*Perceived Behavioural Control*

PBC-O	*Perceived Behavioural Control Organisational*
PCME	*Perceived Critical Mass Effect*
PLC	*Public Listed Companies*
PS	*Proprietary Software*
RBT	*Resource Based Theory*
REH	*Rational Expectation Hypothesis*
RoI	*Return on Investment*
SA/ST	*Stakeholder Analysis/Theory*
SaaS	*Software as a Service*
SE	*Self-efficacy*
SEM	*Structured Equation Modelling*
SEP	*Social Economic Psychological model*
SI	*Social Identification*
SIT	*Social Identity Theory*
SME	*Small to Medium-sized Enterprise*
SME	*Small to Medium-sized Enterprise*
SMP	*Sense Making Perspective*
SN	*Subjective Norm*
SN-BO	*Subjective Norm Behaviour of Others*
SN-IO	*Subjective Norm Influence of Others*
SN-IOE	*Subjective Norm Influence of Others Expectations*
SOC	*Standard Occupational Classification*
SP	*Supply Push*
SPSS	*Statistical Package for Social Sciences*
SQL	*Structured Query Language*
SS	*Social Shaping*
TAM	*Technology Acceptance Model*
TAUT	*Top 5 Adoption and Usage Theories*
TCCD	*Theory of Consumer Choice and Decision-making*
TCO	*Total Cost of Ownership*
TCT	*Transaction Cost Theory*
TFTM	*Task Fit Technology Model*
TIA	*Theory of Industrial-level Activity*
TOE	*Technology Organisation Environment*
TOT	*Theory of Trying*
TP/NP	*Technology Push/Need Pull*
TPB	*Theory of Planned Behaviour*
TRA	*Theory of Reasoned Action*
UEM	*Unified Economic Model*
UK	*United Kingdom*
UoH	*University of Hertfordshire*
URN	*Unique Response Number*

US	*United States*
USA	*United States of America*
USBLS	*US Bureau of Labor Statistics*
USPTO	*US Patent and Trade Mark Office*
UTAUT	*Unified Theory of Acceptance and Use of Technology*
VAM	*Value-based Adoption Model*
WAM	*Web Acceptance Model*

Chapter 1: Introduction

1.1. Introduction

This chapter provides an overview of this study and highlights the practical importance of this research. The chapter begins by explaining the roots of Open Source Software (OSS) in terms of Intellectual Property Rights (IPR). It also discusses the importance of OSS in Information Systems (IS) terms. This leads to the aims and objectives of this research, followed by a description of the scope of this study. Following this, there is a discussion of the research approach as well as the contributions of this study and an overview of this dissertation. Having considered the outline of this chapter the background to the research problem is now discussed.

1.2. Background to the Research Problem

1.2.1. Open Source Software (OSS)

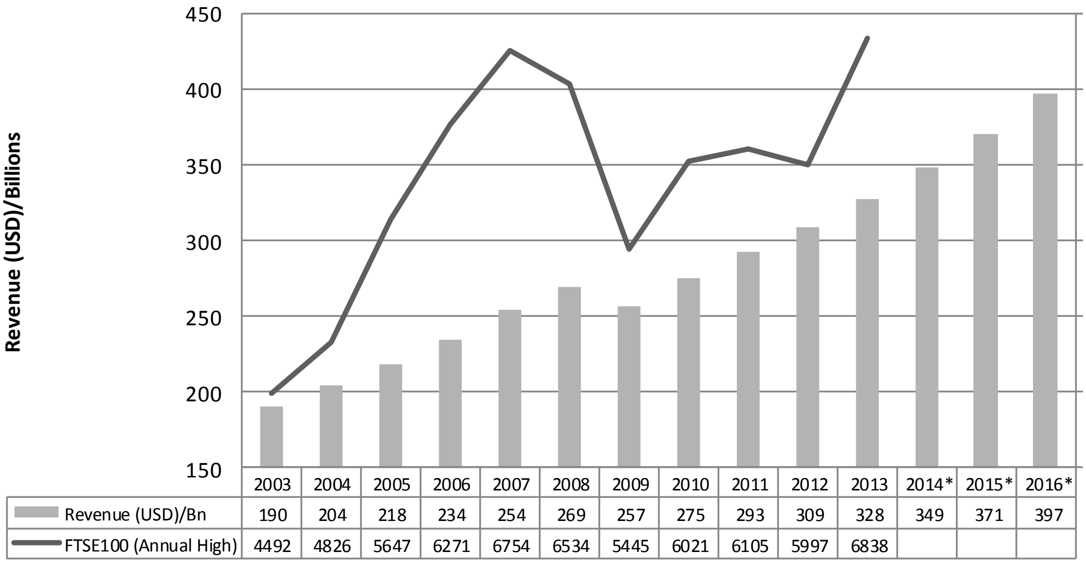
Although Open Source Software (OSS) has been used for many years, in recent years the increasing rise of online platforms and applications in daily life has led to researchers and individuals to pay more attention to the technology. In the following descriptions, definitions of the technology and its background as well as differences to other software in an organisational context are provided.

OSS has played a key role in the IT industry and originated in its current form within organisations in 1996 when the Open Source Institute (OSI) was formed. Information Systems (IS) research has broadly defined OSS as, "software where the license model grants individuals, groups, and organisations extensive rights to use, modify, and redistribute the binary and source-code of the original and modified/derived works, without requiring license royalty fees" (Fitzgerald, 2004 cited in Macredie and Mijinyawa, 2011, p237).

In terms of the history of OSS in organisations, attention is drawn to the International Business Machines Corporation (IBM). In 1964 IBM launched the 360 mainframe with a standardised architecture (Campbell-Kelly, 2008, p21. In contrast to previous designs, a standardised architecture meant that programs were transferable between computers on a reasonably large scale; thereby effectively creating a market for those interested in developing code into packaged applications. At the time most software was 'open source' in the sense that it was distributed in a format and computer language which was intelligible and editable by trained specialists or programmers (ibid).

By 2012, driven by a wide range of innovations produced by Proprietary Software (PS) publishing firms, the IT software market (initially created by the IBM 360 Mainframe) had grown into an industry worth USD328Billion globally (Marketline, 2012, p10). In the intervening period, PS had become the norm, source code distribution had completely ceased and most software was fully protected as trade secrets by intellectual property laws (Campbell-Kelly, 2008, p22).

In Figure 1.1 an illustration is provided of the growth and comparative resilience of the IT software industry (i.e. the reaction of the FTSE100 in 2008 shows the impact of the world financial crisis) (Marketline, 2012, pp 7-10).



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*	2015*	2016*
Revenue (USD)/Bn	190	204	218	234	254	269	257	275	293	309	328	349	371	397
FTSE100 (Annual High)	4492	4826	5647	6271	6754	6534	5445	6021	6105	5997	6838			

Figure 1.1: Global Software Revenue Compared to FTSE 100 Share Index (Marketline, 2012)

1.2.2. Proprietary Software (PS)

When considering OSS, PS must also be emphasised. PS is defined as, “software that is available only in its binary form (i.e., not in a form that can be easily modified), that generally requires the payment of license fees by enterprises/users, and that legally restricts user rights and vendor liabilities” (Macredie and Mijinyawa, 2011, p238). The PS philosophy originated from the traditional intellectual property legal frameworks and IT Software Industry means of production (WIPO, 2013, Marketline, 2012). PS products are the commercial off the shelf (CoTS) packages that many individuals use in their working lives. Some applications and systems software with which the reader may be familiar include; a web browser such as MS Internet Explorer, an office automation suite such as Microsoft Office, an email server such as Microsoft Exchange or a database system such as Oracle or IBM DB/2 (Sen, 2007, p234). A more comprehensive description of PS CoTS packages in common use in organisations, along with some OSS alternatives, is detailed in Appendix A:NAPCS Software Industry Classification. As previously discussed, the source code of these PS products is often regarded by the copyright owners as a ‘trade secret’ (Campbell-Kelly, 2008, p22) . In contrast, OSS has been defined as, "a transparent process of collaborative [software] development and the Intellectual Property (IP) regime that underpins it" (Cornford et al., 2010, p811). In the next sub-section, a description of the IP issue is provided.

1.2.3. Intellectual Property (IP)

A large proportion of the US and European economies are devoted to the production and distribution of IP intensive industries (WIPO, 2013, EPO, 2013, USPTO, 2012). According to the World Intellectual Property Organisation (WIPO)[1], IP is described as, "creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce. IP is protected in law by; for example, patents, copyright and trademarks, which enable people to earn recognition or financial benefit from what they invent or create" (WIPO, 2013). Furthermore, copyright is an automatic protection (i.e. without the need for registration) which provide certain rights, "[specifically] economic rights allow the rights owner to derive financial reward from the use of his [or her] works by others; and moral rights or the rights to claim authorship of a work, and the right to oppose changes to the work that could harm the creator's reputation" (ibid).

Copyright laws state that the author or rights owner has the right to authorise or prevent certain acts in relation to a work (e.g. reproduction) (ibid). According to the United States Patent and Trademark Office (USPTO) the intellectual property rights (IPR) intensive industries contributed USD5.1Trillion to the 2010 gross domestic product (GDP) in the United States (USPTO, 2012). Similarly, according to the European Patent Office (EPO) the IPR intensive industries contributed EUR4.7Trillion to GDP in Europe, of which, copyright intensive industries accounted for EUR500Billion per year (averaged over 2008 to 2012). Having considered the economic scale of the IPR intensive industries the next section will discuss efforts which have emerged to make such industries more accessible and open.

[1] WIPO is a self-funded United Nations organisation of 186 member states which was formed in 1967.

1.2.4. Open Innovation

According to IS research the emergence of OSS is part of a wider, "democratisation of innovation" which is largely driven by the internet and has become known as, "open innovation" (Cheliotis, 2009, p229). Open innovation is described as, "the process whereby innovations of any kind are shared and jointly developed by more than one person", of which Wikipedia, Flickr, YouTube and OSS are considered exemplar (ibid). Furthermore, it has been argued that it is the communities which develop and support such innovations which differentiate these networks from other internet resources and the 'collective intelligence' and 'network effects' which emerge; also known as 'Web 2.0' (Anfinnsen et al., 2010). The Creative Commons (CC) licensing model is a legal framework which provides a menu of licenses which can govern the precise terms of use, in an open innovation form, which are summarised in the table below.

Table 1.1: Creative Commons Licensing Typology (Cheliotis, 2009)

Name	**Description**
By attribution (BY)	Requires that users of the work give attribution to the author.
Share-alike (BY-SA)	Requires that derivatives be licensed under the same license.
No derivatives (BY-ND)	Forbids the creation of derivatives.
Non-commercial (BY-NC)	Same as BY, but permitting only non-commercial use.
Non-commercial (BY-NC-SA)	Same as BY-SA, but permitting only non-commercial use.
Non-commercial (BY-NC-ND)	Same as BY-ND, but permitting only non-commercial use.

In Table 1.1, the "share-alike" (BY-SA) version, requires that derivatives should also be licensed as open (also known as "copy-left"), which is regarded by some legal research as a form of "institutional jujitsu", (i.e.) using copyright-based laws to "prevent certain kinds of defection from peer production processes [e.g. OSS]" (Benkler, 2002, p446). These CC-type licenses are considered to have provided an intellectual property framework that challenge traditional means of production. Research has described this as peer-production, "a model of social production, emerging alongside [firstly] contract- and market-based, [and secondly] managerial-firm based and state-based production", Benkler and Nissenbaum (2006); cited in (Morgan et al., 2012, p569). Such "Commons-based Peer

Production" methods are placed firmly outside these traditional systems as "an emerging third model of production" (Benkler, 2002, p375). Beyond such production processes, IS research has argued that communities of user/contributors are utilising the internet to effectively, "bypass traditional marketing and distribution channels" (Cheliotis, 2009, p229).

1.2.5. Organisations Representing OSS and PS

Having considered the definitions of OSS and PS it is important to consider some of the organisations which represent them in order to contrast their legal frameworks, ideology and philosophy.

IS research has described free software as that which adheres to the definitions of the Free Software Foundation (FSF) (Lundell et al., 2010a, p520). The FSF was formed in 1985, which predates the Open Source Institute (OSI) by over a decade, and defined free software licenses as providing four key freedoms as summarised in the table below (ibid).

Table 1.2: FSF Copyright License "Freedoms" (Lundell et al., 2010a)

Copyright License Freedoms	**Description**
(1) Use and purpose	The freedom to run the program, for any purpose.
(2) Study, change and access	The freedom to study how the program works, and change it so it does your computing as you wish. Access to the source code is a precondition for this.
(3) Re-distribution and community	The freedom to redistribute copies so you can help your neighbour.
(4) Distribution of modifications and access.	The freedom to distribute copies of your modified versions to others. By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

As previously discussed, by the mid-1980s, most software was distributed in a binary software format which made it unintelligible to those who might wish to study, change or re-distribute in the manner described by the FSF and in the above table. In addition, The FSF have also declared such proprietary practices as morally questionable (FSF, 2014). In contrast, In 1998 the Open Source Initiative (OSI) first made use of the phrase, "Open Source", to explain, "…in a business-friendly way, the technical and economic benefits of sharing, rather than restricting, the availability of computer source code" (OSI, 2014).

IS research has defined software as open source if, "it is released under a license approved by the OSI" (Stewart et al., 2006, p127). After forming in 1998, the OSI published the open source definition (OSD) licenses. It has defined such licenses as providing ten key attributes as detailed in the table below.

Table 1.3: OSI Ten Key License Attributes (OSI, 2014)

Copyright License Attributes	**Description**
(1) Free Redistribution.	The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.
(2) Source Code.	The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a pre-processor or translator are not allowed.
(3) Derived Works.	The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.
(4) Integrity of The Author's Source Code.	The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.
(5) No Discrimination Against Persons or Groups.	The license must not discriminate against any person or group of persons.
(6) No Discrimination Against Fields of Endeavour.	The license must not restrict anyone from making use of the program in a specific field of endeavour. For example, it may not restrict the program from being used in a business, or from being used for genetic research
(7) Distribution of License.	The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.
(8) License Must Not Be Specific to a Product.	The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.
(9) License Must Not Restrict Other Software.	The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.
(10) License Must Be Technology-Neutral.	No provision of the license may be predicated on any individual technology or style of interface".

Therefore, a major difference between OSS and FSF licenses is that the FSF raises objections to software ownership on ethical grounds, and has declared PS as "the enemy" (FSF, 2014). On the other hand, the OSI is more flexible toward the business community, many of whom are IPR owners themselves, and have sought to somewhat de-emphasise "ideological and moral" questions raised by the FSF (Gwebu and Wang, 2011, p221). Having considered some of the key organisations behind the FOSS (Free/Open Source Software) movement, by way of contrast, it is important to consider organisations in the traditional IT software industry.

The Business Software Alliance (BSA) was formed in 1988 and has defined its mission as, "to promote a long-term legislative and legal environment in which the industry can prosper and to provide a unified voice for its members around the world. BSA's [programmes] foster innovation, growth, and a competitive marketplace for commercial software and related technologies. BSA members are optimistic about the future of the industry, but believe that the future does not simply unfold. And, [the BSA believe] that it is critical for companies to work together to address the key issues that affect innovation" (BSA, 2014).

The BSA members include The Microsoft Corporation (founded in 1975) and The Oracle Corporation (founded in 1977) whose products are represented in; all of the Systems Software category and half of the Applications Software category. See Appendix A:NAPCS Software Industry Classification. Furthermore, these two corporations combined global revenues alone total USD115Bn (USD78Bn Microsoft and USD37Bn in 2013). By comparison, the global software industry itself amounts to USD328Bn in the same year, also described earlier.

1.3. Motivation of this research, Aim and Objectives

The above discussions have highlighted differences between the communities represented by the FSF, OSI and BSA. IS research has argued that the FOSS communities have developed a 'cost-reducing 'alternative to PS, which has successfully attracted a great deal of attention from a wide variety of academic, professional and political stakeholders toward the "OSS movement" (Gallego et al., 2008, p2200). However, IS research has also claimed that despite this interest actual organisational usage remains comparatively low and 'underutilisation persists' (Gwebu and Wang, 2011).

IS research has shown that global OSS related revenues are expected to be in the region of USD8.1Bn in 2013 and grow at an annual rate 22.4% (Gwebu and Wang, 2011). However, this must be considered in the context of the previously discussed USD328Bn global software industry in the same period (Marketline, 2012, p10). In other words, OSS revenues were forecast to be less than 3% of global software industry annual revenue for the same period. Despite this small financial contribution, IS research has claimed that there is a real possibility that OSS will break the dominance of traditional PS (Nagy et al., 2010, p148).

Using this issue as a motivation for this research study, this research will raise the question of why, despite significant drivers, OSS organisational adoption rates continue to remain comparatively low, from the perspective of the managers involved in an organisational context. The question is further motivated by this doctoral candidate's 23 years' sales experience in the IT industry in which anecdotal evidence obtained from customer managers have consistently reported high cost-sensitivity with a major emphasis on return on investment.

1.3.1. Aims of This Research

Therefore, the aim of this research is to identify and establish the extent to which organisational adoption and usage of OSS can be shown to be a function of the driving and inhibiting salient beliefs of the managers involved for a specific sample.

1.3.2. Objectives of this Research

To effectively address the aim of this research study the following objectives have been established.

- To complete a comprehensive literature review in the area of organisational adoption and usage in IS research in general, and OSS research in particular, with the aim of a producing a cogent conceptual model.
- To develop a research methodology optimised for organisational OSS research, based on the findings of the literature review and most appropriate for the data collected.

- To obtain findings using an appropriately selected sample population such that data analysis can occur.
- To identify and evaluate the most appropriate analytical processes which will assist to establish the salient driving and inhibiting factors.
- To evaluate the findings in terms of the contribution made to academia and practice.
- To provide suggestions in the form of future directions that will be obtained from the limitations encountered by this research.
- To provide the implications of this research to industry, academia and policymakers.
- To provide conclusions drawn from the research study findings and analysis.
- To reflect upon the pursued research study approaches and lessons drawn.

1.4. Research Approach

To complete this research study, an appropriate research approach is required. IS research has shown that most OSS studies are silent with respect of the adoption, use and drivers of OSS. For this reason, this research aims to bridge the existing research gap by drawing on predominantly positivist research traditions that are based on common 'commitments' which include: (a) the correspondence theory of truth (i.e. the researcher's ability to match theory with hypothesis); (b) neutral observable language (i.e. the researcher's ability to make value free judgements); and (c) the practical utility of theory development (i.e. utilitarian approach to knowledge creation) (Johnson and Duberley, 2000, p37, Table 2.1: "Three Positivist Approaches Compared").

The positivist research philosophy is used in the majority of IS adoption research (Jeyaraj et al., 2006, Williams et al., 2009) in general, and OSS research in particular (Bueno and Gallego, 2010, Gallego et al., 2008, Gwebu and Wang, 2011). Therefore, this research has also drawn on these types of approaches.

To obtain the respondents, a self-selection sampling approach similar to other studies in IS adoption research was used (Alshare et al., 2009, Hilton et al., 2006). This resulted in a small sample population of 32 for the pilot phase and 45 for the main study.

A survey instrument developed in this research was designed to collect respondents' beliefs in terms of (a) a Likert-type scale indicating strength and direction of perception (i.e. driver or inhibitor for OSS adoption) and (b) open ended questions designed to collect additional qualitative data (i.e. in relation to OSS adoption) as in other IS research (Jinwei et al., 2006) . Furthermore, as with previous IS research in the adoption and usage field, the instrument also included questions regarding organisational profile (Barbosa and Musetti, 2010, Ngai et al., 2008) and individual profile (Zhou et al., 2011, Karahanna et al., 1999). The instrument was then uploaded onto the Bristol On-line Survey (BOS) a web-based system designed for researchers who wish to collect data from respondents via the internet. It has an easy to use interface, can store large quantities of data which can then be exported, via comma separated values (or CSV) format, for analysis into well-known statistical packages (such as SPSS or Excel). The BOS system was used for the pre-test, pilot and main study.

For the data collection a mixed or multi-methods approach was pursued. This resulted in a non-parametric statistical analysis of the quantitative and qualitative data (i.e. Chi-square/Fisher Exact Test) with a primarily pragmatist world view (see Section: Critical Realism-Pragmatism).

1.5. Research Scope

Given the theoretical, empirical, methodological and analytical gaps identified in the existing research, this study will establish the statistically significant relationships between the self-reported; individual profiles, organisational profiles, salient beliefs (driving and inhibiting factors) and the various organisational OSS adoption behaviour for a specific self-selected sample, as described in Figure 1.2: Research Scope. Although this research will provide recommendations for practical implementations of the results, any testing of this artefact is beyond the scope of this research.

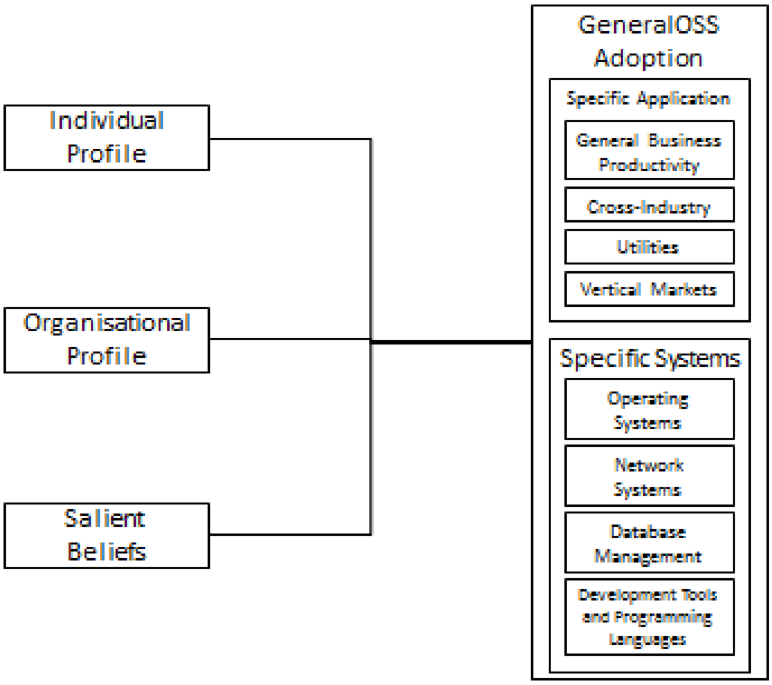


Figure 1.2: Research Scope

1.6. Contributions of this Research

The programme this student has enrolled in is a professional doctorate, leading to the Doctor of Business Administration (DBA) degree. Therefore a contribution to industry as well as academia was required and is described as follows.

1.6.1. Contribution to Academia

In academic terms, this research aims to modestly advance the conceptual models and theoretical constructs that are traditionally used to address adoption/usage of technology/innovation in general, and OSS in particular. From the comprehensive literature review (discussed in Chapter 2) there is a paucity of empirical IS research in OSS adoption in organisations. Of the existing research it can be argued that many of these theories perhaps do not lend themselves to the complexities of the organisational context.

Specifically, utilising The Theory of Planned Behaviour (TPB) (Ajzen, 1991) allows for factors that are crucial to organisational scenarios, such as Perceived Behavioural Control (PBC) and self-efficacy (SE), to be taken into consideration. Furthermore, this research aims to modestly advance theory by incorporating theoretical constructs from organisational diagnostics (i.e. force field analysis - FFA) and IS research (i.e. IT governance - ITG). In terms of research methodology, this research has also taken a unique mixed-method approach in which positivist, quantitative empirical methods, have been complemented by more interpretive and qualitative perspectives and subsequently combined to produce further findings. It is reasonable to expect that these theories and methodologies, which are optimised for the organisational context, will provide researchers with the opportunity to explore this problem space more effectively.

1.6.2. Contribution to Industry

From an industry perspective, and drawing on design science principles, this research aims to devise a methodology and artefact which can be easily reproduced in industry (i.e. the survey instrument and graphical reporting) to enable managers to pragmatically and heuristically develop intervention programmes to aid the adoption of OSS. The approach of utilising FFA in change management and organisational diagnostics is well known, in terms of augmenting drivers and suppressing inhibitors to effect change (Cronshaw and McCulloch, 2008), but has not been used in an adoption and usage context. See Appendix E: FFA and TPB Proposed Process. Hence, it is reasonable to expect that such an artefact will provide a valuable tool to managers who wish to adopt (or not adopt) OSS in line with corporate strategy.

1.6.3. Contribution to Policymakers

From a government perspective, the question of when to deploy OSS presents some unique challenges. One government website likened UK government current policy towards OSS as based on a philosophy, originally attributed to JP Rangaswami, as; "For common problems use [OSS], for rare problems use [PS] and for unique problems build [i.e. develop your own solution]" (GDS, 2012).

However, having established the common problems for which OSS is to be targeted this raises an important question: how to reliably establish factors which drive or inhibit adoption of OSS for a given sample population, so as to ensure successful deployment and how best to intervene? As a professional doctorate, this practical level question is the area where this research has been designed to address.

Having provided a discussion of the contributions of this research, the next section proffers a dissertation overview for the reader.

1.7. Dissertation Outline

To familiarise readers with this dissertation, an overview of the various chapters included in this dissertation is provided in Table 1.4.

Table 1.4: Dissertation Outline

Chapter	Description
Introduction	This chapter provides an orientation of the major topics in the OSS field. Furthermore, an overview of the research problems, questions, aims, objectives, scope, which encapsulate this study; and the research methodologies which were found to be most appropriate for this research.
Literature Review	This chapter explores the adoption and usage of innovations in organisations in the IS field. This review will also investigate the OSS research area in the context of the research question and reported comparatively low organisational OSS adoption. Gaps in the extant research will be considered in order to develop a conceptual framework with which to address the research aims of empirically identifying the drivers and inhibitors of organisational adoption and usage of OSS within a self-selected sample.
Research Methodology	This chapter will justify the research philosophy appropriate to this study. The data collection strategy will be described, the challenges experienced, and the statistical analyses deployed to resolve them. This chapter will also describe the survey instrument designed for this study and the extent to which this research can claim multi-methods research (i.e. qualitative and quantitative methods) which it will be shown has augmented the research findings.
Pre-test and Pilot Analysis: Findings and Discussion	This chapter will describe the initial development of the survey instrument which incorporated Likert-type scales, open-ended questions, proposed literature-based factors (i.e. the self-reported driving and inhibiting forces) and the initial performance of the conceptual framework. Having made some suitable changes the pilot, this study was able to demonstrate the research methods capabilities in establishing the sample's salient driving and inhibiting factors with respect to OSS adoption or non-adoption.
Main Study: Analysis and Findings	This chapter will describe the analysis and findings achieved from the main study. It will show the extent to which OSS organisational adoption and usage can be shown to be a function of the salient beliefs of the managers involved, in the context of the predominant IS/OSS research-based theories, and the conceptual model devised for this study.
Evaluation and Discussion	This chapter will evaluate the research findings against certain relevant criteria published in the existing IS research which is of particular relevance to mixed-methods studies. The research findings will then be discussed in the context of the existing IS/OSS research.
Reflections and Reflexivity	This chapter will provide a more in-depth look at some of the underlying principles which were important to the theoretical and methodological decisions. Similarly, this chapter will expand on the personal, professional and academic experiences of the researcher which will further inform the reader as to the research lens which has been used. In addition, questions will be raised as to the philosophical, ideological, epistemological and ontological decisions which were made and the extent to which these provide alternative analysis and findings. This chapter will show that there are a wide range of reflexive possibilities within IS research in particular (Weber, 2003) and management research in general (Johnson & Duberly, 2000)
Summary and Conclusion	The final chapter will include a summary of the study's findings as to the extent to which the organisational adoption and usage of OSS can be shown to be a function of the salient beliefs of the manager's involved. The chapter will conclude with an assessment of the academic and commercial contribution of this research, its limitations and possible future research directions.

1.8. Summary

This chapter has provided an overview of this study and highlighted the practical importance of the research. In the next chapter an investigation of the theoretical approaches which have been successfully used in other adoption and usage research leads this study to identify potential shortcomings in the existing research in order to justify a proposed conceptual framework that may best address the research question pertaining to the lack of OSS adoption.

Chapter 2: Literature Review

2.1. Introduction

IS research has argued that, as a relatively new discipline, it is important to set guidelines for a quality literature review in the IS field, and stated, "An effective review creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed" (Webster, 2002, pxiii). This chapter will describe a literature-grounded approach to conduct a thorough analysis of the existing research considered most relevant to the research question.

The same research suggests that, in order to review and develop theory, leading IS journals should be explored, as well as research from contributing fields; for example organisational theory, and elsewhere (ibid). With this in mind, other IS research has defined certain IS research journals as "high-impact" or "elite publishing" (Lyytinen et al., 2007, p318, Table 1). Additionally more recent IS research, specifically in the field of adoption and usage, has proposed a set of dimensions with which to review existing literature in order to identify specific areas where IS research is currently lacking activity (Williams et al., 2009, p2). The same research has argued that in order to, "encourage debate about critical issues in the field," and, "assist in the identification of alternative theoretical and methodological perspectives," it is necessary to systematically profile, "a set of existing publications in terms of author, institution, country, publication year, research paradigm, nature of primary data, research methods, theories and theoretical constructs, and the technology examined" (ibid). Therefore, this research will utilise this approach in order to demonstrate a focused and rigorous review of the existing relevant literature.

2.2. Categorisation of OSS Research Contributions

IS research has criticised studies that are over reliant on a narrow set of leading 'top' publications (Webster, 2002, xvi). The same research has argued that although these publications are a good place to start, "…because IS is an interdisciplinary field straddling other disciplines, you must look not only within the IS discipline when reviewing and developing theory but also outside the field" (ibid). Therefore, this research has devised a literature-based categorisation system with which to consider the existing leading IS research and beyond. For a more detailed description of this approach see Appendix D: Method of Categorising Tiers of Research Articles Adopted in Literature Review

2.2.1. OSS Research from 'High Impact' or 'Elite' IS Publishing

This section has used prior IS research categorisations of 'high-impact' or 'elite' IS journals described as those which, "focus solely on IS-related topics, and are located highly in published rankings[2]", specifically; (1) Management Information Systems Quarterly (MISQ), (2) Information Systems Research (ISR), (3) Journal of Management Information Systems (JMIS), (4) Journal of the Association of Information Systems (JAIS) and (5) European Journal of Information Systems (EJIS) (Lyytinen et al., 2007, p318). For the purposes of this research these publications will be considered as High Impact IS research and, in the case of OSS research, these journals have produced 55 articles between 2000 and 2013. For an analysis of the volume of high impact IS publishing which was considered most relevant to this research question see Appendix 0.

2.2.2. OSS Research from ''Mid Impact' IS Publishing

Furthermore IS research, specifically in the field of adoption and usage field, has identified, "…19 journals viewed as being important to IS/IT researchers", considered, "appropriate outlets for IS research" (Williams et al., 2009, p3). This happens to include the five 'high impact' journals that were discussed in the preceding section (Lyytinen et al., 2007, p318). These are listed as: Information & Management, Communications of the Association of Computer Machinery (ACM), Journal of Computer Information Systems, International Journal of Information Management, Journal of Information Technology, Industrial Management & Data Systems, Decision Support Systems, Journal

[2] http://www.isworld.org/csaunders/rankings.htm

of Strategic Information Systems, Journal of Organizational Computing and Electronic Commerce, Information Society, Information Systems Journal, Information Systems Management, Database for Advances in Information Systems and Journal of Global Information Management (Williams et al., 2009, p4, Table 2). This research will refer to these 14 publications as Mid Impact which, in the case of OSS research, published 88 articles on the topic of OSS between 1999 and 2014. For an analysis of the volume of mid impact IS publishing which was considered most relevant to this research question see Appendix 0.

2.2.3. Peer-reviewed OSS Research from Outside Recognised IS Publishing

Finally, as previously discussed, to 'review and develop theory' it is necessary to survey other contributing fields from 'outside' the IS discipline (Webster, 2002). Therefore, this research has made use of the Boolean search operator feature in the Web of Science scholarly database (i.e. the "NOT" feature) to survey all peer-reviewed journals (other than those previously defined as High Impact and Mid Impact) using the same conceptual terms as search criteria and discussed in the next section. In the case of OSS research this method identified 1,185 journals (which were categorised as Third Tier) from which 3,940 articles were published between 1999 and 2014. For an analysis of the volume of third tier publishing which was considered most relevant to this research question see Appendix 0.

The three categories described above are illustrated in the figure below in terms of the volume of articles and number of journals related to OSS research between 1999 and 2014.

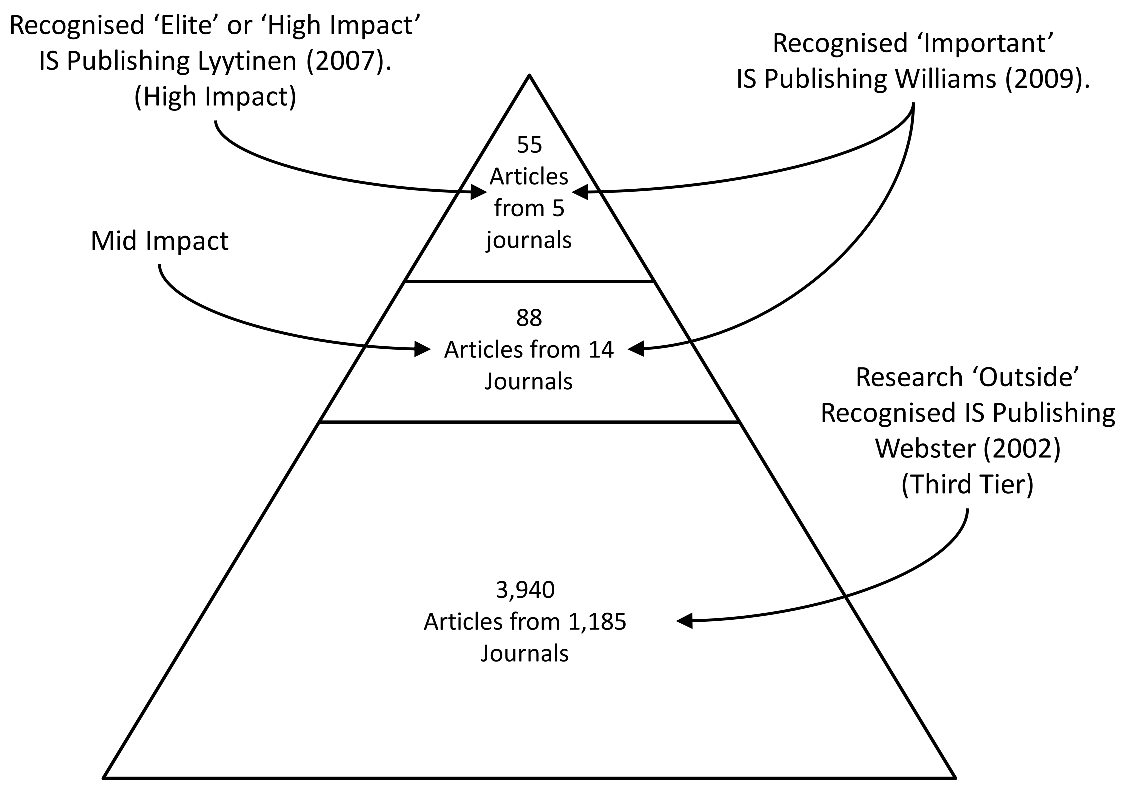


Figure 2.1: Peer Reviewed OSS Research Published Between 1999 and 2014, Sourced from Web of Science. Categorisation Derived from (Lyytinen et al., 2007, Webster, 2002, Williams et al., 2009)

IS research has criticised author-centric literature reviews as producing little more than a summary of relevant articles, and also argued (with this author's emphasis) that, "A complete review covers relevant literature on the *topic* and is not confined to one research methodology, one set of journals, or one geographic region" (Webster, 2002, xv). In addition, the same research argues that a concept-centric approach more readily identifies gaps in the extant research and allows previous work to be synthesised and highlight contributions to practice (ibid). For this reason, this research has utilised a set of concepts specifically selected to assist in addressing the research question, i.e. the extent to which organisational OSS adoption can be shown to be a function of the salient beliefs of the managers involved. These theoretical and conceptual areas are discussed in the next section.

2.3. Theoretical and Conceptual Areas

IS research has differentiated between process and variance theories, and stated that, "Variance theories incorporate independent variables that cause variation in dependent variables. In contrast, process theories use events and states to help explain dynamic phenomena" (Webster, 2002, xix). The same research cites scholars from the organisational studies field who claim that many of the best theories are regarded as 'hybrid theories' (DiMaggio, 1995, cited in Webster, 2002, xix). See Figure 2.2: Variance Versus Process Theory, in this case, using strategic change as an example. Therefore, in line with the aims and objectives of this research, this study has sought to appropriately combine and integrate process and variance theoretical approaches identified in this literature review. Additionally, the remainder of this chapter will also explore conceptual areas considered important to this research area.

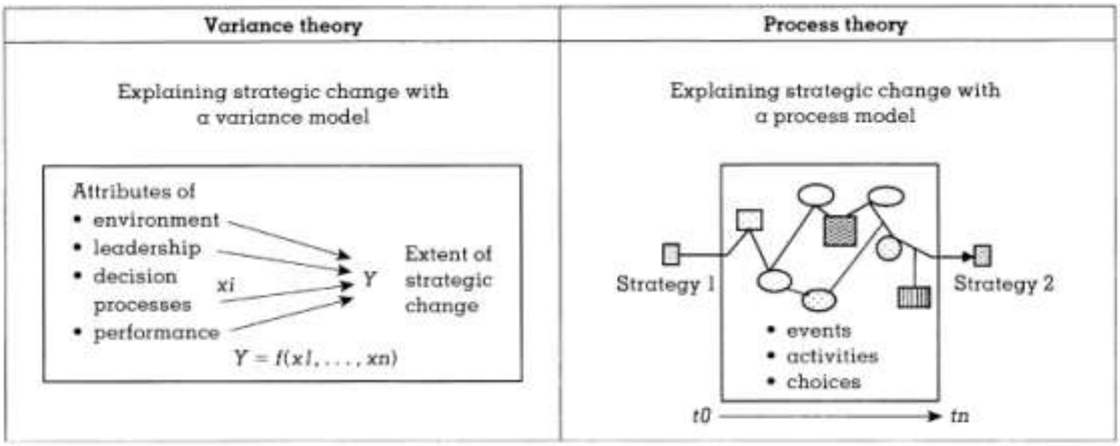


Figure 2.2: Variance Versus Process Theory (Langley, 1999, p693)

2.3.1. Theoretical Typology

2.3.1.1. Variance Theory

IS research has argued that the dominant paradigm incorporated in the field of adoption and usage can be described as, "the more individuals and organizations possess of the right independent variables, the more the IT innovation will be adopted", or put another way, the more of the 'Right Stuff' the more adoption of the innovation in question (Fichman, 2004, cited in Jeyaraj et al., 2006, p2). Therefore, this research will seek to establish a suitable variance theory with which to understand the driving and inhibiting factors in relation to OSS adoption.

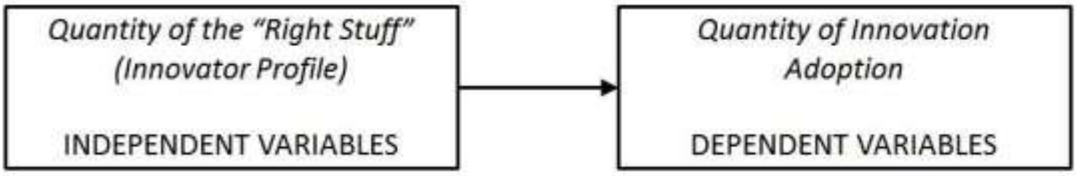


Figure 2.3: Dominant Paradigm in IS Research on Adoption and Usage (Jeyaraj et al., 2006, p2)

2.3.1.2. Process Theory

As previously discussed, "In contrast, [to variance theories] process theories use events and states to help explain dynamic phenomena" (Webster, 2002, xix) and are described, among other ways, in terms of stages (Langley, 1999). Therefore, this research has sought to establish appropriate process theories which will; (a) be most likely to enable managers to intervene in an operational setting and (b) address some of the complexities of organisational adoption and usage (e.g. the stage-based nature of organisational adoption of innovation and IT governance) (Benbasat and Barki, 2007, Xue et al., 2008).

2.3.1.3. Hybrid Theory

As previously discussed, IS research has claimed that the best theories are those that have combined 'variance' and 'process' theories to create a 'hybrid theory' which maximises the strengths of both (DiMaggio (1995), cited in (Webster, 2002)). So far as this research is concerned, it is intended that such a composite theory could, in the first step, enable managers to empirically identify driving and inhibiting factors within their organisations, and in the second, devise qualitative intervention strategies in a manner with which they are most likely to be familiar (e.g. Force Field Analysis).

Having considered the typology of potential theories applicable to this research the next section will seek to synthesise the existing research in a more 'concept-centric' structure as previously discussed (Webster, 2002, xvi).

2.3.2. Adoption, Usage, Diffusion and Acceptance as Conceptual Terms

The terms 'Adoption', 'Usage', 'Diffusion' and 'Acceptance' are commonly used in the IS research field (Jeyaraj et al., 2006). These terms have been described by IS research as follows. Firstly, adoption has been defined as, "Whether a person or an organisation is an adopter or a non-adopter of an innovation. This is usually measured as a binary variable based on self-assessment" (Jeyaraj et al., 2006, p5, Table 4). Secondly, usage has been differentiated from adoption as post-adoption 'subsequent continued use' (Karahanna et al., 1999, p184). Thirdly, diffusion has been defined as, "The extent to which a person or an organization exploits an innovation. This is usually measured as a percentage of available features used, possible sites adopted, or possible applications" (Jeyaraj et al., 2006, p5, Table 4). Fourthly, when considering adoption, acceptance is another term which has emerged. Acceptance is specifically associated with end-user acceptance, which previous IS research has argued is important, especially in organisational settings, as logically end-users must accept innovation before organisations can claim that a deployment has been successful (Gwebu and Wang, 2011, p221). These four conceptual terms were all considered particularly relevant to organisational adoption of OSS and key to establishing the associated driving and inhibiting factors. Therefore, this research will refer to these conceptual terms collectively as AUDA and use these concepts as keywords and context for this research.

2.3.3. Organisation, Enterprise and Firm as Conceptual Terms

IS research has criticised previous adoption and usage research for utilising both individual and organisational adoption theories irrespective of what was actually being studied. Specifically, "Researchers cite and adopt constructs from both domains regardless of whether they are studying individual or organisational adoption" (Jeyaraj et al., 2006, p4). Since the primary aim of this research is to investigate organisational (as opposed to individual) adoption and usage, the key word 'organisation' (or 'organization') was therefore considered important as a conceptual term in surveying the literature.

An 'organisation' has been generally described as, "...systems of coordinated and controlled activities that arise when work is embedded in complex networks of technical relations and boundary-spanning exchanges" (Meyer and Rowan, 1977). Furthermore, in terms of the drivers experienced by such organisational 'systems',

> *…organizations are driven to incorporate the practices and procedures defined by prevailing rationalized concepts of organizational work and institutionalized in society. Organizations that do so increase their legitimacy and their survival prospects, independent of the immediate efficacy of the acquired practices and procedures (Meyer and Rowan, 1977, p340).*

So far as this research is concerned, this raises the question of which factors are perceived to drive (or inhibit) these organisations, specifically in terms of organisational OSS adoption behaviour, and having identified them how best to implement management interventions in an operational setting.

Furthermore, IS research has argued that 'organisational knowledge' can be described as, "The capability [that the] members of an organization have developed to draw distinctions in the process of carrying out their work, in particular, concrete contexts, by enacting sets of generalizations whose application depends on historically evolved collective understanding" (Tsoukas, 2005, cited in von Krogh, 2009, p121). It is these 'collective understandings' as drivers or inhibitors, or more accurately the most significant of those in terms of the organisational adoption of OSS, which is the primary concern of this research.

Additionally, 'enterprise' was considered an important alternative conceptual term for 'organisation'. 'Enterprise' is defined by, "…any entity engaged in an economic activity, irrespective of its legal form" (European-Commission, 2011). The European Commission defines an organisation with less than 250 employees, and less than (or equal to) Euro50m annual turnover as a Small and Medium-sized Enterprise (SME) and that which has more than 250 employees and Euro50m as a large organisation (ibid). This raises the question of whether an organisation's size, and other other organisational factors, are important in terms of organisational OSS adoption (Mosoval et al., 2006, Macredie and Mijinyawa, 2011).

The term 'firm' was also considered a synonym of 'organisation' for the purposes of this research. That is a 'firm', it has been argued, can be described as an organisation which emerges as, "…a cluster of resources and agents which interact through managerial command systems rather than markets" (Benkler, 2002, p372). The same research argued that transaction and organisations costs were of strategic importance in determining the use of markets-based or firm-based systems. At an operational level, the question of the specific factors which drive manager's perceptions, and therefore influence the associated 'command systems' and whether to adopt OSS, was considered a key concern of this research.

This research will refer to these conceptual terms of Organisation/Organization, Enterprise and Firm collectively as OEF and use these concepts as keywords and context for this literature review.

2.3.4. Open Source Software (OSS) as a Conceptual Term

The innovation which is the primary subject of this research is OSS. In recent years IS research has argued that there is a paucity of OSS research in the field of adoption and usage. For example, it was identified that only 88 out of 1,355 scholarly articles (i.e. 7%) were published in connection with OSS diffusion. From those 88, only 44 (i.e. 4%) of the scholarly articles related to OSS adoption (Aksulu and Wade, 2010, p583, Table 1). The same research claimed that organisational adoption was a particular area in need of research, specifically, "[Beyond] a few niche areas, such as web server or other, behind-the-scenes infrastructure software" (Aksulu and Wade, 2010, p598). Therefore, as previously described, this research has defined and investigated 'application' and 'system classifications' of OSS adoption (USCB, 2003), as well as generic OSS adoption in the sample population. In terms of this literature review and consistent with the aims and objectives previously established for this research, "Open Source Software" is used as a conceptual term for surveying the literature between 1999 and 2014.

2.3.5. Top Adoption and Usage Theories and OSS

IS research has established that the five most commonly used theoretical constructs in adoption and usage studies are as follows. Between 1985 and 2007, there were 345 publications from 19 journals, described as 'important to IS researchers' (i.e. 'high impact' and 'mid-impact' IS research), in which;

> *[1] Technology Acceptance Model (TAM) has emerged as the most popular theory with 88 [i.e. 29%] studies employing the theory. This was followed by the [2] Diffusion of Innovations (DoI) theory that was used in 49 [i.e. 16.3%] publications. The third largest construct category was [3] the Theory of Planned Behaviour (TPB) that was utilised in 17 studies, followed by [4] the Theory of Reasoned Action (TRA) and [5] Self Efficacy (SE), each contributing eight studies" and a further 47 theories that were used to a lesser extent (i.e. 43.5%) (Williams et al., 2009, p7).*

For a summary of the less common theories see Appendix B:Lessor-used Theories used in IS Adoption and Usage . Therefore, as these theories account for the majority of the existing adoption and usage research (i.e. 56.5%), these theories were considered as appropriate candidates for this research. The table below illustrates the contribution by volume of publications of the aforementioned theories, compared with other forms of research, which will be discussed in the following section.

Research	Diffusion of Innovations (DoI)	Theory of Reasoned Action (TRA)	Theory of Planned Behaviour (TPB)	Technology Acceptance Model (TAM)	Self-efficacy (SE)
All research articles	2,732	799	3,020	2,108	25,008
IS Research articles	188	68	120	649	462
IS Research Contribution (%)	6.9	8.5	4.0	30.8	1.8

Table 2.1: Comparison of and the Volume of Contribution of IS Research by Theory (Web-of-Knowledge, 2014)

2.3.5.1. Diffusion of Innovations (DoI)

Diffusion of Innovations (DoI) has been used in research articles since the 1960's, on which topic 2,732 papers have been written, of which 188 have been published in IS research (Rogers, 2003, Web-of-Knowledge, 2014) . As such, it is the third most commonly used adoption and usage theory in IS research and makes use of a 'contagion' or 'viral' metaphor in the adoption of innovation (Lyytinen and Damsgaard, 2011).

DoI has been described as, "The process through which an innovation spreads over time through certain communication channels" (Bixler and Taylor, 2012, p234). Therefore, it can be regarded as the previously defined 'process theory' (Webster, 2002). DoI has been described as foundational to much adoption and usage research, and has described technology characteristics; such as, "relative advantage, compatibility, complexity, trial-ability, and observability", as key influencers in adoption decisions (Dedrick and West, 2003, p237). Additionally, DoI has been successfully combined with other theoretical constructs (i.e. TAM), to make the 'hybrid theories' referred to earlier (Webster, 2002), which has also proved successful in eliciting driving and inhibiting factors of certain innovations (Moore and Benbasat, 1991). Furthermore, such factors have been successfully combined and tested with TPB (Benbasat and Barki, 2007). Additionally, DoI has also been successfully combined with the Theory of Reasoned Action (TRA) (Karahanna et al., 1999). None of the aforementioned DoI-based research has explored OSS adoption and usage. Therefore, this research has sought to address this gap by establishing whether technology characteristics of DoI are associated with organisational OSS adoption behaviour.

2.3.5.2. Theory of Reasoned Action (TRA)

Originating in the psychology research field and originally published in the 1970s (Fishbein and Ajzen, 2010), TRA has contributed to 799 research articles, of which 68 were in the field of IS research (Web-of-Knowledge, 2014). As such, it is the fifth most commonly used adoption and usage theory in IS research. See above table. TRA requires that, "salient beliefs about one's attitude toward a particular behaviour [e.g. adoption of OSS] be elicited in order to be relevant to the specific behaviour being studied" (Benbasat and Barki, 2007, p212). Therefore, TRA can be considered one of the aforementioned 'variance theories' (Webster, 2002). The salient beliefs are described as attitude, subjective norm and intention (Fishbein and Ajzen, 2010). IS Research has defined; (a) 'attitude' as, "An individual's evaluative affect about performing the target behaviour", (b) 'subjective norm' as, "Perception that most people who are important think that the potential adopter should perform a behaviour", and (c) 'intention' as, "An individual's intention to perform a behaviour" (Jeyaraj et al., 2006, Independent Variables Appendix). However, other research has argued that TRA breaks down when target behaviour is dependent on third party's approval or actions (Sheppard et al., 1988) (i.e.) almost all organisational scenarios. Therefore, in order to address this gap, this research has considered other theoretical constructs which include TRA constructs, and provide for third party interactions and influencing factors which are relevant to an organisational setting.

2.3.5.3. Theory of Planned Behaviour (TPB)

Also originating in the psychology research field and first published in the 1980s (Ajzen and Madden, 1986), TPB has contributed to 3,020 research articles, of which only 120 were in the field of IS research (Web-of-Knowledge, 2014). As such, TPB is the fourth most commonly used adoption and usage theory in IS research. See table above. As an extension of TRA (Fishbein and Ajzen, 2010), TPB can also be considered a ‘variance theory’ (Webster, 2002), and includes the construct known as Perceived Behavioural Control (PBC) (Ajzen and Madden, 1986). IS research has defined PBC as, “The perceived ease or difficulty of performing a behaviour” (Jeyaraj et al., 2006, Independent Variables Appendix). Previous research, originally associated with TPB, has argued that PBC is a more significant to behaviour than any other factor studied via TRA (Ajzen and Madden, 1986). One of the criticisms of TPB is that the monolithic structures (i.e. attitude, subjective norm and perceived behavioural control) are not easily recognisable by those other than a small group of specialist researchers, and therefore TPB may be of limited value to operational managers (Taylor and Todd, 1995, p170). Therefore, in order to address this gap, this research has considered other theoretical constructs which are more easily operationalised and accessible to practitioners.

2.3.5.3.1. Decomposed Theory of Planned Behaviour (DTPB)

Originating in the IS research field and first published in the 1990s (Taylor and Todd, 1995), DTPB has contributed to 35 research articles, of which 13 were in the field of IS research (Web-of-Knowledge, 2014). As an extension of TPB (Ajzen and Madden, 1986), DTPB includes a more detailed and operationally usable consideration of the monolithic structures associated with TPB, in which, “…attitudinal, normative and control beliefs are decomposed into multi-dimensional belief constructs” (Taylor and Todd, 1995, p151). Reasons for adopting DTPB in IS research in general, and OSS research in particular, are described as;

> *[Firstly], the DTPB has three belief components (attitude, subjective norms, and perceived behavioural control), which are applicable to a wide variety of complex and subjective factors associated with ICT adoption ... and therefore relevant for exploring and developing valid explanations of diverse factors influencing the adoption of OSS. [Secondly], the belief components within the DTPB are decomposed into their belief structures, which provides greater scope for identifying complex factors than that offered by other theories and models*

such as the TRA and the traditional TPB, which have monolithic belief components" (Macredie and Mijinyawa, 2011, p239).

Therefore, given the aims and objectives of this study (i.e. to establish specific driving and inhibiting factors associated with OSS adoption as opposed to 'monolithic belief components') this research has also sought to establish the constituent parts of TPB (i.e. DTPB) associated with organisation OSS adoption.

2.3.5.4. Technology Acceptance Model (TAM)

Originating in the field of IS research and first published in the late 1980s (Davis, 1989), TAM has contributed to 2,108 research articles, of which 649 were in the field of IS research (Web-of-Knowledge, 2014). As such, TAM is the most commonly used adoption and usage theory in IS research. See table above. In particular, TAM has been used on a number of occasions in OSS adoption and usage research (Bueno and Gallego, 2010, Gallego et al., 2008, Gwebu and Wang, 2011). TAM has been considered by IS research (Benbasat and Barki, 2007) as a highly successful simplification of TRA. Therefore, TAM can also be considered a 'variance theory' (Webster, 2002).

IS research has defined TAM as a theoretical construct which, "specifies two beliefs, perceived usefulness (PU) and perceived ease of use (PEOU), as determinants of attitude towards usage intentions and IT usage" (Taylor and Todd, 1995, p147). The original TAM research defined PU as, "the degree to which a person believes that using a particular system would enhance his or her job performance", and PEOU as, "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p320). Therefore, for the purposes of this research, this study has sought to establish whether factors associated with PEoU and PU are significant in the context of organisational OSS adoption. A large number of derivatives of TAM have been developed which will be discussed in the next section.

2.3.5.4.1. Derivatives of Technology Acceptance Model (TAM++)

There have been a large number of enhancements to TAM, which have been referred to as the "TAM++", which have also been criticised for, "[adding] little knowledge to TAM" (Benbasat and Barki, 2007, p212). An example of a TAM enhancement includes TAM2 which provides additional factors such as, "social influence processes (voluntariness, subjective norm and image) and cognitive instrumental processes (job relevance, output quality and result demonstrability)", as antecedents to intention (Venkatesh and Davis, 2000p, 187). One synthesis of such research has produced a theory known as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). However, the growth of TAM-based research and its derivatives have been criticised;

> *And now, after years of investigation, social influences and facilitating conditions are being added to the two main constructs of TAM, i.e. PU and PEOU. Adding social influences and facilitating conditions to TAM results in a model that is not very different from the Theory of Planned Behaviour (TPB), since these two constructs overlap considerably with TPB's subjective norms and perceived behavioural control"* (Benbasat and Barki, 2007, p213).

Therefore, this research has sought to deploy TPB, rather than TAM, as a theoretical construct with which to investigate organisational OSS adoption. In so doing, as encouraged by Webster, this research has sought to avoid contributing further to this research base of which there is already considered to be a 'plethora' in IS research (Webster, 2002). .

2.3.5.5. Self-efficacy (SE)

Also originating in the field of psychology and first published in the 1970s (Bandura, 1977), SE has contributed to 25,008 research articles, of which 462 were in the field of IS research (Web-of-Knowledge, 2014). As such, SE is the second most commonly used adoption and usage theory in IS research. See table above. IS research has defined SE as,

…beliefs about one's ability to perform a particular behaviour. [SE] influences choices about which behaviours to undertake, the effort and persistence exerted in the face of obstacles to the performance of those behaviours, and thus, ultimately, the mastery of the behaviours" (Compeau and Higgins, 1995, p191)

Therefore, SE could also be considered a 'variance theory' (Webster, 2002). However, original TPB research has argued that aspects associated with SE are built into TPB by virtue of the PBC construct (Ajzen, 1991). Therefore, in order to avoid potential redundancy, this study has selected TPB as effectively including SE.

2.3.6. Other Theoretical Considerations

Appendix B:Lessor-used Theories used in IS Adoption and Usage illustrates the constructs less commonly used in IS research and has similarly categorised them as variance or process theories. TPB has already been established as the most appropriate variance theory for this research. See Section: Theory of Planned Behaviour (TPB)). The analysis therefore highlights potential process theories which could be best used to assist implementing the findings of this research by practitioners. However, the following theoretical constructs were considered to be the most appropriate for this research for the reasons described below.

2.3.6.1. Force Field Analysis

FFA is a well-known method of planning management intervention and a means of organisational diagnostics which is credited as being "fundamental" to the behavioural sciences discipline (Cronshaw and McCulloch, 2008). To a somewhat lessor extent IS research has identified FFA as a useful tool for creative problem-solving, and stated, "The technique can stimulate creative thinking in three ways: (1) defining direction (vision), (2) identifying strengths that can be maximized, and (3) identifying weaknesses that can be minimized" (Couger et al., 1993, p383). FFA has also been utilised in adoption and usage research in the field of production research, and stated more emphatically;

[FFA is a] 'time-honoured' qualitative analysis tool, included in many organisational behaviour and strategic management texts. Primarily utilised to inform the strategy when an organisation wishes to undertake change, it is used to identify and evaluate the forces at work where a force refers to any factor that has the potential to impact on an organisation, capable of changing its state (Wagner et al., 2011, p3074).

Therefore, in consideration of the aforementioned theoretical definitions, FFA was considered as a candidate 'process theory' for integration with a suitable 'variance theory' (i.e. TPB), to propose a combined 'hybrid theory' (Webster, 2002).

It has also been argued that traditionally FFA, "is not used to measure exact organisational outcomes but rather as a tool for group dialogue and the brainstorming of [management] interventions to enhance helpful forces and mitigate hindering ones" (Cronshaw and McCulloch, 2008, p99). Therefore, this research identified a relatively unique opportunity to carry out quantitative research (i.e. empirically establishing the driving and inhibiting factors of organisational OSS adoption for a given sample), compatible with the more qualitative implementation strategies described by FFA and above.

Hence, it was identified that there was potential to make a unique contribution to the field of IS research by using FFA to model the findings of this research. As discussed, this research has considered various other process theories, however, as the programme of study for this degree is a professional doctorate, FFA was chosen because it is widely researched and well-known to most operational managers (Couger et al., 1993, Cronshaw and McCulloch, 2008, Wagner et al., 2011). See Appendix E: FFA and TPB Proposed Process.

2.3.6.2. IT Governance

It has been argued that IS researchers should, "develop and test [ideally longitudinal] multi-stage models that focus on a broad and comprehensive range of behaviours as consequences instead of the single, narrowly conceptualized usage behaviour" (Benbasat and Barki, 2007, p213). Additionally, IS research in the field of IT Governance (ITG), has argued that compared to attributes-based models, "the stage-based approach views the investment decision as a complex, multistage process," which can be defined by,

> *In the initiation stage [1], organizations recognize, specify, and diagnose the stimuli that trigger an IT investment proposal. In the development stage [2], the proposal results from activities such as search, design, judgment, evaluation, analysis, and negotiation. In the management stage [3], the proposal is guided through the organisational hierarchy by a manager who champions the project. Finally, [4] appropriate organizational authorities approve the requested authorisation and funding after reviewing the proposal. (Xue et al., 2008, p68).*

Therefore, this research has sought to incorporate these stages, which were logically considered interim-stages of organisational OSS adoption, in order to differentiate interim driving and inhibiting factors and provide a more sophisticated conceptual model to aid analysis in an operational scenario.

2.4. Conceptual Analysis

As previously discussed, this research has established four sets of conceptual areas to assist targeting the most relevant research in line with the aims and objectives of this study (i.e. the extent to which organisational OSS adoption can be shown to be a function of the salient beliefs of the managers involved): (1) Adoption, Usage, Diffusion and Acceptance, (2) Organisation/organization, Enterprise and Firm, (3) Top Adoption and Usage Theories and (4) Open Source Software (OSS). The table below illustrates that the majority of research has been in areas other than the conceptual areas identified for this research (i.e. 77.2%). Furthermore, only a minority of research is shown in the organisation, enterprise or firm area (i.e. 16%), even less in the adoption, usage, diffusion or acceptance area (i.e. 10.3%) and a very small amount in the top adoption and usage theories area (i.e.

0.50%). Therefore, this table clearly illustrates a lack of research in the conceptual areas considered central to this research, which this study aims to modestly address.

Conceptual Area (Within OSS Research)	**Number of Articles**	**Percentage Contribution (%)**
Adoption , Usage, Diffusion and Acceptance	*420*	*10.3*
Organisation/Organization, Enterprise and Firm	*653*	*16.0*
Top Adoption and Usage Theories	*19*	*0.50*
Others	*3,153*	*77.2*
Total OSS Research	**4,083**	**100.0**

Table 2.2: Analysis of Conceptual Terms within OSS Research (Source: Web of Science March 2014)

This research has previously described a literature-based method of categorisation of research articles into 'Elite' or 'High Impact', 'Mid Impact' and Third Tier journals (Lyytinen et al., 2007, Williams et al., 2009, Webster, 2002). The table below illustrates that Third Tier journals are a significant source of research in the OSS conceptual area (i.e. 96.4% by volume), which as discussed, is consistent with IS research guidance concerning the importance of widening literature reviews beyond 'elite publishing' (Webster, 2002).

Tiered Journals (Within OSS Research)	**Number of Articles**	**Percentage Contribution (%)**
High Impact	*55*	*1.4%*
Mid Impact	*88*	*2.2%*
Third Tier	*3,940*	*96.4*
Total OSS Research	**4,083**	**100.0**

Table 2.3: Analysis of Journal Categorisation within OSS Research (Source: Web of Science 2014)

The conceptual areas previously defined for this research were not found to be mutually exclusive and therefore Venn diagramming, a well-known means of illustrating set relationships, was selected as a suitable method of analysing OSS research contributions from the various tiers and conceptual areas. The area where the conceptual terms intersect (i.e. OSS {TAUT^AUDA^OEF}) was therefore of particular relevance and considered central to this research. See shaded areas in Figure 2.4. A more detailed analysis can be found in Appendix F: Comparison of Key Conceptual Areas in OSS Research.

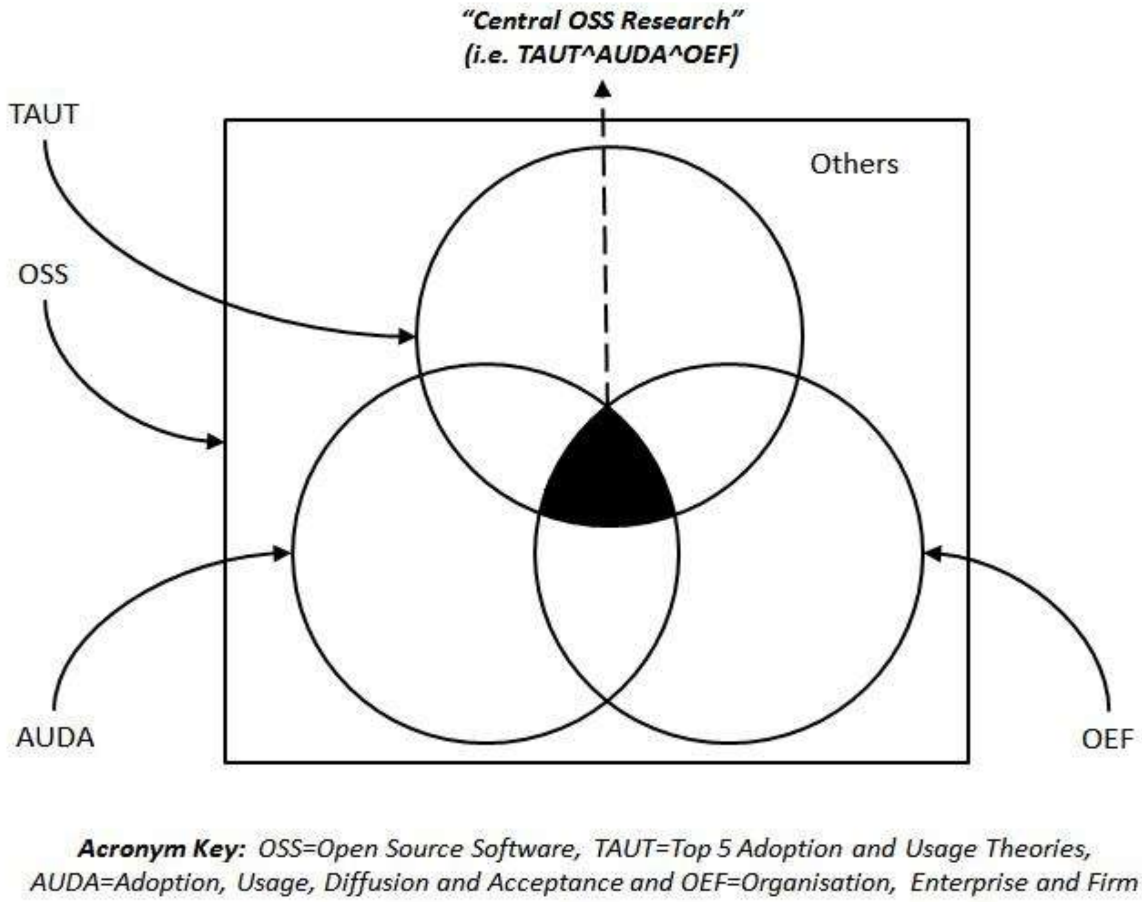


Figure 2.4: OSS Research Central to this Study

2.4.1. OSS Research Considered Central to This Study

Seven articles were identified as occupying the research area considered central to this research, and therefore key to the thesis of this dissertation, a summary of which now follows.

In the UK, Macredie and Mijinyawa (2011), investigated the factors influencing OSS adoption in ten Small-to-Medium Sized Enterprises (SMEs) in the UK IT sector; using qualitative, empirical case study methods in a positivist paradigm, grounded theory and a DTPB-based model which has previously been discussed (Macredie and Mijinyawa, 2011). The research is relevant to this study as it found a reliable explanation of the 'complex and subjective factors' which influence TPB constructs and OSS adoption in SMEs (ibid). However, the study would suggest that there is scope for making a relatively unique research contribution by; (a) investigating organisations not limited to SMEs in the IT sector, (b) making use of quantitative and qualitative data, (c) making use of mixed-methods (i.e. those associated with quantitative and qualitative data) as opposed to qualitative mono-method approaches, (d) utilising a paradigm other than positivism alone (e.g. pragmatism) and (e) introducing an element of objectivity via analysis via statistical significance. The research would also suggest that there is scholarly precedent, from high impact IS publishing, for using the DTPB/TPB-based models in OSS adoption and usage research in organisations based in the UK.

As described in Appendix F: Comparison of Key Conceptual Areas in OSS Research and Appendix G: Systematic Profile of OSS Research Central to this Study, this article was the only contribution from high impact and mid impact IS publishing in the area considered central to this study. Therefore, given the overall volume of OSS research (i.e. 4,083 articles previously highlighted), this would indicate that there is a clear paucity in the area considered central to this research (i.e. OSS in organisations using the predominant adoption and usage theoretical constructs), which this study seeks to modestly address.

There were a further six articles published in the area considered central to this research from outside recognised IS publishing which was previously defined in this study as third tier. The research contributions of these authors are outlined and discussed below.

In Spain, Gallego et al. (2008) investigated European respondents, made use of a positivist paradigm, quantitative data, gathered via a survey instrument to establish the factors in the OSS adoption behaviour of 347 respondents (who were described as registered users of the Linux operating system software project) and analysed using a TAM-based conceptual model (Gallego et al., 2008). The research is relevant as it found that OSS is a viable solution for information management for organisations (ibid). However, as previously discussed TAM is considered 'overwhelmingly' the most commonly used adoption and usage theoretical construct in IS research (Williams et al., 2009) which would suggest that opportunities for unique research contributions from using more suitable and alternative theoretical approaches such as TPB, as argued in the year prior to Gallego et al.'s (2008) publication (Benbasat and Barki, 2007). Additionally, subsequent research has criticised OSS studies for predominantly investigating 'large, successful and community-driven [OSS] projects' (Hauge et al., 2010). This could be argued to be the case with Gallego et al (2008) which investigated Linux. Therefore, this would suggest there is scope for a relatively unique research contribution through investigating OSS projects not limited to Linux. Also, Gallego et al's (2008) focus on European respondents would also indicate that a more UK-centric study would similarly address a gap in the existing research, notwithstanding Macredie and Mijinyawa's (2011) UK contribution. As with Macredie and Mijinyawa's (2011) study, Gallego et al's (2008) positivist paradigm research decision would suggest that a study making use of an alternative to the philosophical assumptions associated with positivism would also address a gap in the existing research (e.g. pragmatism). Similarly, the decision to work with quantitative data would also suggest that an alternative approach, for instance mixed-methods, would produce a relatively unique research contribution. Also, Gallego et al's (2008) decision to work with a survey instrument for data collection which would suggest that there is scholarly precedent for gathering data via a questionnaire in the of organisational OSS adoption.

Also in Spain, Bueno and Gallego (2010) with a global target population; again made use of a positivist paradigm and quantitative data, gathered via a survey instrument to establish the factors in the OSS adoption behaviour of 703 global respondents (who had downloaded an Enterprise Resource Planning (ERP) software project) which was also analysed using a TAM-based conceptual model (Bueno and Gallego, 2010). This is relevant to this study as it found that (a) End-users should be involved as early as possible, (b) OSS ERP should be selected which is (i) easy to use and (ii) useful; and (c) OSS ERP is a viable alternative to PS in SMEs (ibid). The publication of yet further studies which had successfully made use of TAM-based models in European (Gallego et al., 2008) and global settings (Bueno and Gallego, 2010) would suggest there would also be scope to make a relatively unique research contribution drawing on data from UK respondents, a paradigm other than exclusively positivist (i.e. pragmatism), data other than quantitative (i.e. quantitative and qualitative data) and utilising a model based on a construct other than TAM (e.g. TPB). As before, the successful use of a survey instrument would suggest scholarly precedent for the use of a questionnaire for data collection in this research. Also, Bueno and Gallego (2010) investigated the adoption of a single-type of OSS project (i.e. ERP) which would also suggest scope for researching OSS adoption outside single types of software. See Appendix A for further details of different types of software commonly used in organisations. Furthermore, in terms of Gallego's (2010) findings; (a) to suggest that end-users should be 'involved early' raises the question of what are the important factors so far as end-users are concerned (b) the successful ratification of TAM monolithic constructs (i.e. ease of use and usefulness) would suggest there is a gap in the existing research in terms of the complex driving and inhibiting factors associated with organisational OSS adoption and (c) the relative viability of OSS ERP in SMEs raises the question of the viability of other software categories in other organisational settings.

In summary, the previous two studies have demonstrated how third tier research projects can; contribute earlier than high impact IS publishing, and in the case of mid-impact IS publishing (to date), publish before there was any contribution whatsoever. In addition, these studies and others, have successfully demonstrated the approaches of the positivist paradigms, quantitative data and survey instrument data collection methods in the area under investigation. However, notwithstanding the Gallego's (2010) study of OSS ERP adoption, IS research has criticised prior OSS research for investigating pre-dominantly well-diffused OSS projects (e.g. operating systems such as Linux) (Hauge et al., 2010). Furthermore, both studies identified in this area used TAM, and IS research has criticised research methods incorporating TAM as over-used and recommends alternative theoretical constructs such as TPB (Benbasat and Barki, 2007). Consistent with this argument, IS research has encouraged future research to adopt approaches other than those most commonly used (Webster, 2002). Therefore, this research will seek to address other categories of software (as well as the operating system). In addition, this research will make use of TPB/DTPB-based conceptual model as the most flexible and appropriate theoretical construct with which to develop a conceptual model which is also capable of incorporating some of the stage-based complexities of organisational adoption (Benbasat and Barki, 2007).

A Chinese author, Hau and Kim (2011), investigated South Korean "gamer" communities; who again made use of a positivist paradigm, quantitative data, gathered via a survey instrument to establish the factors in the adoption behaviour of 1,244 respondents who were described as users of innovation-conducive knowledge sharing (a phenomenon which includes OSS) using a TPB-based model (Hau and Kim, 2011). The study is relevant to this research as it found that intrinsic motivation, shared goals and social trust were important factors in promoting users 'innovation-conducive' knowledge sharing (such as OSS). Although, Hau and Kim's (2011) research was not directly linked to the organisational OSS adoption area, this would further suggest that there is yet more scope for a unique contribution from a UK-centric study using alternatives to solely quantitative and positivist research methods and a conceptual model based on a theory other than TAM.

In the USA a US author, Bixler and Taylor (2012), utilised OSS as an analogy and DoI theory, in the diffusion of a particular community-based environmental management framework and was therefore also not directly relevant to this research (Bixler and Taylor, 2012). Notably, however, this was the only research to make use of a DoI based model from the search criteria used in this study. This would suggest that there is scope for this research to make a unique contribution by using factors associated traditionally with DoI in the context of OSS adoption.

The remaining two articles in this area post-dated the data collection phase of this research (i.e. 2012), and as a result did not feature in the original literature review and therefore did not directly influence the conceptual model. The first scholar Divakran (2013), made use of TPB to analyse movie-centric on-line community adoption and was also not directly concerned with organisational OSS adoption (Divakaran, 2013).

However a UK-US research team, Mount and Fernandes (2013), once more made use of quantitative methods and yet another TAM-based conceptual model to investigate the factors associated with organisational OSS adoption (Mount and Fernandes, 2013). Therefore, this would further suggest that there is scope for making a relatively unique contribution using a TPB-based model and mixed methods. The research is relevant to this study as it found that performance attitude of managers, data regulation and facilitating conditions were important determinants of a firm's intention to use OSS. However, as with DTPB, such monolithic constructs were considered of little value to operational managers therefore this research has effectively post-hoc addressed this gap by seeking to establish specific driving and inhibiting factors. Furthermore, Mount and Fernandez (2013) found that factors associated with social and organisational domains did not influence organisational intention to adopt OSS, which would appear to be largely in contradiction with the theoretical constructs of TPB (i.e. Subjective Norm and Perceived Behavioural Control). Therefore, this research also sought to address this gap.

The above section represents a summary of a number of research articles in an area considered central to this research. Adjacent areas were also surveyed as part of this review and broadly supported the reasoning and decisions made above in order to establish the proposed conceptual model. See Appendices F to J for further comparison and profile.

2.4.2. OSS Research Considered Adjacent to This Study

A further 19 articles from recognised IS publishing were identified as occupying the research area considered adjacent to this research, and therefore important to the thesis of this dissertation. This area can be described as the intersection of OSS, OEF and AUDA conceptual areas identified earlier. A summary now follows. See Appendix I: Systematic Profile of Other OSS Research and Appendix J: Bibliographic Profile of Other OSS Research.

A UK author, Barrett (2013), conducted global research making use of an interpretative paradigm, non-empirical data, computerisation movements theory in which the competing discourses of proprietary, free and OSS were compared (Barrett et al., 2013). The research is relevant as it was able to highlight disparate ideologies of the three types of software discussed (ibid). Although the research was able to illustrate some deep-seated historical and fundamental differences between the different software discourses (as discussed in the introductory chapter of this dissertation) the study did not empirically establish a clear set of factors which would be of use to a manager in an operational setting. This study has specifically sought to address this gap.

A US author, Vitharana (2010), investigated a single large US corporation making use of a positivist paradigm with empirical, qualitative data via case study drawn from structured interviews (Vitharana et al., 2010). The study is relevant to this research as it and found that knowledge creation was an important driver in the adoption of OSS-type innovation. However, since the research was focused solely on a single company (i.e. IBM) and 'internal OSS' (a derivative of OSS in which code is re-used *within* a corporation) it was considered important to establish a wider population using primarily quantitative data, in order to develop a methodology which could be replicated by operational managers.

A US author, Chengular-Smith (2010), conducted global research of business value in OSS database projects (i.e. MySQL) again making use of a positivist paradigm with empirical, quantitative data collected via a survey instrument drawn from 149 respondents and analysed via Confirmatory Factor Analysis (CFA) and Partial Least Sqaures (PLS) (Chengalur-Smith et al., 2010). The same research also found that several key IS resources were important to OSS adoption which included (a) IT skill and knowledge, (b) technical infrastructure and (c) IT/Business relationship (ibid). The research successfully identified some key factors responsible for the legitimacy and sustainability of OSS using sophisticated statistical procedures. However, it was considered that such procedures (i.e. CFA and PLS), were unlikely to be available to managers in an operational setting. Therefore, this research has sought to address this gap by devising a more accessible methodological approach (e.g. Fisher's Exact Test and Force Field Analysis). These approaches can be considered more accessible since, as discussed in the Research Methododology chapter, they are likely to be available and well-known to managers in an operational setting.

A German author, Sojer (2010), investigated the code re-use behaviour 686 individual OSS developers, in a positivist paradigm, gathering empirical quantitative data via survey instrument and analysing it via TPB and regression analysis (Sojer and Henkel, 2010). This is relevant since the research found that greater OSS experience and wider personal networks were important to successful code re-use behaviour. However, this was considered a relatively narrow target behaviour (i.e. developer code re-use) which this research has sought to expand to a variety of organisational OSS adoption behaviour.

A US author, Stewart (2006), conducted global research into 138 OSS projects, making use of a positivist paradigm, empirical and quantitative data which were analysed for driving factors via the commonly-used TAM-based model (Stewart et al., 2006). The research is relevant to this research as it found that 'license restrictiveness' and organisational sponsorship were important factors to OSS project success (ibid). The research was able to identify factors which differentiate successful from unsuccessful OSS projects. However the research did not address the question of what specific factors drive and inhibit OSS organisational behaviour from an operational manager's perspective. This research has sought to address this gap through the selection of practical and accessible research methodologies and approaches.

The six articles discussed above originate from 'elite 'or 'high impact' IS publishing largely from US authors. The articles show a preference for research incorporating positivist philosophical assumptions, empirical and quantitative data which have successfully illustrated a number of driving and inhibiting factors of relevance to this research. However, as also shown above, these articles have not fully addressed the thesis of this research and a number of gaps relevant to this research have been identified. Therefore, to further inform this literature review, this section will now explore the research contributions from the remainder of recognised IS publishing. This research has identified a further thirteen articles from 'mid impact' IS publishing which have fulfilled the aforementioned search criteria in respect of conceptual areas.

An Australian author, Goode (2005), investigated 108 key informants from top Australian public limited companies, making use of a positivist paradigm, empirical qualitative data, drawn from a survey of 108 respondents and analysed using Inhibitor Determination Methodolgoy (IDM) (Goode, 2005). Respondents were found to have rejected OSS for a number of reasons including; lack of relevance, lack of reliable technical support, learning costs and compatibility concerns. Although this research successfully highlighted inhibiting factors which were of clear relevance to this research, it was considered important to investigate the significant drivers (as well as inhibitors) for a given sample (i.e. an operational setting). Therefore, this research has sought to address this gap by including driving, as well as inhibiting factors, in the development of a suitable conceptual model.

A Swiss author, Von Grogh (2007), produced a global investigation into OSS as a form of innovation and highlighted parallels with inter-disciplinary research, using a descriptive/interpretative paradigm, non-empirical qualitative data drawn from a selective literature review aimed at explaining the proliferation of OSS research using the Collective Innovation Model (CIM) (von Krogh and Spaeth, 2007). The research is relevant to this research as it found that 'phenomenon-driven trans-disciplinary research' (such as OSS) promote greater dialogue between research disciplines, the product of which is often OSS artefacts (ibid). However, despite asserting that (1) Impact (2) Theoretical Tension (3) Transparency (4) Communal Reflexivity and (5) Proximity are factors which have made OSS attractive to multi-disciplinary research, the study did not address what factors actually drive OSS adoption in organisations and a suitable means of identifying them in an operational environment. This research has sought to address this gap.

In 2009, the same Swiss author, Von Krogh (2009), once again conducted a study using an interpretative paradigm, non-empirical qualitative data and a selective literature review which examined individualist, collectivist and combined perspectives of knowledge management (KM) (drawing on the OSS phenomenon as example) (von Krogh, 2009). The research is relevant as, as with Vitharana (2011), it argues that OSS is an important resource in developing organisational knowledge creation and re-use (ibid). However, the research does not discuss the other aspects that drive (or inhibit) organisational adoption of OSS and how to better understand them in a given scenario. Therefore, this research has sought to address that gap.

A Swedish author, Lundell (2010), investigated key individuals in Swedish companies, 58 of whom were purposefully sampled, using a positivist paradigm, empirical qualitative data drawn from semi-structured telephone interviews originally gathered in 2006 (Lundell et al., 2010a). The research is relevant as it found that (a) uptake and activity were largely centred on SMEs (b) some interest beyond OS systems components at the infrastructure level (i.e. applications software category) (c) companies were both beneficiaries and contributors to OSS projects (ibid). The research successfully established a snap-shot or description of the status of OSS adoption for a specific location and sample (i.e. Sweden and certain Swedish firms). However, the research did not provide an assessment of the driving and inhibiting factors within an organisation or a suitable means of identifying them operationally. Therefore, this research has sought to address that gap

A Canadian author, Poba-Nzaou (2011), investigated four Canadian SME’s adoption of ERP making use of a positivist paradigm, empirical qualitative data via case studies drawn from semi-structured interviews and using Technology Organisation Environment (TOE) Model and Organisational Buying Behaviour (OBB) model (Poba-Nzaou and Raymond, 2011). The research is relevant to this research as it argued that the legal complexity of OSS licensing can often inhibit organisational adoption and also found that, in certain cases, SMEs will use OSS ERP to manage the risk of highly customised requirements (ibid). Despite these insights the research did not identify a reliable method of comprehensively establishing the statistically significant driving and inhibiting factors in a given organisational scenario accessible to operational managers.

A US author, Lee (2012), investigated 157 Korean organisations' adoption of enterprise software, making use of a positivist paradigm, empirical qualitative data gathered via a survey instrument and analysed via Structure Equation Modelling (SEM) using a conceptual model based on IS Success Model (Lee and Lee, 2012). The research is relevant as it found that service quality from the OSS community had an important driving effect on OSS Enterprise Information Systems (EIS) adoption and also reported a paucity of OSS adoption at the 'enterprise' level of software (ibid). However, this research also made use of SEM which was not considered commonly available to operational managers in industry. Therefore, this research has sought to investigate enterprise level software (via NAPCS discussed earlier) and selecting a methodology most likely to be replicable in an operational environment.

A Canadian author, Marsan (2012), carried out a global study of public discourse and the rate of adoption of OSS in organisations, making use of a positivist paradigm, empirical quantitative and qualitative data analysed via Institutional Theory, Organising Theory and Rhetorical Theory (Marsan et al., 2012). The research is important to this study as it found that OSS has become 'institutionalised', that is a norm which is taken for granted, for many of the previously discussed systems category software and some applications category software mainly in SMEs (ibid). However, although the research reported a macro-level generally positive tone toward OSS in public discourse it did not produce any micro-level specific driving (or inhibiting) factors which would help explain the lack of OSS adoption or could assist in management interventions of organisation who might wish to accelerate it. Therefore, this research has sought to address this gap.

A US author, Li (2013), conducted a global investigation of disaster management organisations making use of an interpretative paradigm, empirical qualitative data gathered via case study from public and private sector key informants and analysed via Technology Organisation and Environment (TOE) framework (Li et al., 2013a). The study is relevant to this research as it found that task-technology fit, expertise and inter-organisational relationships were key factors for OSS adoption in certain humanitarian organisations (ibid). However, the research was considered too narrow (i.e. humanitarian organisations) and without an easily replicable methodology in industry. Therefore, this research has sought to address this gap.

A separate French author of the same name, Li (2013), conducted a study of expert IT systems in organisations, making use of a positivist paradigm, empirical quantitative data, drawn from a survey of 114 IT manager and professional respondents considering organisational investment and internal human capital (Li et al., 2013b). This study is of relevance to this research as it found that (1) firm specificity (i.e. how well the OSS human capital is tied to the organisation) and (2) learning-related scale (i.e. how well the cost of learning OSS skills can be leverage elsewhere in the organisation) were positively associated with the investment in developing 'OSS human capital' (ibid). However, although the research identifies some specific antecedents to developing OSS resources, it does not provide a rigorous set of driving and inhibiting factors applicable to a given scenario or a means of doing so. Therefore, this research has sought to address that gap.

A Brazilian author, Santos (2013), investigated 4000 OSS projects over four years making use of a positivist paradigm, empirical quantitative data, analysed via Structured Equation Modelling (SEM) in the context of causal factors of project attractiveness for OSS contributors (Santos et al., 2013). The research is relevant to this study as it identified that an OSS projects set of conditions, such as 'license restrictiveness' and available resources were found to be important to work activity recorded in the projects (ibid). Although the study successfully developed a theoretical model to help explain source code contribution, maintenance and usage so far as OSS contributors were concerned; it was considered that the research did not produce finding which would effectively assist managers seeking to assess driving or inhibiting factors in organisational adoption and usage, or a means of intervention. Therefore, this research has sought to address that gap.

2.4.3. Summary

Of the articles highlighted in this review only three articles originated from UK authors (Barrett et al., 2013, Mount and Fernandes, 2013, Macredie and Mijinyawa, 2011). As discussed, the first investigated UK SME's in the IT Sector (Macredie and Mijinyawa, 2011), the second researched companies from the Science City York and Digital Sector (Mount and Fernandes, 2013), and the third examined public discourse and global organisational adoption rates (Marsan et al., 2012). This would suggest that organisational OSS adoption research has been somewhat overlooked in the UK, and this research intends to contribute to this area.

As expected from the search criteria described for this review, the majority of the research made use of an organisational unit or level of analysis. Informants and respondents were generally those considered to be expert key individuals in the areas under investigation, for example, IT managers, developers or senior managers. However, some research made use of a mixture of students, graduates and professionals (Gwebu and Wang, 2011). Therefore, this research has sought to identify key individuals within organisations, specifically those who considered themselves responsible for software selection, from whom to identify driving and inhibiting factors in organisational OSS adoption.

The vast majority of research reviewed in this section can be described as subscribing to the philosophical assumptions of the positivist paradigm. From elite IS publishing there were no research contributions other than positivist. Elsewhere, in mid-impact research, there were limited examples of contributions originating from a descriptive or interpretative paradigm (Barrett et al., 2013, von Krogh, 2009, von Krogh and Spaeth, 2007). This would suggest that there is somewhat of a gap in the existing research and that a relatively unique contribution could be made from selecting a research paradigm other than positivist (e.g. pragmatism).

The majority of the research highlighted in this review drew results from empirical quantitative data, with some exceptions that chose to make contributions drawn from qualitative data (Macredie and Mijinyawa, 2011, Bixler and Taylor, 2012, Vitharana et al., 2010, Goode, 2005, Lundell et al., 2010a, Poba-Nzaou and Raymond, 2011, Li et al., 2013a). However, there was no contribution from any scholar, from the articles highlighted, which incorporated both quantitative and qualitative data. This would suggest that there is potential to make a relatively unique research contribution from conducting a study which exploits both types of data.

A detailed discussion of research methods will be provided in the next chapter. However, so far as this literature review and the area considered central to this research is concerned, the single contribution from recognised IS publishing made use of a case study approach via semi-structured interviews (Macredie and Mijinyawa, 2011). Outside recognised IS publishing another scholar made use of a survey instrument and semi-structured interviews (Bixler and Taylor, 2012). All other contributors used survey instruments and various forms of statistical analyses (Bueno and Gallego, 2010, Gallego et al., 2008, Divakaran, 2013, Mount and Fernandes, 2013, Hau and Kim, 2011). This would suggest that there is scholarly precedent in this field for research methods which incorporate survey instrument and statistical analysis. This would also suggest that there is an opportunity to make a relatively unique contribution via making use of a mixed-methods approach.

So far as the area considered central to this research is concerned, the theories and theoretical constructs successfully deployed and highlighted in this review include; TAM (Bueno and Gallego, 2010, Gallego et al., 2008, Mount and Fernandes, 2013), TPB (Divakaran, 2013, Hau and Kim, 2011), DoI (Bixler and Taylor, 2012) and DTPB (Macredie and Mijinyawa, 2011). Furthermore, outside the organisational (OEF) area TAM has been further deployed to investigate OSS adoption (Gwebu and Wang, 2011, Martinez-Garcia et al., 2013, Delibasic et al., 2013). Ordinarily this would suggest that

TAM would be considered a scholarly precedent in this research area, however, as described in the aforementioned critiques of TAM (Williams et al., 2009, Benbasat and Barki, 2007) this research has elected to use a suitable alternative (i.e. DTPB/TPB).

The articles highlighted in this section, and others which have influenced this literature review, are also summarised in Appendices F to J. There now follows a discussion of the theoretical framework which was developed for this research.

2.5. Foundations of the Theoretical Framework of This Research

Having considered the types of research that IS researchers have conducted on the adoption and use of OSS, certain gaps were identified that led to the formation of the conceptual framework. In the following sub-sections details of these factors are now provided.

2.5.1. Demographic Factors of Consideration in this research

TPB does not provide for demographic factors in predicting behaviour (See TPB Section). IS research has argued that certain individual and organisational attributes can be of significance which we also viewed as important for the development of our research framework.

2.5.1.1. Individual Demographic Factors

When considering IS adoption and usage research, it has been proposed demographic variables such as, age, gender and length of service are suitable individual profile data to collect. This is useful for establishing these demographic factors are statistically significant independent variables in relation to adoption behaviour (Adams et al., 1992, Venkatesh et al., 2003). IS researchers have also proposed that demographic data focused on education levels (ranging from secondary school through to doctoral studies) are also important attributes to test for statistical significance in relation to adoption (Karahanna et al., 1999). Therefore, this research has sought to collect and analyse this type of data to determine statistical significance in relation to organisational OSS adoption.

When considering the occupations of demographic data, original intention-based model research proposed that respondents should declare their role in an organisation (Fishbein and Ajzen, 2010). Therefore, this research will utilise the United States (US) federal government's categorisation of occupation (US Department of Labor, 2011). Using the above reasoning, the following hypothesis was formed:

H1: Individual profile factors will be of statistical significance in OSS adoption outcomes.

2.5.1.2. Organisational Demographic Factors

IS research has linked the size and nature of an organisation to the breadth and depth of innovation adoption, and stated,

> *Organizations that are larger, more diverse, have greater technical expertise, possess supportive senior management, operate in more competitive contexts, and perceive the innovation as more beneficial and compatible, are more likely to adopt a larger number of innovations, to adopt them earlier, and to implement them more thoroughly" (Fichman, 2004, cited in Ping, 2009, p2).*

IS research has also concluded, via meta-analysis, that organisation size has a positive effect on innovation adoption behaviour (Jeyaraj et al., 2006). However, OSS adoption research in the United Kingdom, has argued that there are fundamental differences between the way small and large organisations adopt innovation, and has claimed that smaller organisations should have greater motivation for OSS adoption (Macredie and Mijinyawa, 2011). Similarly, other OSS research has argued that there is a negative correlation between size of organisation and the amount of OSS which is adopted (Mosoval et al., 2006, Glynn et al., 2005). SME has been defined as an organisation with less than 250 employers and less than EUR50m turnover (European-Commission, 2011).

It has also been proposed that motivation for OSS adoption can be linked to whether or not organisations actually employ software developers (i.e. have in-house skills to adapt code) (Morad et al., 2005). Organisational profile has been further defined by the North American Industry Classification System (NAICS) a hierarchical categorisation devised by the US Census Bureau (USCB, 2003). Therefore, this research will seek to establish whether or not various organisational factors are significant in the context of organisational OSS adoption.

H2: Organisational profile factors will be of statistical significance in organisational OSS adoption.

2.5.2. Planned Behaviour

The original intention-based research specifies that adoption behaviour should be defined in terms of target action, context and timescales (Fishbein and Ajzen, 2010). Therefore, this research has defined organisational OSS adoption planned behaviour as implementing an IT project incorporating OSS within a year. Attitude, subjective norm and perceived behavioural control, in the context of TPB, were defined earlier.

2.5.3. Attitude (A)

For the purposes of this research, the first TPB construct has already been defined as attitude. This review has found that the extant research will often investigate driving factors but not always inhibiting factors (Goode, 2005). Therefore, this research will investigate both driving and inhibiting factors, as described in Appendix K: Potential Driving and Inhibiting Factors Drawn from the Literature Review. These factors, in conjunction with TPB, have been used to deductively reason the creation of the hypothesis in the context of OSS adoption as below:

H3: Attitudinal factors will be of statistical significance in organisational OSS adoption outcomes.

2.5.4. Subjective Norm (SN)

This research has sought to establish whether factors associated with subjective norm are significant in the context of OSS adoption. IS Research has argued that social influence such as subjective norm can be considered, "(1) informational influence, which occurs when individuals accept information as evidence of reality, and (2) normative influence, which occurs when individuals conform to the expectations of others" (Karahanna et al., 1999, p189). Therefore, this research has sought to establish whether potential subjective norm factors associated with organisational OSS adoption and; (a) the behaviour of others (b) the influence of others and (c) the influence of others expectations. These factors are summarised in Appendix K: Potential Driving and Inhibiting Factors Drawn from the Literature Review, and in conjunction with TPB, have been used to deductively reason the creation of the hypothesis adoption as below:

H4: Subjective norm factors will be of statistical significance in organisational OSS adoption behaviour.

2.5.5. Perceived Behavioural Control (PBC)

TPB has postulated that this PBC is of significance to behaviour (Ajzen and Madden, 1986), and effectively distinguishes TPB from TRA. Therefore, this research has sought to establish whether factors associated with the PBC construct are significant in the context of organisational OSS adoption. It has been argued that perceived behavioural control can be considered, (1) facilitating conditions, described as, "the availability of resources needed to engage in a behaviour, such as time, money or other specialised resources", and (2) self-efficacy, described as, "an individual's self-confidence in his/her ability to perform a behaviour" (Taylor and Todd, 1995, p150) Therefore, this research has sought to establish whether PBC factors associated with organisational OSS adoption and those which are specific to (a) organisational factors and (b) OSS factors. These factors are summarised in Appendix K: Potential Driving and Inhibiting Factors Drawn from the Literature

Review. In conjunction with TPB they have been used to deductively reason the creation of the hypothesis as below:

H5: Perceived Behavioural Control factors will be of statistical significance in organisational OSS adoption behaviour.

2.6. Theoretical Framework

Figure 2.5: Conceptual Model illustrates the theoretical framework adapted from TPB, and the various literature-based factors highlighted in the previous section. This is in the form of a variance theory, in which independent variables are tested for significance in relation to dependent variables, and is an approach which is commonly associated with IS research (Webster, 2002). However, as will be shown, the model can be combined with the previously described process theories (i.e. FFA and ITG) to create a hybrid theory optimised for operational management interventions.

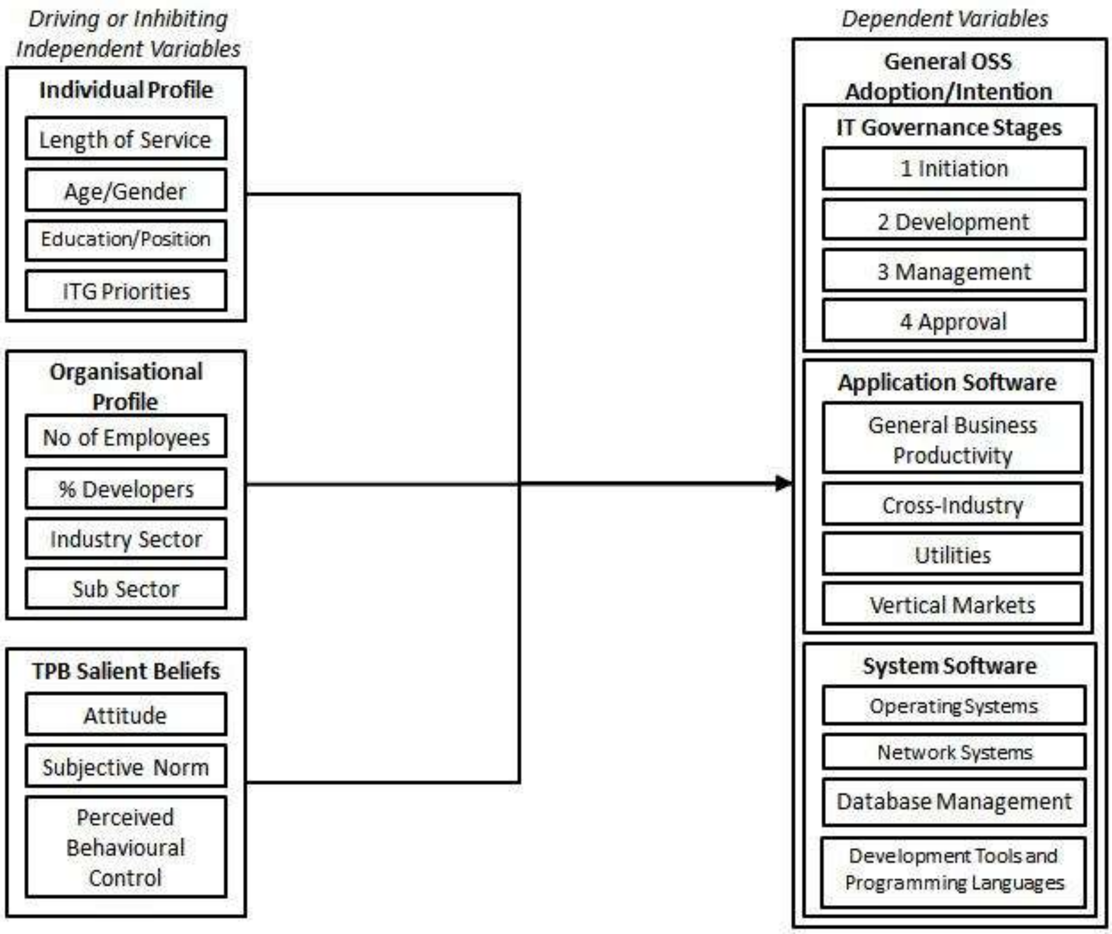


Figure 2.5: Conceptual Model - Theory of OSS Adoption

2.7. Summary

Previous IS research has argued that a 'quality' literature review should; (a) provide firm foundation for advancing knowledge, (b) facilitate theory development, (c) close areas where a plethora of research exists and (d) uncover areas where research is needed (Webster, 2002). Firstly, this chapter has reviewed the most relevant research to this study by devising a system of categorisation and conceptual analysis to highlight the most meaningful research in this area and establish a unique combination of theoretical and methodological approaches to organisational OSS adoption. Secondly, this chapter has discussed a means of combining appropriate variance and process theoretical constructs to create a unique hybrid theory. That is, this chapter has identified a wide variety of research which has been carried out using TAM, and has identified alternative theoretical constructs (i.e. TPB, FFA and ITG) to propose a demonstratively novel and alternative approach to the existing organisational OSS adoption research. Finally, this chapter has identified that there is a dearth of research, in the areas defined as central to this study, which is in sharp contrast to the academic and industrial acclaim which was highlighted in the previous chapter. The next chapter will describe the research methodology adopted as a result of this literature review.

Chapter 3: Research Methodology

3.1. Introduction

Having introduced the topic of this research, and the theoretical foundations of this study, the next phase involved developing and explaining the methodological decisions which were made. This chapter begins by explaining the philosophical foundations of this study which is then followed by a discussion of the research methods and data collection techniques as well as the reasons behind the selection of particular sampling approaches.

3.2. Philosophical Assumptions

The philosophical assumptions of management research have been described along two key dimensions (in terms of subjectivity and objectivity), namely: epistemology and ontology (Johnson and Duberley, 2000, p180).

3.2.1. Epistemology

The term epistemology has been described as, "[derived] from two Greek words: 'episteme' which means 'knowledge or science'; and 'logos' which means 'knowledge', 'information', 'theory' or 'account'", and also, "the study of the criteria by which we can know what does and does not constitute warranted, or scientific, knowledge" (Johnson and Duberley, 2000, p2). Similarly, IS research has defined epistemology as, "the type of knowledge that can be obtained about a phenomenon under study… [ranging from] general explanations based on regularity and causal relationships to, one that only give validity to a participant within a given activity" (Cornford and Smithson, 2006, p61).

3.2.2. Ontology

The term ontology has been described as, "derived from the Greek words 'ontos' (being) and 'logos' (theory or knowledge)", and also, "a branch of metaphysics dealing with the essence of phenomena and the nature of their existence" (Johnson and Duberley, 2000, p2). Similarly, IS research has defined ontology as, "underlying assumptions made about the phenomenon under study [i.e.] theories of reality… [ranging from] subjective to objective" (Cornford and Smithson, 2006, p61). The quadrant in Figure 3.1 shows some of the different types of research paradigms described by these aforementioned dimensions.

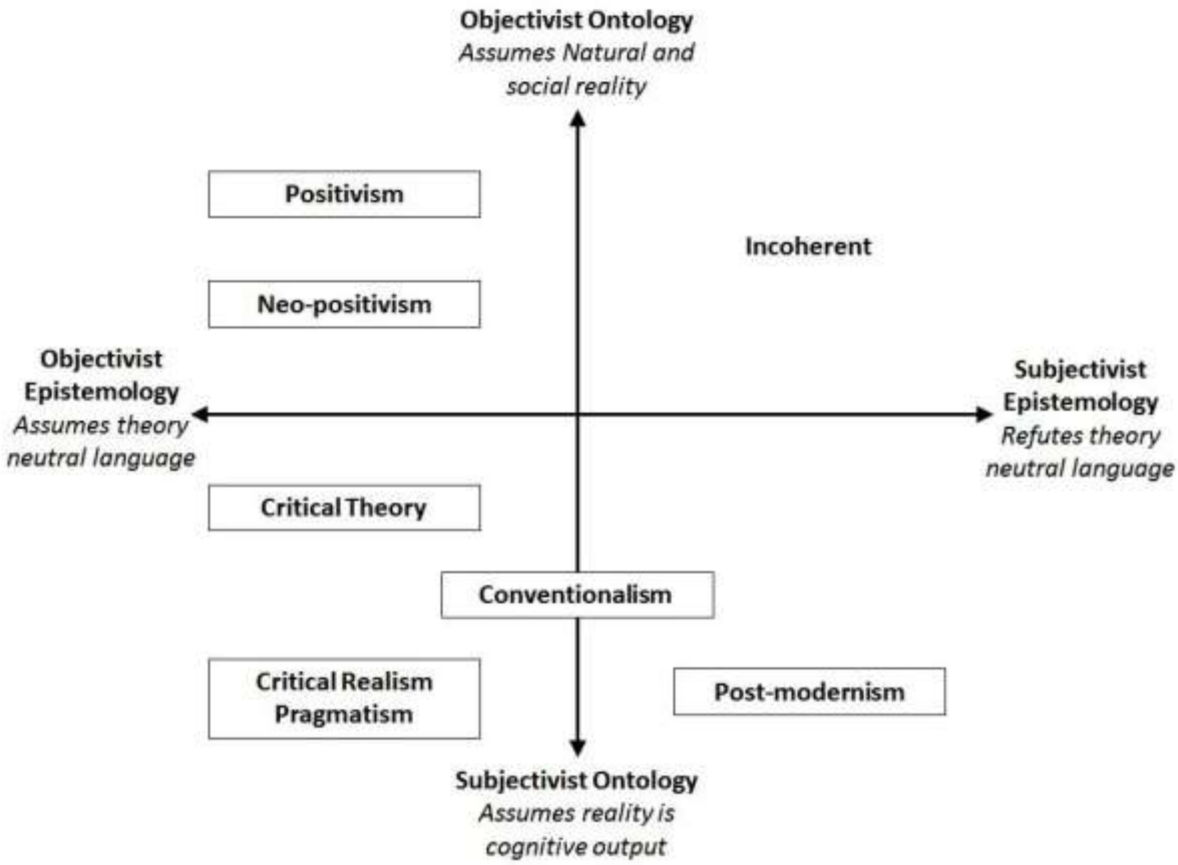


Figure 3.1: Research Paradigm Typology (Adapted from Johnson and Duberley, 2000, p180)

3.2.3. The Paradigm Wars

When considering the philosophical foundations of a subject, the term paradigm also emerges. Paradigm has been defined as, "…a construct that specifies a general set of philosophical assumptions covering, for example, ontology (what is assumed to exist), epistemology (the nature of valid knowledge), ethics or axiology (what is valued or considered right), and methodology" (Mingers, 2001, p242). Other IS research has suggested that where these different approaches become entrenched or puritanical an incompatibility thesis or ‘paradigm war’ has emerged, and has stated, “dominant research paradigms have resulted in two research cultures, 'one professing the superiority of deep, rich observational data’, and the other the virtues of ‘hard, generalizable... data'” (Sieber, 1973 cited in Johnson and Onwuegbuzie, 2004, p14). The same research has argued that researchers should take a pragmatic (or mixed) philosophical view taking into account the aims and objectives of the project, and claimed that, “[mixed methods research] is an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection” (Johnson and Onwuegbuzie, 2004, p17) .

Having ascertained the main concepts surrounding the philosophical foundations of a subject, the following section will seek to establish the philosophical assumptions of this research in terms of the aforementioned dimensions and in terms of the typologies of management research that research communities traditionally identify themselves with.

3.2.4. Positivism

3.2.4.1. Central Commitments of Positivism

Positivist worldviews have been categorised into (a) Logical (b) Interpretative and (c) Popperian; and all three categories have three commitments in common, as described in Figure 3.2 and discussed in the following sections, in the context of the aims and objectives of this research.

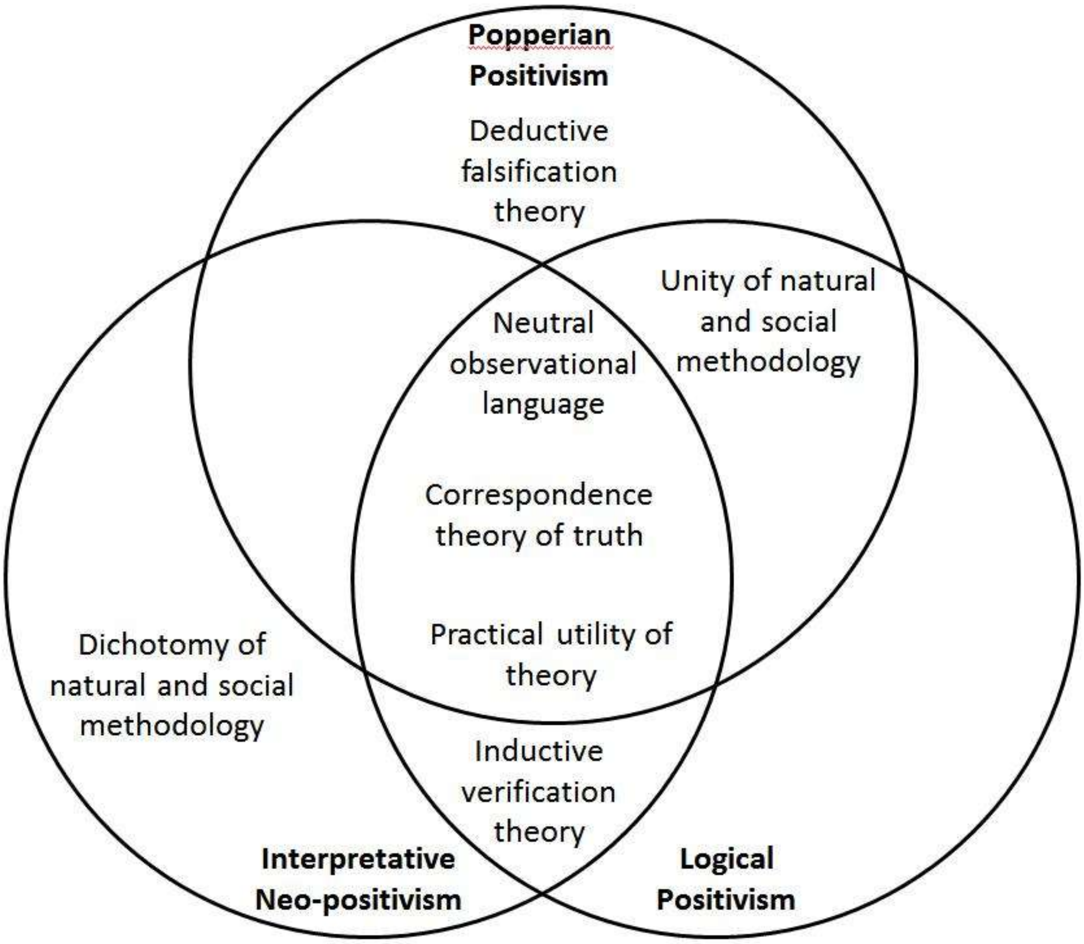


Figure 3.2: Three Positivist Approaches Compared by Epistemic Commitments (Adapted from Johnson and Duberley, 2000, p37, Table 2.1)

3.2.4.1.1. Neutral Observational Language

It is also argued that a positivist philosophy assumes there is a neutral point where the researcher may metaphorically stand, and stated that, "[The researcher] is independent of what is being [researched]. Therefore, the [researcher] can stand back and [research] the world objectively". This study has primarily made use of a survey for data collection, hence this research has adopted the philosophical assumptions associated with objective and neutral observable language.

3.2.4.1.2. Correspondence Theory of Truth

The 'Correspondence Theory of Truth' is another positivist philosophy which assumes the researcher may test observations against theory, and is described by, "Theory can be tested against irreducible statements of observation – the 'facts' of the situation. Research is concerned with producing accounts that correspond to an independent reality" also known as the 'correspondence theory of truth' (Johnson and Duberley, 2000, p39, Table 3.1). See figure above. Therefore, since this study has developed a conceptual model against which the 'factual' data collected were tested (ibid), this research has adopted the philosophical assumptions associated with the correspondence theory of truth.

3.2.4.1.3. Practical Utility of Theory

It has been claimed that positivist philosophy requires that theory is successfully devised and developed for specific a purpose, in that, "The aim of research should be to identify causal explanations and fundamental laws that explain regularities in human social behaviour" (Johnson and Duberley, 2000, p39, Table 3.1). Therefore, since this study aims to show the extent to which OSS adoption and usage can be shown to be a function of salient beliefs (i.e. drivers and inhibitors) of managers, with a view to provide assistance in management interventions, this research can be said to subscribe to the philosophical assumptions associated with the practical utility of theory.

Hence, as a result of the research decisions and philosophical assumptions described above, this research has broadly subscribed to the philosophical assumptions central to positivism (Johnson and Duberley, 2000{Cornford, 2006 #336)}

3.2.4.2. Logical Positivism

It has been claimed that certain philosophies distinguish that which can be called; (a) Logical positivism (or empiricism) (b) Interpretative positivism and (c) Popperian positivism (Johnson and Duberley, 2000, p37), which are described below.

3.2.4.2.1. Inductive Verification Theory

The fundamental principle of inductive reasoning is an important factor which distinguishes Logical Positivism from others. "[Such principles] underpin experimental logic… once causal relations had been discovered… those inferences could be extrapolated to further instances" (Johnson and Duberley, 2000, p21). Therefore, as this research has augmented quantitative data collection (via closed questions), with qualitative data (via open questions), this study can be said to have partially subscribed to the philosophical assumptions associated with inductive verification theory. However it is important to note that this research, in line with current IS research recommendations (Seddon and Scheepers, 2012), explicitly makes no inferences of statistical representativeness (i.e. beyond the sample which has been analysed).

3.2.4.2.2. Methodological Unity of Natural and Social Science

It has also been claimed that a philosophy which further distinguishes Logical and Popperian Positivism from Interpretative Positivism is the question of methodological alignment between the natural and social sciences. "[In Logical and Popperian Positivism] the method of the natural sciences is the only rational source of knowledge and should therefore be adopted in the social sciences. This implies preoccupations with (a) internal validity, (b) external validity, (c) reliability and (d) operationalisation" (Johnson and Duberley, 2000, p39, Table 3.1). Therefore, as this research has adopted (a) quantitative research methods and statistical analysis, and (b) evaluation and validation procedures in line with current IS research (Venkatesh et al., 2013), this study can be said to have partially subscribed to the philosophical assumptions associated with the methodological unity of natural and social sciences. However, as previously discussed, this research makes no claims to generalise of findings beyond the sample specified.

3.2.4.3. Interpretative Neopositivism

Furthermore, it has also been claimed that a philosophy which distinguishes Interpretative Positivism, from Logical and Popperian Positivism, is that there are fundamental differences between the natural and social sciences which cannot be ignored (Johnson and Duberley, 2000) and are described below.

3.2.4.3.1. Dichotomy of Natural and Social Methodologies

Interpretative philosophical assumptions claim that, in the natural sciences, the "human being" observers (i.e. those who themselves both experience and are experienced) are fundamentally different from the objects being observed (i.e. that which may be experienced, but experience nothing). Therefore, "[Since] subject matters of the natural sciences do not have subjective capacities, the natural scientist can quite legitimately impose an a priori external logic upon it's behaviour in order to explain it – a process known as 'Erklaren'" (Johnson and Duberley, 2000, p34). In contrast, the same research has defined the social science equivalent as, "the interpretative understanding of the meaning of a set of actions has to an actor through some form of contact with how they experience their experience", as 'Verstehen' (ibid). Furthermore, the same research has pointed out that, "[such] neo-positivists argue that in order to understand human behaviour in organisations we must gain access to those actors' subjective interpretations of reality… and the deployment of reputedly qualitative methods of data collection" (ibid). Therefore, as this research has sought to augment methods associated with objective quantitative data collection (via closed questions in the survey), with subjective qualitative data (via open questions in the survey), this study can be said to have partially subscribed to the philosophical assumptions associated with the dichotomy of natural and social methodologies. However, this is primarily a philosophical debate beyond the scope of this research and, in line with IS research practice (Seddon and Scheepers, 2012, p7), this study will adopt the pragmatic philosophy of, "Truth beyond reasonable doubt is sufficient", referred to as, "a scientific-realist definition of truth" (ibid).

Therefore, for the purposes of this research and by virtue of the self-reported, self-selected or purposive sample selection employed in this research, this study may be regarded as subscribing to certain philosophical assumptions associated with interpretative or neo-positivism.

3.2.4.4. Popperian Positivism

One of the philosophical assumptions which distinguishes Popperian Positivism from Logical and Interpretative is characterised by the use of deductive, as opposed to inductive, reasoning (Johnson and Duberley, 2000, p39, Table 3.1) which is described below

3.2.4.4.1. Deductive Falsification Theory

Popperian Positivism originated the hypotheses approach in research, and stated, "the principles of the hypothetico-deductive method expressed what Popper called a 'critical attitude' which he later defined as the willingness to change laws and theories, 'to test them; to refute them; to falsify them, if possible" (Popper, 1967, cited in Johnson and Duberley, 2000, p28). Therefore, since this research has employed hypothetico-deductive techniques to establish significance between salient beliefs (i.e. drivers and inhibitors) and organisational OSS adoption, this research partially subscribes to the philosophical assumptions associated with Popperian positivism. This is also in line with the methodological practice of IS research associated with the theoretical foundations of the conceptual model devised for this research. See Theory of Planned Behaviour (TPB) Section 2.3.5.3., Page 79.

Therefore, the positivist/neo-positivist philosophical assumptions, although epistemologically nuanced in terms of objectivity, fundamentally rely on objective views of epistemology (i.e. warranted knowledge) and ontology (i.e. warranted reality). So far as this research is concerned, certain philosophical assumptions beyond positivism have also been considered and adopted, which are described below.

3.2.5. Beyond Positivism

As discussed in the previous section, philosophical assumptions beyond positivism have been described as; (i) phenomenology, "a focus on the meanings that research subjects attach to social phenomena; an attempt by the researcher to understand what is happening and why it is happening" (Saunders et al., 2009, p72) and (ii) anti-positivist, "[those who believe] that facts and values are mixed up, and probably cannot ever be wholly separated" (Cornford and Smithson, 2006, p60). IS research has criticised adoption and diffusion researchers who, "…tend to neglect paradigms [other than positivism]" (Williams et al., 2009, p9). Alternative paradigms have been broadly categorised as (a) Critical Theory (b) Conventionalism (c) Critical Realism Pragmatism and (d) Post-modernism (Johnson and Duberley, 2000, p180). Therefore, this section will consider potential paradigms beyond positivism which are appropriate to this research.

3.2.5.1. Critical Theory

It has been claimed that the philosophical assumptions associated with a Critical Theory paradigm are based on complex and sophisticated ideological positions. The ability of the researcher to adopt are, "…clearly influenced by the researcher's own philosophy and view of the world", and suggests that, "…today's society is based on certain deep-seated structural faults that need to be exposed" (Cornford and Smithson, 2006, p60). Given the diametrically opposed ideological views expressed by the FSF and the BSA with respect to the global software industry (in which PS is described as 'the enemy') a critical theory approach could well prove a fruitful study. See Section 1.2.5, Page 56. However, for the purposes of this research and due to the previously established scope, aims and objectives, no particular ideological stance has been taken. In addition, It has also been argued that such a complex philosophical tradition should be avoided, "We would normally advise… researchers without a strong philosophical background in this area to steer clear of this approach" (Cornford and Smithson, 2006, p60). Therefore, no philosophical assumptions associated with critical theory are claimed in this research.

3.2.5.2. Conventionalism

It has been claimed that the philosophical assumptions associated with a conventionalist paradigm reject the correspondence theory of truth, and replace it with, "Consensus theory [which] argues that any judgement as to the truthfulness of an account or theory is the outcome of, and is nothing more than, socially established agreement, or convention, between those who share a particular paradigm or frame of reference" (Johnson and Duberley, 2000, p73). It has also been claimed that such a collective 'interpretivism' is a growing anti-positivist area in the field, and has stated that,

> *…[it] is based firmly on the notion that reality is socially constructed and research becomes more a case of trying to understand this construction and how it came about, rather than generating 'facts'. It is normally focused in a particular context (a specific organisation or industry) such that the results are not immediately generalizable" (Cornford and Smithson, 2006, p60).*

Therefore, for the purposes of this research and by virtue of deploying mixed-methods approaches, this research can claim to have partially adopted some of the philosophical assumptions associated with conventionalism.

3.2.5.3. Critical Realism-Pragmatism

It has also been argued that the philosophical assumptions associated with a Critical Realism-Pragmatism paradigm also reject the correspondence theory of truth, and replace it with, "the demands of practical adequacy… any resultant theoretical account must provide a guide to practical action that enables the pursuit of particular interest-laden human purposes through active intervention in a social world" (Johnson and Duberley, 2000, p170). Similarly, it has been argued that pragmatism is an appropriate 'philosophical partner' of mixed-methods research,

> *Pragmatism also helps to shed light on how research approaches can be mixed fruitfully… the bottom line is that research approaches should be mixed in ways that offer the best opportunities for answering important research questions" (Johnson and Onwuegbuzie, 2004, p16).*

Therefore, for the purposes of this research and by virtue of utilising mixed-methods which are best placed to address the previously established scope, aims and objectives, this research can claim to have adopted some of the philosophical assumptions associated with critical realism-pragmatism.

3.2.5.4. Post-modernism

It has been argued that the philosophical assumptions associated with Post Modernism reject the concept of theory-neutral observational language, and replace it with, "whatever counts as truth, is a changeable socio-linguistic artefact where justification lies in the consensus arising out of the culturally specific 'language games'…" (Johnson and Duberley, 2000, p97). IS research has argued that certain post-modern style approaches (e.g. negotiation of meaning and language via dialogue with stakeholders) are more appropriate to certain IS problems (Remenyi et al., 1999). Other IS research has claimed post-modern style approaches, such as Actor Network Theory (ANT) can better aid understanding of IS research problems (Cornford et al., 2010). Therefore, by virtue of encouraging implementing managers to contribute their own culturally specific interpretations of driving and inhibiting factors (via FFA), some limited post-modern philosophical assumptions are also made in this research.

3.2.6. Summary of Philosophical Assumptions

As previously, discussed, philosophical considerations are methodologically key as they will arguably underpin all other aspects of a research project (Cornford and Smithson, 2006). Certain positivist research traditions are based on core assumptions such as (a) the correspondence theory of truth (i.e. the researcher's ability to match theory with hypothesis), (b) neutral observable language (i.e. the researcher's ability to make value free judgements) and (c) the practical utility of theory development (i.e. utilitarian approach to knowledge creation) (Johnson and Duberley, 2000). It is this research philosophy which is used in the 'overwhelming' majority of IS adoption research in general (Jeyaraj et al., 2006, Williams et al., 2009), and OSS research in particular (Bueno and Gallego, 2010, Gallego et al., 2008, Gwebu and Wang, 2011). However, as shown in this section, there are other philosophical approaches largely unused in IS research, therefore this research will aim to adopt the philosophical assumptions and paradigms highlighted in this section (i.e. largely pragmatism and positivist central tenets) in the context of the aims and objectives of this research (i.e. establishing the driving and inhibiting factors in organisational OSS adoption).

Having discussed a range of philosophical assumptions considered for this research the overall research approach will now be discussed.

3.3. Research Approach

This research has taken a deductive approach in terms of establishing a set of hypotheses against which the quantitative data collected has been tested. In addition, an inductive approach has been taken in terms of considering patterns in the qualitative data collected. Furthermore, IS research has argued for a pragmatic approach, "based on abduction reasoning that moves back and forth between induction and deduction", in which, "a forced choice between existing paradigms with regard to logic, ontology, and epistemology [is rejected]" (Venkatesh et al., 2013, p17). Therefore, this section will seek an approach, method and strategy which are best suited to the previously established aims and objectives of this research. That is; (a) a hypothetico-deductive approach to establishing the driving and inhibiting factors associated with OSS adoption based on the quantitative data collected, (b) an inductive approach to analysing qualitative data based on the qualitative data collected and (c) an 'abduction' approach to establish inferences from mixed-methods.

3.4. Research Method and Strategy

Research methods have been described as, "the techniques that researchers employ for practising their craft," and includes, "instruments of data collection like questionnaires, interviews or observation; they might refer to the tools used for analysing data, which might be statistical techniques or extracting themes from unstructured data; or the term might refer to aspects of the research process like sampling" (Bryman, 2008p, 160). IS research has defined methods as, "Basic activities or techniques", such as, "administering and analysing a survey, conducting controlled experiments, doing ethnography or participant observation, or developing root definitions and conceptual models" (Mingers, 2001, p241). Considering the existing research this section will seek to establish the most suitable methods in the context of the previously established aims and objectives of this research.

3.4.1. Experiment

Experiment is a classical form of research which typically involves inductive or deductive reasoning and: (i) Selection of samples from known populations. (ii) Allocation of samples to different experimental conditions. (iii) Introduction of planned change on one or more of the variables (iv) Measurement and control of variables (Saunders et al., 2009). In terms of data, it has been argued that such approaches have limited, if any, 'real-life' equivalency (Cornford and Smithson, 2006). Therefore, due to a preference for real data the experiment method was rejected for this research.

3.4.2. Survey

It has been claimed that the survey approach is most scale-able, economic and common form of data collection (Saunders et al., 2009). IS research has argued that, "A single survey provides a cross-sectional picture of affairs a point in time", and that, "to achieve statistical validity may require far more respondents than an individual researcher can process. More commonly, the researcher has to acknowledge that, while a small scale survey can provide some interesting results from a real population, it is not statistically representative" (Cornford and Smithson, 2006, p70). Despite these drawbacks, due to the preference for "real-life" data and the ability to easily deploy the approach in an operational environment, the survey method was used in this research.

3.4.3. Case Study

It has been pointed out that the case study method enables the development of a detailed, deep and rich knowledge of a small number, or singular, case(s), (Saunders et al., 2009). Additionally, a case study has been defined as, "an in-depth exploration of one situation", and stated, "for most case studies the dimension of time is very important in developing understanding…[or] insight into dynamic processes of change" (Cornford and Smithson, 2006, pp71-72). Given that such cases were not available and that a longitudinal study was not required to fulfil the aims of this research the case study approach was rejected.

3.4.4. Other Research Methods

3.4.4.1. Literature Analysis/Conceptual/Meta-analysis

A review is a retrospective account described as, "[that] which is concerned with charting the development of a set of ideas, and with placing them within a descriptive framework" (Cornford and Smithson, 2006, p71). This approach was used in Chapter 2: The Literature Review of this research, and as a result, a meta-analysis and conceptual framework was formed. However, due to the preference for "real-life" data, this study has sought to test the frameworks that were developed, rather than using this approach as a primary research method.

3.4.4.2. Action Research

The output of action research has been described as two-fold, "Firstly, the researcher uses their theoretical knowledge to shape the activity they participate in; second, through reflection on their experience, they can relate events to prior theoretical knowledge" (Cornford and Smithson, 2006, p73). Given the lack of research using this approach (Williams et al., 2009) and given that this research has sought to devise a means of operationalising this research for practitioners this was considered as appropriate. However, due to the lack of access to a suitable target organisation, this approach has been rejected for the purposes of this study.

3.4.4.3. Content Analysis

Content analysis is a method of analysing qualitative data which is described as, "…the application of an existing categorisation scheme to the text, rather than one based on the text" (Cornford and Smithson, 2006, p148). Therefore, given the preference to deploy a mixed-methods approach, this method was used to enhance the quantitative methods (via closed questions) with qualitative methods (also open questions). That is, content analysis was applied to the qualitative data, elicited from the questionnaire, and used to augment the quantitative findings.

3.4.5. Mixed-method Research

Mixed-method research seeks to combine suitable methods of more than one type. It has been argued that;

> *[Research] approaches and strategies do not exist in isolation and can be therefore 'mixed and matched'. Not only can they, but it is often beneficial to do so. It is quite usual for a single study to combine quantitative and qualitative methods (Saunders et al., 2009, p80).*

Such claims have been criticised as a 'crude dichotomy' which confuse *data* with *methods*, however, such criticisms can also underline the basic pluralistic premise;

> *[Firstly], the distinction properly applies to the nature of data rather than the research method. Thus quantitative data, conforming to interval or ordinal scales, result from processes of measurement or counting whereas qualitative data are essentially linguistic or pictorial, representing meanings. Particular research methods, for example, questionnaires… may well generate both types of data. [Secondly], there tends to be a belief that the two cannot be mixed because of their underlying paradigms, yet in fact the current view within social research is that the two are mutually informing (Mingers, 2003, p236).*

Therefore, this research has sought to establish suitable *methods* (i.e. the aforementioned survey instrument) having devised an appropriate means of collecting quantitative and qualitative *data* (i.e. via closed and open questions).

Mono-method and mixed method research has been further differentiated, see Figure 3.3, where 'designs' 1 and/or 8 are considered 'mono-methods' and the remainder 'mixed-method' (Johnson and Onwuegbuzie, 2004. p21). As will be shown, when considering this study's; (a) aims (i.e. establishing driving and inhibiting factors in OSS adoption), (b) methods (i.e. survey instrument), (c) analysis (Fisher Exact Test, Content Analysis and Binomial Logistic Regression) and (d) proposed implementation of this research (i.e. FFA) the 'designs' incorporated in this research range from 5 to 8. Therefore, this study was designed to broadly follow a mixed-methods design.

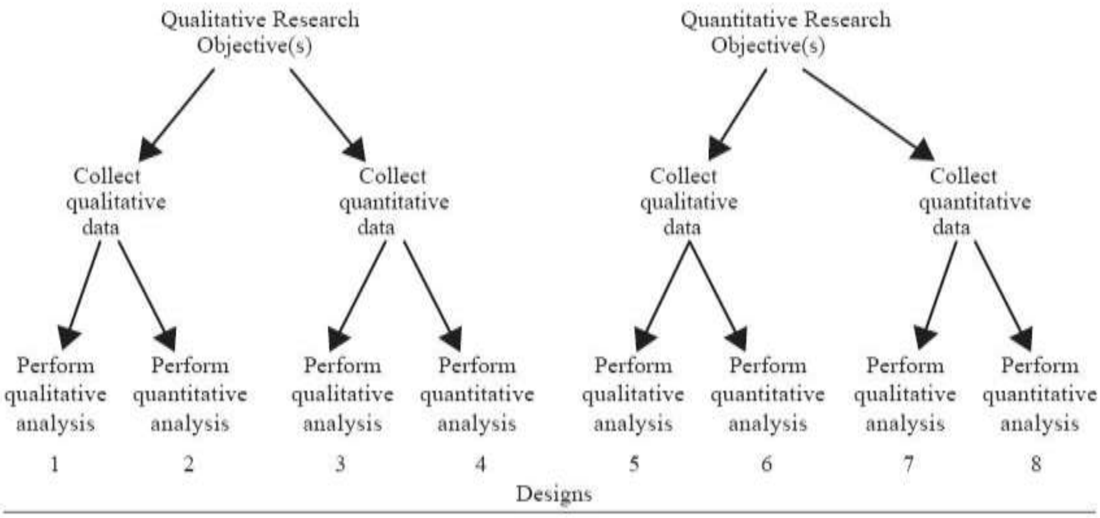


Figure 3.3: Mono-method and Mixed-method Research (Johnson and Onwuegbuzie, 2004. p21)

It has been claimed that research which does not include, "a visible effort to integrate quantitative and qualitative findings", cannot be considered 'true' mixed-methods (Venkatesh et al., 2013, p11). The same research was unable to find any IS research which fulfilled this criteria (ibid). Similarly, where there is no "serious integration of findings" such research has been described as "quasi-mixed-methods" research (Tashakkori and Creswell, 2007). Specifically, IS research has criticised such a studies, which combine quantitative and qualitative data, but do not integrate findings (Venkatesh et al., 2013, p9, See Cao et al, 2006, in Table 2). Uniquely therefore, this research has sought to appropriately combine quantitative and qualitative findings as described below.

3.4.5.1. Reasons for Using Multi-method Research

There are a number of advantages to quantitative methods that are applicable to this research. These include; the ability to test conceptual models and hypotheses, relatively fast collection and analysis of precise data, investigating cause-effect relationships, results of analysis are often repeatable and independent of researcher (i.e. objective) and such results enjoy higher credibility for those in positions of power (i.e. those interesting in implementing findings). Conversely, there are some relevant disadvantages. These include; the categories and theories selected by the research may not agree with the sample population, the hypethetico-deductive model may lead to confirmation bias or other situations in which phenomena are simply missed, and finally, results may be so abstract or general so as to confound any direct application in practice (Johnson and Onwuegbuzie, 2004, p19, Table 3).

Similarly, there are many advantages to qualitative methods that are also applicable to this research. These include; the ability to describe complex and subtle phenomena, a potential to understand personal experiences of phenomena, richer detail of phenomena in specific contexts, the production of tentative inductive theory and to determine participant's nuanced interpretations. Conversely, there are also some relevant disadvantages. These include, results typically do not generalise, testing hypotheses/theories become more difficult, more time-consuming analysis/data collection, less influence with those in positions of power and the results are not independent of (and actually more easily influenced by) the researcher (Johnson and Onwuegbuzie, 2004, p20, Table 4). Therefore, this research has sought to maximise strengths and minimise weaknesses by adopting a suitably combined mixed-methods approach.

It has been argued mixed-methods research can be pursued for a number of reasons which include; (a) 'Complementarity', defined as, "Mixed methods are used in order to gain complementary views about the same phenomena or relationships", (b) 'Completeness', defined as, "Mixed methods designs are used to make sure a complete picture of the phenomenon is obtained" and (c) 'Compensation', defined as, "Mixed methods enable to compensate for the weakness of one approach by using the other." (Venkatesh et al., 2013, p6, Table 1). Firstly, this research has sought to augment closed questions (yielding quantitative data) with open questions (yielding qualitative data) and in so doing made use of the 'complementarity' and 'completeness' of mixed-methods research as defined above (ibid). Secondly, this research has also sought to minimise the previously discussed weaknesses, described in both quantitative and qualitative approaches in this section, by making use of the above 'compensation' qualities of mixed-methods research (ibid).

3.4.5.2. Criticism of Mixed-method

IS research has argued that mixed-method approach may present considerable resource issues and may in fact require suitably experienced (and entirely separate) quantitative and qualitative research teams or specialists (Johnson and Onwuegbuzie, 2004). Therefore, this research has sought to maintain a manageable level of scope, in order to minimise this drawback. In addition, the same research has pointed out that the researcher will have to acquire skills in both approaches (ibid). This was considered an advantage in a doctoral research project such as this research.

In addition, inevitably the findings will be open to criticism from, "Methodological purists [who] contend that one should always work within either a qualitative or a quantitative paradigm" (Johnson and Onwuegbuzie, 2004, p21, Table 5). As a result, this research will endeavour to ensure that the relevant approaches are as valid as possible in terms of the respective quantitative or qualitative origins.

3.4.5.3. Mixed-method Research Design

A number of mixed-method research designs have been identified, which include; (1) Sequential, defined as, "Methods are employed in sequence with results from one feeding into the later one", (2) Parallel, defined as, "Methods are carried out in parallel with results feeding into each other", (3) Dominant (Imperialist), defined as, "One method or methodology as the main approach with contribution(s) from the other(s)", (4) Multi-methodology, defined as, "A combination of methods, embodying different paradigms, developed specifically for the task" and (5) Multi-level, defined as, "Research conducted simultaneously at different levels of an organization and using different methods" (Mingers, 2001, p252, Table 1). Considering the resource limitations and the aims of this research a combination of; firstly, the Parallel (i.e. collecting data for analysis at the same time) and secondly, the Dominant (i.e. quantitative as the main method) approaches have been identified as the most appropriate design for this study.

Having established the philosophies, approaches, methods and strategies most appropriate to this research, the remainder of this chapter will explore the data collection and analysis decisions made.

3.5. Data Collection Techniques

It has been claimed that when planning and carrying out data collection, five main areas require consideration: (i) sampling (ii) secondary data (iii) observation (iv) semi-structured or in-depth interviews and (v) questionnaires (Saunders et al., 2009, p4). IS research has also argued that problems associated with; effort required, developing a sampling frame, poor response, bias, the need to limit to well understood topics and the need for a pilot study should also be considered (Cornford and Smithson, 2006, pp113-118). These areas are discussed below.

3.5.1. Sampling

Sampling techniques can be divided into (i) probability (or representative) sampling, in which, "the chance, or probability, of each case being selected from the population is known and is usually equal for all cases"; or (ii) non-probability (or judgemental sampling), in which, "[the same probability] is not known, and it is [therefore] impossible to answer research questions or objectives that require you to make statistical inferences about the characteristics of the population" (Saunders et al., 2009, p126). It has been argued that a significant minority of quantitative IS research (22 out of 66 articles analysed) are in fact non-probability studies and has recommended a process of drawing general inferences from non-probability sampled research (Seddon and Scheepers, 2012). Therefore, owing to the response rates experienced in both pilot and main study, this research has employed non-probability sampling techniques.

3.5.1.1. Non-probability Sampling Techniques

It has been claimed that there are a number of important scenarios in which probability sampling techniques may not be possible. Firstly, "[Probability sampling] is often not possible and so [the] sample must be selected some other way… non-probability sampling provides a range of alternative techniques based on your subjective judgement" (Saunders et al., 2009, pp 141-142). Secondly, "[The] research question, objective and choice of research strategy may dictate non-probability sampling" (ibid). Finally, "Limited resources or the inability to specify a sampling frame may dictate the use of one or more non-probability sampling techniques" (ibid). For the purposes of this research, in the first instance difficulty was experienced in obtaining managers willing to participate in this research and in sufficient numbers to enable even initial analysis. Secondly, the research question, "the extent to which adoption of OSS can be shown to be a function of the salient beliefs of managers in an organisation in a given sample", does not predicate the use of statistical representation of a wider population (i.e. probability sampling). In addition, the philosophical assumptions selected for this research (i.e. those largely associated with pragmatism and the central tenets of positivism) do not necessarily require the use of generalisation and a statistically representative sample. Finally, given the response rates experienced in this research the resources necessary to achieve a representative sample were unfortunately not available. For example, in order to claim a representative sample of a population of the FTSE500 group of companies, it would be necessary to have received responses from 217 companies (43%) for a 95% margin of error (Saunders et al., 2009). So far as this research was concerned, such a response rate was simply not achievable in either pilot or main study.

3.5.1.1.1. Quota Sampling

Quota sampling, another form of sampling which is similar to probability sampling in that, the variability of the sample is considered quantifiable (Saunders et al., 2009). Therefore, for the purposes of this research, and for the same reasons probability sampling was not possible, quota sampling was also rejected.

3.5.1.1.2. Purposive or Judgemental Sampling

It has been claimed that purposive or judgemental sampling enables the researcher to use judgement to select cases which best address the study's aims and objectives (Saunders et al., 2009, p145). Therefore for the purposes of this research, participants were selected who were considered to be; (a) most likely to respond (b) who were responsible for software selection decisions and (c) who had organisationally both adopted and not adopted OSS technologies. Additionally within purposive or judgemental sampling, the same research has identified typical case sampling, in which, "an illustrative profile… of what is 'typical' to those who will read your report, and may be unfamiliar with the subject matter" (ibid). Therefore, this research has provided individual and organisational profile data to allow the reader to judge how typical the selected sample may have been.

3.5.1.1.3. Snowball Sampling

Snowball sampling is considered appropriate particular in research areas where responses are problematic and is used in such circumstances so that members of a target populations identify further members who in turn refer to further members and so forth (Saunders et al., 2009). This approach presents inherent problems with representativeness of a wider population, however the benefits include leveraging the respondents' network of contacts to identify those with similar interests. Therefore for the purposes of this research, and in view of the difficulty experienced with response rates, this study asked respondents to refer to other respondents as potential participants.

3.5.1.1.4. Self-selection Sampling

Self-selection sampling is considered an appropriate sampling technique where an individual (or organisation); communicates their desire to participate in study, includes the same issues of representativeness and are often those who fell strongly one way or another about the research topic (Saunders et al., 2009, p147). Therefore, this study has sought to remain neutral on the functional benefits of OSS selection and aim to invite respondents who are both for, against and neutral toward organisational OSS adoption.

3.5.1.1.5. Convenience Sampling

Convenience-sampling has is described as selecting case who are easy to obtain. It is widely used and is susceptible to bias and other influences (Saunders et al., 2009). Therefore for the purposes of this research, this study will seek to attract sufficient respondents to allow analysis, and ensure individual organisational profiles are explicit to illustrate bias and purposive sampling.

Having discussed the most appropriate form of sampling, the remainder of this section will return to types of data collection considered for this research.

3.5.2. Secondary Data

Secondary data can be described as re-analysing data which was originally collected for some other purpose (Saunders et al., 2009). As such, the data has usually been gathered to answer an entirely different research question, and may not prove useful for another study. So far as this research is concerned, owing to the paucity and unique nature of this research (i.e. the salient beliefs of OSS adopting and non-adopting managers) it was not possible to employ the analysis of secondary data.

3.5.3. Observation

The observation data collection technique has been described as, "the systematic observation, recording, description, analysis and interpretation of people's behaviour" (Saunders et al., 2009, p186). It has been claimed that this approach requires 'meticulous' research notes, in three phases; (a) descriptive observation, to understand the complexity of the situations, (b) focused observation, in which data relevant to the research question is gathered and (c) selective observation, in which a particular sequence of events of interest is studied (Cornford and Smithson, 2006, p124). This approach presents particular problems of access and was also considered time-consuming. For the purposes of this research, there was no opportunity to employ this data collection method and therefore it was rejected.

3.5.4. Semi-structured Interview/In-depth Interviews

The interview data collection technique has been described as, "a purposeful discussion between two or more people", and can assist, "gather valid and reliable data which are relevant to your research question(s) and objectives(s)" (Saunders et al., 2009, p210). The same research has identified three types of interviews, for instance (a) structured interviews (b) semi-structured interviews and (c) unstructured interviews (ibid). In the first instance, structured is based on a, "pre-determined… and identical set of questions", secondly semi-structured in which, "the researcher will have a list of themes and questions to be covered", and finally unstructured (or in-depth) in which, "The interviewee is given the opportunity to talk freely about events, behaviour and beliefs in relation to the topic area" (Saunders et al., 2009, p211). Therefore, mindful of the straight forward implementation framework proposed for this study, only a small number of structured-interviews were used in this research for the purposes of validation of findings.

3.5.5. Questionnaire

The questionnaire data collection method has been described as, "…all techniques of data collection in which each person is asked to respond to the same set of questions in a pre-determined order", and provides, "…the most widely used survey data collection technique" (Saunders et al., 2009, p243). Some of the issues associated with questionnaire-based research include; "effort required, developing a sampling frame, problems of poor response, problems of bias, limited to well understood topics, structure of questions and the need to pilot" (Cornford and Smithson, 2006, p114). It is claimed that the different types of questionnaire are; (a) self-administered (i.e. postal questionnaire or delivery and collection) and (b) Interviewer-administered (i.e. telephone questionnaire or structured interview) (Saunders et al., 2009). The questionnaire in this research also included a qualifying question which asked the respondent to specify the degree to which they were responsible for organisational software selection. As with other IS research, specifically in the field of technology adoption, to some extent this enabled this research to claim the aforementioned purposive (or key informant) approach (Ngai et al., 2008). The same research claimed that such key informants, "because of [their] specific knowledge, [were] in a unique position to report on the phenomena being studied" (Ngai et al., 2008, p227). It has also been argued that purposive sampling may be the most appropriate where it is not possible to assess the population with any degree of accuracy (Zhou et al., 2011, p264). Therefore, for the purposes of this research, a web-enabled version of a self-administered questionnaire was developed (i.e. BOS) and deployed in the way described above and in the next chapter.

Having described the primary means of data collection and the rationale behind it selection, the following sections will discuss the data, the collection process, the design and its administration.

3.5.5.1. The Data

The conceptual model developed for this research is partly based on TPB, which as discussed, can be considered a variance theory. This theory was developed through 'explanatory research' which is requires data to test theory, which means that, "[it is necessary] to define the theories you wish to test as relationships between variables before designing your questionnaire" (Saunders et al., 2009, p250). The same research claims it is necessary to specify; (a) what relationships are likely to exist between variables; (b) which variables are dependent (i.e. those which change in response to changes in other variables); (c) which variables are independent (i.e. those which cause changes in dependent variables); and (d) which variables are extraneous (i.e. those which might also cause changes in dependent variables providing an alternative explanation to your independent variable) (ibid). Therefore for the purposes of this research, variables will be selected for test as described in the Literature Review chapter. In addition, the variables will be categorised in line with the aforementioned TPB constructs.

3.5.5.1.1. Types of Variable

The different types of data which can be collected by way of the questionnaire technique has been described as; (a) attitude (i.e. respondents' feelings), (b) beliefs (i.e. respondents' thoughts on true/false statements), (c) behaviour (i.e. organisations' or respondents' concrete experience) and (d) attributes (i.e. organisation's or respondents' characteristics) (Saunders et al., 2009, p250). Therefore, in line with the conceptual model and the research question, respondents' attitudes and beliefs with respect to various aspects of organisational OSS adoption will be collected. In addition, and also in line with previous IS research various literature-based individual and organisational attribute data will be collected via the questionnaire (Karahanna et al., 1999).

3.5.5.2.2. Essential Data Collection

A five-stage plan for determining essential data to be collected via the questionnaire technique has been described as: (1) Descriptive or Explanatory (i.e. decide whether the research is descriptive or explanatory in nature), (2) Investigative Questions (i.e. subdivide each research question or objective into more specific investigative questions about which data is to be collected, (3) Repeat the second stage (i.e. if the investigative questions are not sufficiently precise), (4) Identify Variables (i.e. about which data will need to be collected to answer investigative question) and (5) Establish Measures (i.e. data for each variable) (Saunders et al., 2009, p252). See Figure 3.4.

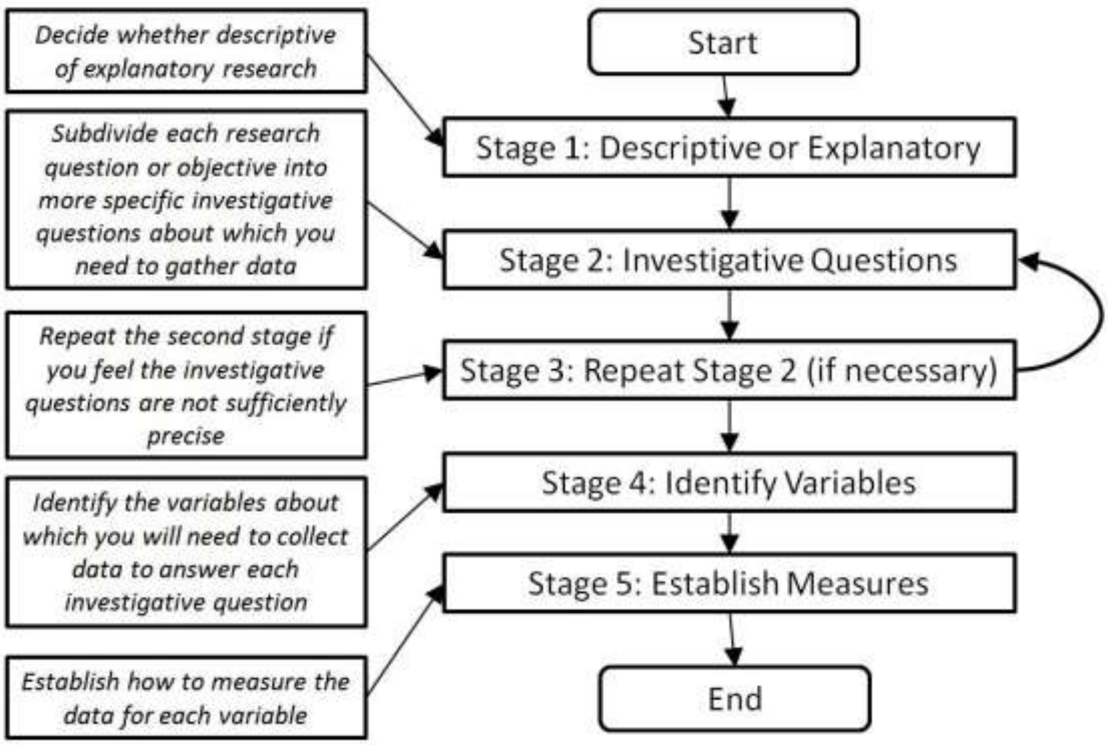


Figure 3.4: Essential Data Collection (Adapted fromSaunders et al., 2009, p252)

For the purposes of this research, firstly the nature of the research was considered explanatory as a conceptual framework had been developed which was to be tested against the data collected. Secondly, the model was based on TPB with three major constructs which, as previously described, consist of (a) attitude (b) subjective norm and (c) perceived behavioural control (i.e. driving or inhibiting factors toward OSS adoption behaviour). In addition, as previously discussed, behavioural and attribute data was collected in line with the objectives of the research (i.e. individual/organisational profile and the extent and stage of OSS adoption). Thirdly, as previously discussed, additional data was gathered as to certain variables considered important in ITG research, specifically the respondents self-reported stage-based assessment organisational OSS adoption. The last two stages are discussed in the following sections.

3.5.5.2. The Survey Instrument Design

It has been suggested that there are two types of questions commonly used in the questionnaire technique of data collection. These are open and closed questions. "Open questions allow respondents to give their answers in their own way. Closed questions provide a number of alternatives from which the respondent is instructed to choose" (Saunders et al., 2009, p255). The same research argues that open questions, "[are useful] when you require a detailed answer or when you want to find out what is upper most in the respondent's mind", and closed questions are, "usually quicker and easier to answer… [and] easier to compare as they are pre-determined" (ibid). For the purposes of this research, and in view of the previously established multi-methods research strategy, this study has sought to collect the literature-based driving and inhibiting factors of organisational OSS adoption, by closed questions, and also elicit any additional factors the respondent may wish to make via open questions.

3.5.5.2.1. Closed Questions

Closed questions were used to gather quantitative data. It has been claimed that there are six types of such questions; (1) List (i.e. where respondent is offered a list of items, (2) category (i.e. where only one response can be selected from a given set of categories, (3) ranking (i.e. where the respondent is asked to place something in order, (4) scale (i.e. in which a scaling device is used to record responses, (5) quantity (i.e. to which the response is a number giving the amount and (6) grid (i.e. where responses to two or more questions can be recorded using the same matrix (Saunders et al., 2009). The same research has pointed out that with list questions a selection of responses is offered, any of which can be chosen or unmarked (ibid). For the purposes of this research, list responses were considered too ambiguous and rejected. However, with ‘category closed questions’, each answer only fits a single category and are also mutually exclusive (Saunders et al., 2009). By making use of BOS, the system could automatically enforce these rules. Therefore, this type of closed question was selected for gathering attribute data. See Figure 3.5.


About You

Gender

2. Are you male or female? *(Optional)*

- Male
- Female

Age and tenure

3. How old are you?

- Under 20 years
- Between 20 and 30 years
- Between 31 and 40 years
- Between 41 and 50 years
- Between 51 and 60 years
- Over 60 years

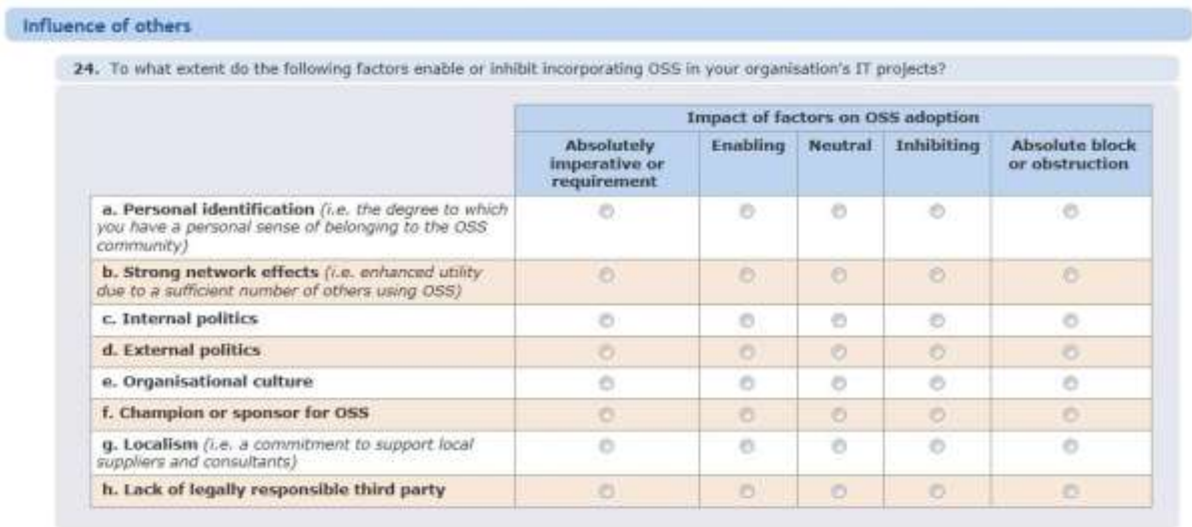
4. Please indicate your length of service at your organisation

- Under 5 years
- Between 5 and 10 years
- Between 11 and 15 years
- Between 16 and 20 years
- Over 20 years

Figure 3.5: Example of Quantitative Data Collection Using Category Closed Questions from this Study’s Questionnaire

The same research points out that the ranking type of closed question is intended to elicit the relative importance of an item to a respondent and in more complex scenarios is regarded by some respondents as too much effort (Saunders et al., 2009). Therefore for the purposes of this research, and in the interests of maximising response rates, this type of question was rejected.

It has also been suggested that that the scale (or rating) closed questions are commonly used to collect attitude or belief data. "The most common approach is the Likert-style rating scale, in which you ask the respondent how strongly they agree or disagree with a statement" (Saunders et al., 2009, p259). Psychological research has used this type of question in developing the TPB approach (Ajzen, 1991), which is important to the conceptual framework developed for this study. Therefore, for the purposes of this research and in the interests of consistency, this research will make use of the rating-scale type of question. See Figure 3.6.

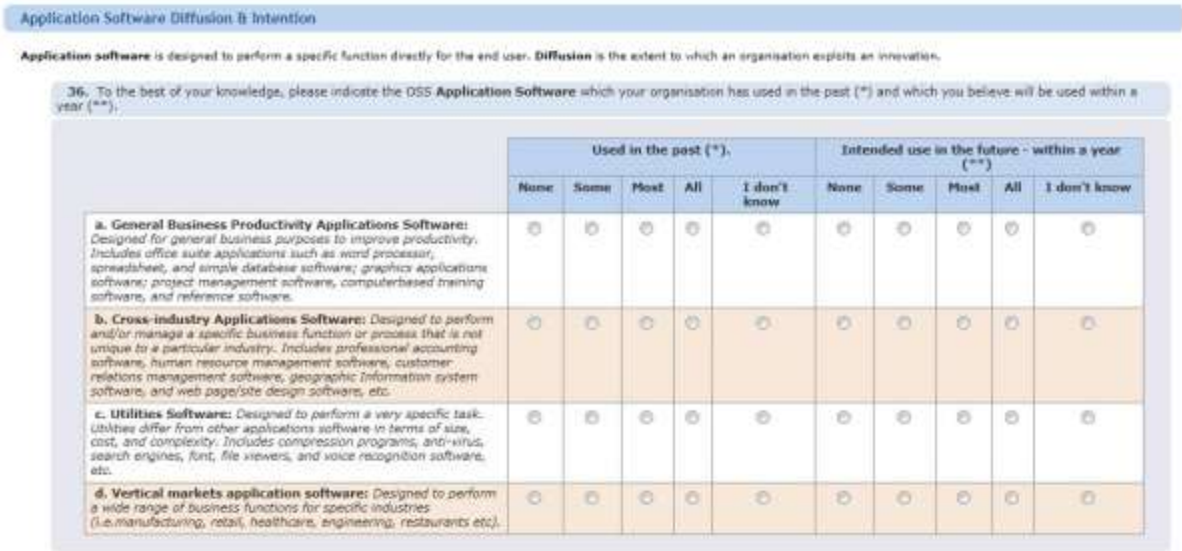

Influence of others

24. To what extent do the following factors enable or inhibit incorporating OSS in your organisation's IT projects?

	Impact of factors on OSS adoption				
	Absolutely imperative or requirement	Enabling	Neutral	Inhibiting	Absolute block or obstruction
a. Personal identification *(i.e. the degree to which you have a personal sense of belonging to the OSS community)*					
b. Strong network effects *(i.e. enhanced utility due to a sufficient number of others using OSS)*					
c. Internal politics					
d. External politics					
e. Organisational culture					
f. Champion or sponsor for OSS					
g. Localism *(i.e. a commitment to support local suppliers and consultants)*					
h. Lack of legally responsible third party					

Figure 3.6: Example of Quantitative Data Collection Using Rating Scale Closed Questions

As previously discussed, the quantity question requires the respondent to enter an amount. This was not considered necessary in establishing the driving and inhibiting factors in OSS adoption, or when gathering the associated individual and organisation attributes. This led to the quantity question being disregarded for this research. What has also been pointed out is that the grid (or matrix) type of closed question enables responses to multiple similar questions at the same, and stated, “Although using a grid save space… respondents have difficulties comprehending theses designs and that it is a barrier to response” (Saunders et al., 2009, p261). Therefore for the purposes of this research, the grid (or matrix) type of closed question was used in gathering essential OSS adoption (and intention to adopt OSS responses) but otherwise kept to a minimum. See Figure 3.7.



Application Software Diffusion & Intention

Application software is designed to perform a specific function directly for the end user. **Diffusion** is the extent to which an organisation exploits an innovation.

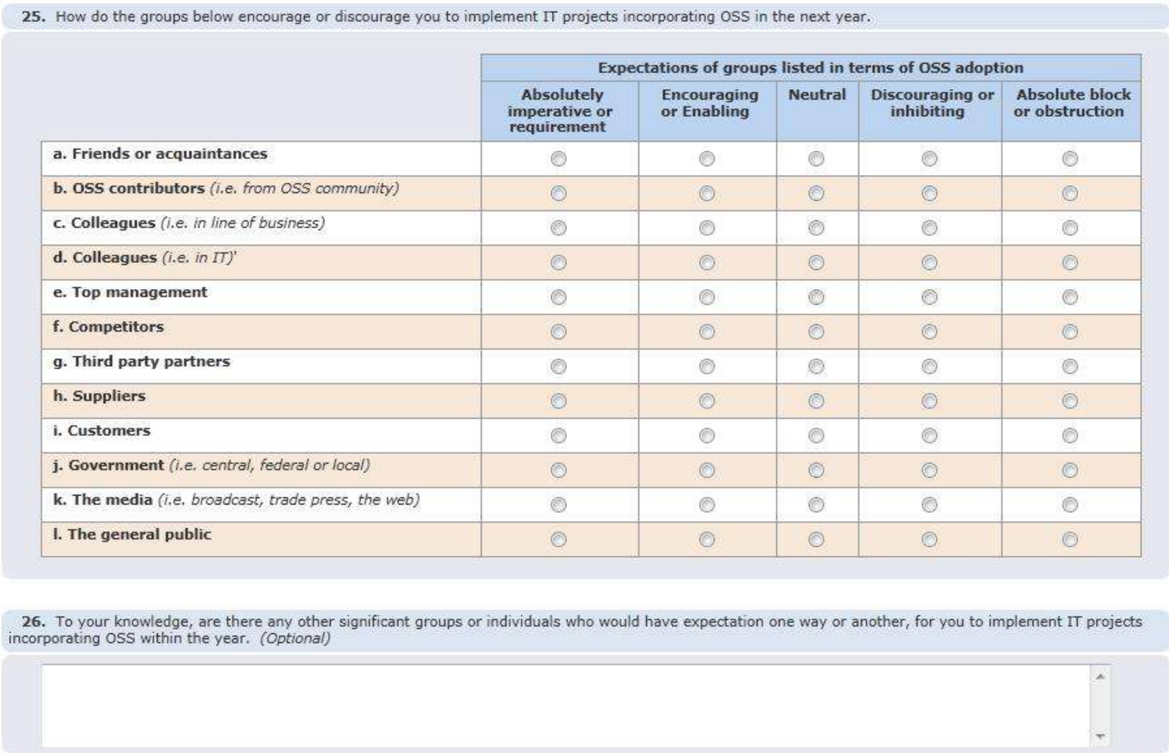
36. To the best of your knowledge, please indicate the OSS **Application Software** which your organisation has used in the past (*) and which you believe will be used within a year (**).

	Used in the past (*).					Intended use in the future - within a year (**)				
	None	Some	Most	All	I don't know	None	Some	Most	All	I don't know
a. General Business Productivity Applications Software: *Designed for general business purposes to improve productivity. Includes office suite applications such as word processor, spreadsheet, and simple database software; graphics applications software; project management software, computerbased training software, and reference software.*										
b. Cross-industry Applications Software: *Designed to perform and/or manage a specific business function or process that is not unique to a particular industry. Includes professional accounting software, human resource management software, customer relations management software, geographic Information system software, and web page/site design software, etc.*										
c. Utilities Software: *Designed to perform a very specific task. Utilities differ from other applications software in terms of size, cost, and complexity. Includes compression programs, anti-virus, search engines, font, file viewers, and voice recognition software, etc.*										
d. Vertical markets application software: *Designed to perform a wide range of business functions for specific industries (i.e.manufacturing, retail, healthcare, engineering, restaurants etc).*										

Figure 3.7: Example of Quantitative Data Collection Using Grid (or Matrix) Closed Questions

3.5.5.2.2. Open Questions

Open questions were used to gather qualitative data. Such questions are widely used in questionnaires and it has been argued that, “the precise wording of the question and the amount of space partially determine the length and fullness of response” (Saunders et al., 2009, pp255-6). The analysis of data derived from open questions is considered extremely time-consuming and should therefore be kept to a minimum (ibid). Mixed-methods IS adoption and usage research, which used closed and open questions in a questionnaire, has claimed that data from open questions provided important results which would have otherwise not been possible (Jinwei et al., 2006). For the purposes of this research, and in the interest of eliciting richer and deeper data which may have otherwise been overlooked, this study will make use of an open questions in combination with closed questions. See Figure 3.8.



25. How do the groups below encourage or discourage you to implement IT projects incorporating OSS in the next year.

	Expectations of groups listed in terms of OSS adoption				
	Absolutely imperative or requirement	Encouraging or Enabling	Neutral	Discouraging or inhibiting	Absolute block or obstruction
a. Friends or acquaintances					
b. OSS contributors *(i.e. from OSS community)*					
c. Colleagues *(i.e. in line of business)*					
d. Colleagues *(i.e. in IT)'*					
e. Top management					
f. Competitors					
g. Third party partners					
h. Suppliers					
i. Customers					
j. Government *(i.e. central, federal or local)*					
k. The media *(i.e. broadcast, trade press, the web)*					
l. The general public					

26. To your knowledge, are there any other significant groups or individuals who would have expectation one way or another, for you to implement IT projects incorporating OSS within the year. *(Optional)*

Figure 3.8: Example of Quantitative and Qualitative Data Collection (i.e. Closed Followed by Open Question)

3.5.5.2.3. Form Design

It has been claimed that the order, flow and layout of a questionnaire is important to achieve a reasonable response rate (Saunders et al., 2009). For this reason the questionnaire began with a covering letter explaining the research, the overall structure and estimated time required. Figure 3.9: Questionnaire Covering Letter.

Welcome to the Open Source Software (OSS) Survey

Dear Sir/Madam

Thank you for participating in the OSS survey.

There has been widespread academic and industrial acclaim for the benefits of Open Source Software (OSS) and yet organisational adoption rates remain low compared to traditional proprietary alternatives. This survey seeks to investigate some of the motivating and inhibiting factors involved in the adoption of OSS.

This survey is divided into ten parts and should take around half an hour to complete.

1 - Welcome
2 - The survey
3 - About you
4 - Your role
5 - Your organisation
6 - Your attitude toward OSS
7 - Influence and behaviour of others; and OSS
8 - Ability to act and OSS
9 - Past behaviour, future intention and OSS
10 - Request for summary report

If you would like to receive a summary report of this research please remember to complete your contact details at the end. Your responses will remain anonymous.

Yours faithfully

Neil Greenley, Doctoral Candidate, University of Hertfordshire

n.greenley@herts.ac.uk

Dr Jyoti Choudrie, Supervisor, University of Hertfordshire

j.choudrie@herts.ac.uk

Figure 3.9: Questionnaire Covering Letter

3.5.5.3. The Survey Instrument Administration: Bristol On-line Survey (BOS)

Having developed the survey instrument to establish the salient factors the questionnaire was loaded on to an on-line web system known as BOS for pre-test, pilot and main study surveys. The BOS system is subscribed to by 130 universities, including the University of Hertfordshire, which meant there were no additional licensing costs. This enabled the data to be efficiently and inexpensively collected and stored in a format which could be subsequently loaded into statistical packages such as MS Excel and SPSS for analysis. Commercial survey systems were rejected largely due to cost. Developing a bespoke on-line survey tool was considered time-consuming and also rejected.

Having discussed the philosophy, method, data collection, including the; development, design and administration of the questionnaire, the remainder of this chapter will discuss the data analysis procedure used in this study.

3.6. Data Analysis

3.6.1. Quantitative Analysis

3.6.1.1. The Quantitative Data

Quantitative data is normally associated with 'extensive research' which involves gathering 'superficial or thin' information about a relatively large number of cases (Mingers, 2003). Types of quantitative data have been described as categorical (i.e. descriptive and ranked) and quantifiable (i.e. continuous and discrete) ranging from descriptive data (low precision) to discrete (high precision) (Saunders et al., 2009, p289). See Figure 3.10: Data Typology . This research will select the type of data most suited to the previously established scope, aims and objectives.

<table>
<tr><td colspan="4" align="center">Data</td></tr>
<tr><td colspan="2" align="center">Categorical Data</td><td colspan="2" align="center">Quantifiable Data</td></tr>
<tr><td align="center">Descriptive Data</td><td align="center">Ranked Data</td><td align="center">Continuous Data</td><td align="center">Discrete Data</td></tr>
<tr><td colspan="4">Low Precision   Medium Precision   High Precision</td></tr>
</table>

Figure 3.10: Data Typology (Adapted from Saunders et al., 2009, p289)

Categorical data has been described as that which can be distinguished by characteristics or ranking, and stated, "data whose values cannot be measured numerically but can either be classified into sets (categories) according to the characteristics in which you are interested, or placed in rank order… [i.e.] counted to establish which category has the most… [as such] ranked (or ordinal data) are more precise" (Saunders et al., 2009, p289).

Quantifiable data is that which has numerical value, and stated, "[that which] values you actually measure… [and one can] assign each data value a position on a numerical scale" (ibid). Quantifiable data can be further divided between (a) continuous data which, "can theoretically take any value", dependent on accuracy of measuring equipment and (b) discrete data which, "can be measured precisely", and normally integer values of discrete units or counts (e.g. number of organisations who have or have not adopted OSS) (Saunders et al., 2009, pp289-90). For the purposes of this research, and by reason of making use of the self-reported salient beliefs of manager's whose organisations have (or have not) adopted OSS software, ranked and continuous data are rejected and descriptive and discrete data will be used to establish if salient beliefs and organisational OSS adoption behaviours are associated.

3.6.1.1.1. Statistical Analysis

The relevant research question which required testing for this section is: How does a manager's self-reported salient beliefs with respect to various factors associated with OSS (i.e. independent variables) relate to self-reported organisational OSS adoption (i.e. dependent variables, specifically groups of OSS adopters or non-adopters). It is claimed that the most suitable method for establishing whether two categorical variables are significantly associated (also known as a test of independence) is Chi-square analysis (Saunders et al., 2009). The way in which statistical analysis achieves this is by, "[stating] the likelihood of the relationship occurring by chance (i.e.) significance", and, "If the probability of your test statistic having occurred by chance is very low (i.e. usually 0.05 or lower), then you have a significant relationship)" (Saunders et al., 2009, pp316-7). Therefore, so far as the quantitative part of this study was concerned, Chi-square type analysis was considered the most appropriate statistical technique.

3.6.1.1.2. Non-parametric Adoption and Usage Research

IS research specifically in the field of adoption and usage of technology have also collected a sample size similar to this research (i.e. N=38). As a result that study decided to use non-parametric methods of analysis, "Because of the limited sample size and inadequate distributional properties for most of the variables... ...non-parametric tests were used to analyse the data" (Barbosa and Musetti, 2010, p795). As this was also the case in this study, non-parametric analysis was considered appropriate for this research.

3.6.1.1.3. Chi-square Analysis & Fisher's Exact Test

As discussed, it has been claimed that Chi-square analysis can be used to determine whether the values associated with the data summarised in a two way (2x2) contingency table are independent or associated. However, it has also been claimed that this process is not suitable for 2x2 tables in which cell values are lower than 10 (Hays, 1994, cited in Saunders et al., 2009, p317). Furthermore, it has also been claimed that the Chi-square procedure should not be used where a cell value falls below 5 (Fisher, 1925, cited in Yates, 1984, p428), also known as, "the rule-of-five violation" (Small and Yasin, 2000, p396, Table IV). Owing to the small sample size in both pilot study (N=32) and main study (N=45, quantitative and N=25 qualitative) this scenario was found to be a frequent occurrence throughout the analysis phase of this research. Therefore, Chi-square analysis was replaced by Fisher's Exact Test which has no such cell restrictions (Field, 2005, p690).

SPSS automatically switches from Chi-square to Fisher's Exact Test when the package detects the aforementioned 'rule of five' violation. As will be discussed in the next chapter, MS Excel contains the 'hyper-geometric' probability function, which is a core calculation in Fisher's Exact Test and can be used as a leading indicator for this analysis. Similarly, MS Excel 'add-in' functions are also available to generate Fisher's Exact Test. Figure 3.11 provides an example contingency table and the associated hyper-geometric formula.

	Men	Women	Row Total
OSS Adoption	a	b	a + b
No OSS Adoption	c	d	c + d
Column Total	a + c	b + d	a + b + c + d (=n)

$$p = \frac{\binom{a+b}{a}\binom{c+d}{c}}{\binom{n}{a+c}} = \frac{(a+b)!\ (c+d)!\ (a+c)!\ (b+d)!}{a!\ \ b!\ \ c!\ \ d!\ \ n!}$$

Figure 3.11: Example Contingency Table and Associated Hyper-geometric Formula (Adapted from SPSS Manual)

Similar non-parametric analytical techniques have been used elsewhere in IS research (Harman and Koohang, 2005, Farzandipour et al., 2009), in adoption and usage research (Zhou et al., 2011) and specifically in adoption and usage research with similar small sample sizes (i.e. N=47) (Small and Yasin, 2000). Uniquely, however, this study is the only research which has made use of Fisher's Exact Test in the field of organisational OSS adoption and usage.

3.6.1.1.4. Strength of Association

IS research has claimed that having found a relationship which is of statistical significance it is also important to establish the 'strength' of the relationship and one such method is to calculate is the *phi (Φ)* correlation coefficient (Cornford and Smithson, 2006, p139). In organisational research, social research and psychological research the following interpretations are recommended; (a) 'small' 0.1 (or -0.1), (b) 'medium' 0.3 (or -0.3) and 'large' 0.5 (or -0.5) (Field, 2005, p57, Cohen and Cohen, 1975, cited in Dewberry, 2004, p47). Therefore, so far as this research is concerned, this technique will be used to establish the strength of relationships between statistically significant factors and organisational OSS adoption behaviours.

3.6.1.2. Summary of Quantitative Analysis

Figure 3.12 provides an overview of the quantitative research process for the main study: Firstly, quantitative data was gathered via the questionnaire. Secondly, the proposed independent variables were collated (based on the factors drawn from the literature), as well as the various dependent variables (also based on the existing literature). Thirdly, the aforementioned groups were tested for independence, via the Fisher's Exact Test statistical procedure described earlier. Finally, the driving and inhibiting factors are quantitatively established and presented in relation to the pre-determined organisational OSS adoption behaviours.

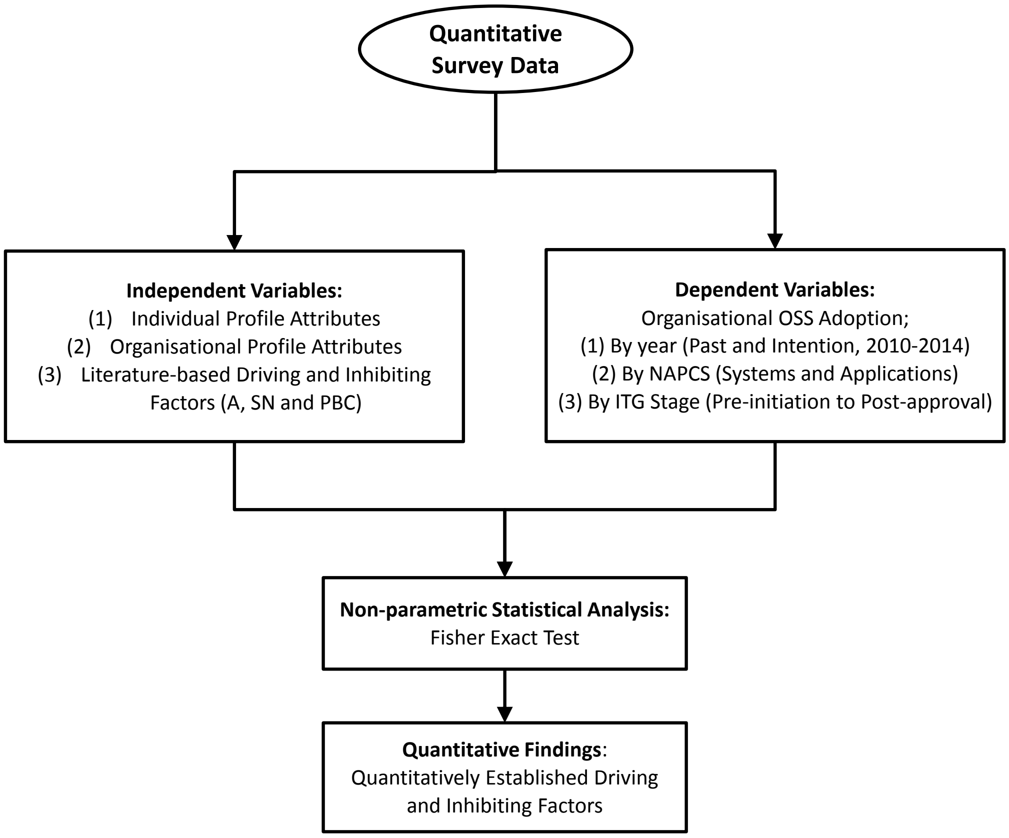


Figure 3.12: Quantitative Research Analysis Overview (Adapted from Barbosa and Musetti, 2010, p794, Figure 2)

Having discussed the quantitative analytical techniques deployed in this research the next section will consider the qualitative forms of analysis which were selected.

3.6.2. Qualitative Analysis

Qualitative data is normally associated with 'intensive research', in which the aim is to understand specific 'causal structures and meaning systems' in a relatively small number of cases (Mingers, 2003). IS research has pointed out that qualitative data is predominantly textual, "with a richness that can be easily lost when we attempt to aggregate or summarise it", and has argued that researchers should consider the pros and cons of inductive versus deductive, as well as (i) data preparation (ii) coding and (iii) sequential analysis (Cornford and Smithson, 2006, pp144-9). A discussion of these points now follows.

3.6.2.1. Inductive, Deductive and Abduction

As discussed previously, there are two analytical strategies in relation to qualitative data (a) deductive, in which, "a theoretical or descriptive framework [is used] to analyse qualitative data" and (b) inductive, in which, "qualitative data [is explored] without a pre-determined theoretical or descriptive framework" (Saunders et al., 2009, p348). What has also been learnt is that when applying the mixed-methods approach, IS research has de-emphasised the deduction-induction dichotomy in favour of abduction (i.e. alternating between the two as necessary) and rejects any 'incompatibility thesis' (Maxcy, 2003, cited in Venkatesh et al., 2013, p17). Furthermore, it should be noted that for the purposes of this research open questions, which yielded qualitative responses, were used specifically; (a) to ask respondents/participants to offer additional factors (i.e. not previously mentioned in the closed questions) and (b) those open questions were optional (and may have been ignored by respondents/participants for whatever reason). Therefore, only a subset of the sample is represented qualitatively. However, important information was considered to be contained in such responses and therefore the appropriate qualitative analyses were selected bearing in mind the scope, aims and objectives of this research.

3.6.2.2. Qualitative Data Preparation

IS research has pointed out specific challenges with respect to managing qualitative data and recommended that (a) data are catalogued and categorised (b) memos are written which detail important insights as they occur and (c) the sequence of events and actions are observed and recorded (Cornford and Smithson, 2006, p146). Therefore to achieve this, a Computer Aided Qualitative Data Analysis Software (CAQDAS) known as WeftQDA[3] was used. This particular software was chosen as a demonstration of it use was provided at a DBA cohort session by a recently graduated doctoral candidate. Other commercial packages were rejected based on cost. This software has a number of key features which include; (a) documents were easily imported and exported, (b) character-level

[3] WeftQDA was downloaded from http://www.pressure.to/qda/

coding was used to categorise in a tree-structure, (c) memos were categorised and documented and (d) the search facility was also used extensively.

3.6.2.3. Coding Analysis

IS research has claimed that the purpose of coding data is to assign meaning to data according to an emergent or pre-determined conceptual model, and stated, "Unlike the coding of quantitative data [qualitative data coding] necessitates a fair amount of interpretation" (Cornford and Smithson, 2006, pp147-8). The same research has proposed three coding techniques (1) Theoretical coding (2) Thematic coding and (3) Content Analysis (ibid).

The theoretical coding process begins with combining all the qualitative data and assumes no pre-determined theory or model (Cornford and Smithson, 2006). Although the questionnaire was nominally structured around TPB and its constructs, mindful of a straight forward process for implementing this research in an operational setting, the qualitative data were combined and then thematically coded for analysis. In contrast, it has been pointed out that thematic coding assumes a pre-determined question or theory, and that, "Open and selected coding are carried out for each interviewee so that themes and categories are developed on a case by case basis… [then] compared across cases" (Flick, 1995, cited in Cornford and Smithson, 2006, pp147-8). This type of analysis, i.e. compared across case, primarily took place when the qualitative and quantitative data were combined. Therefore, so far as the qualitative part of this research is concerned, this approach was only partially used.

It has been argued that, unlike theoretical or thematic coding, content analysis requires a pre-existing categorisation scheme, and has stated, "There is typically a quantitative (counting) element, as the frequency of keywords (terms) is produced, as well as more qualitative interpretation of text" (Cornford and Smithson, 2006, p148). In the sense that there were pre-existing categories, i.e. as used in the questions and derived from the literature review, this approach was used. However, the primary purpose of the qualitative data derived from the open questions was to elicit any further driving and inhibiting factors to OSS adoption. In this sense the former analytical approaches were used.

3.6.2.4. Summary of Qualitative Analysis

Figure 3.13 provides an overview of the qualitative research process for the main study: Firstly, the qualitative data was gathered via the questionnaire. Secondly, relevant factors were identified via content analysis; either from the literature-based factors already identified or any factors which emerged from the data. Additionally, factors were categorised as driving, inhibiting or neutral with respect to organisational OSS adoption. Finally, factors were presented as qualitatively established driving, inhibiting or neutral factors.

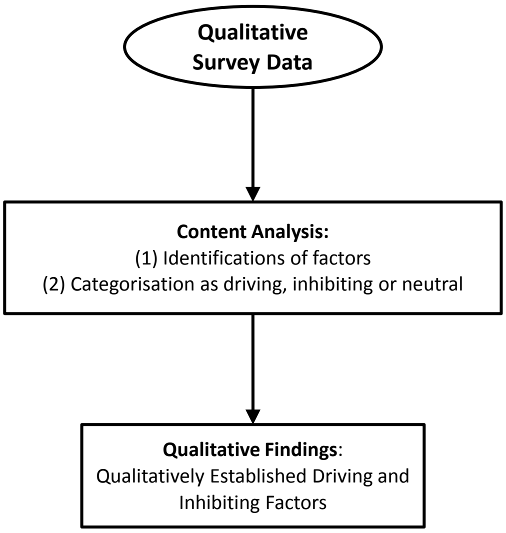


Figure 3.13: Qualitative Research Analysis Overview

Having discussed the qualitative forms of analysis which were used in this research, the next section will discuss the mixed-methods forms of analysis.

3.6.3. Mixed-methods Analysis

A sophisticated seven-stage conceptualisation of mixed-method data-analysis has been proposed, which was considered beyond the scope of this study. However, that conceptualisation recommends a process of 'data consolidation', in which, "both quantitative and qualitative data are combined to create new or consolidated variables or data sets" (Onwuegbuzie and Teddlie, 2003, cited in Johnson and Onwuegbuzie, 2004, p22). Therefore for the purposes of this research, this process will be incorporated into the mixed-methods approach adopted by this research.

Figure 3.14 illustrates how qualitative findings were consolidated with quantitative dependent variables (i.e. mixed-methods) to establish whether there was a significant relationship between qualitative findings and self-reported organisational OSS adoption behaviour. Firstly, quantitative data was gathered via the questionnaire and qualitative findings from the aforementioned procedure. Secondly, the proposed independent variables were collated based on the factors drawn from the qualitative findings, as well as the various dependent variables drawn from the quantitative data. Thirdly, the aforementioned groups were tested for independence, via the Fisher's Exact Test statistical procedure described earlier. Finally, the driving and inhibiting factors are established and presented in relation to the pre-determined organisational OSS adoption behaviours as mixed-methods findings, by virtue of the 'data consolidation' described above (Onwuegbuzie and Teddlie, 2003, cited in Johnson and Onwuegbuzie, 2004, p22).

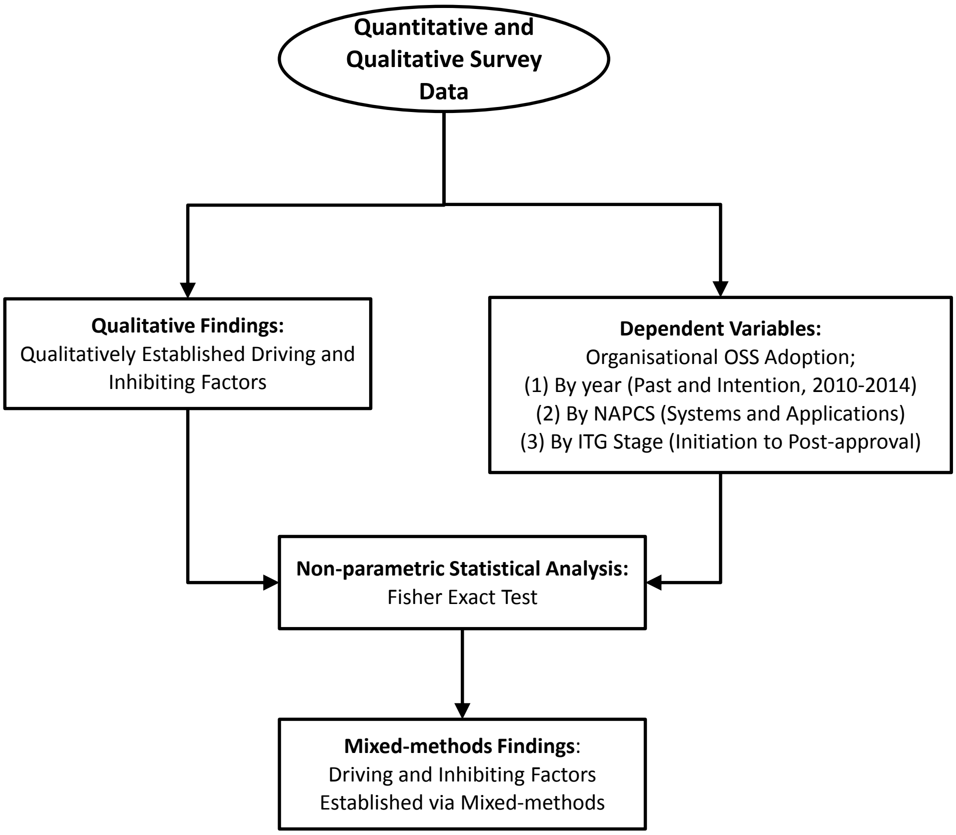


Figure 3.14: Mixed-methods Steps of Data Analysis

Furthermore, as will be discussed later, IS research has criticised studies which claim to have carried out mixed-methods approaches, but failed to consider 'true meta-inferences' (i.e. results which could not have been established using mono-methods approaches) (Venkatesh et al., 2013). Therefore, this research has sought to combine findings as described in Figure 3.15.

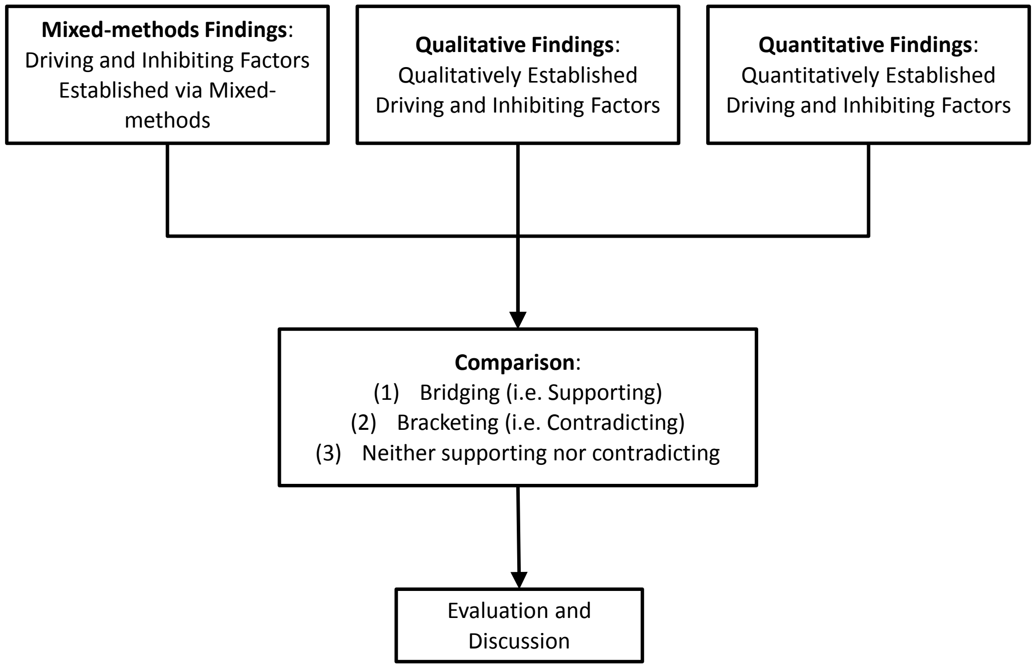


Figure 3.15: Comparison of Mixed-methods Findings

3.7. Evaluation of the Multi-method Approach

3.7.1. Credibility

Concerns about credibility of research findings can be described as, “scientific methodology needs to be seen for what it truly is, a way of preventing me from deceiving myself in regard to my creatively formed subjective hunches which have developed out of the relationship between me and my material” (Rogers, 1961, cited in Saunders et al., 2009, p81). With respect to qualitative and quantitative research and the combination thereof, it has also been argued that; conceptual models, coding variables and the avoidance of spurious results are common to both approaches (Cornford and Smithson, 2006). The resulting ‘meta-inferences’ or, “integrative findings from both quantitative and qualitative studies“, can be evaluated using the following criteria; (1) Purpose of mixed-methods research, (2) Methods Employed and Paradigm Selection (i.e. quantitative/positivist, qualitative/interpretative and dominant method), (3) Meta-inferences and (4) Discussion of Validation (i.e. quantitative, qualitative and meta-inferences) (Venkatesh et al., 2013, p10, Table 2).

The same research identified 31 mixed-methods IS research papers of which one paper (which was identified as similar in design to this research) was evaluated against the above criteria: (1) Complementarily, (2) Quantitative Survey/Positivist, Qualitative (i.e. open questions)/Positivist and with Quantitative as dominant method (3) No meta-inferences and (4) No discussion on validation (quantitative, qualitative or meta-inference), (Venkatesh et al., 2013, p9, See Cao et al, 2006, in Table 2). Therefore for the purposes of this research, the same criteria will be used to assess this study’s claims of having deployed mixed-methods research. See Chapter 6: Evaluation of Research and Discussion, p229 for a more in-depth description.

3.7.2. Triangulation

Saunders et al. (2009) argue that one of the advantages of the mixed or multi-methods approach is that a degree of ‘triangulation’ may take place which, “… refers to the use of different data collection methods within one study in order to ensure the data are telling you what they think they are telling you" (Saunders et al., 2009, p80). So far as this research was concerned, results from quantitative and qualitative data collected via survey instrument were compared with results from qualitative data collected from semi-structured interviews with key informants from buy-side and sell-side organisations. See Chapter 6: Evaluation of Research and Discussion, p229 for a more in-depth description.

3.7.3. Validity and Verification

Saunders et al. (2009) also argue that the validity of findings is, "… concerned with whether the findings are really about what they appear to be about. [i.e.] Is the relationship between the two variables a causal relationship?" (Saunders et al., 2009, p82). Once again, the potential for a lack of validity in this study was reduced by comparing results with findings from the buy-side and sell-side semi-structured interviews. See Chapter 6: Evaluation of Research and Discussion, p229 for a more in-depth description. Additionally, the extent to which the findings of this research supported previous research was also discussed. See Section 6.6: Discussion and Comparison with Other Research, p265 for a more detailed description.

3.8. Summary

In order to answer the research question, aims and objectives; the broad methodological decisions described in this chapter are summarised in Table 3.1: Overview of Methodological Decisions.

Research Domain	Example Options	Decision-making Criteria/Rationale/Comment
Design	PhD and DBA	Common doctoral practice (Phillips and Pugh, 2007) and UoH Doctoral College Handbook.
Philosophical Assumptions	Positivism	Potentially over-used in IS research (Williams et al., 2009) but provides cultural credibility possibly essential to successful implementation of findings in practice (Cornford and Smithson, 2006)
	Beyond Positivism	Under-utilised in IS research with large scope for unique research contributions (Williams et al., 2009).
	Pragmatism	Freedom to draw on positivist techniques and use "practical adequacy" as the most important test (Johnson and Duberley, 2000). Most appropriate for mixed-methods research (Johnson and Onwuegbuzie, 2004).
Approach	Inductive/Deductive	Commonly associated with analysing qualitative and quantitative data respectively (Cornford and Smithson, 2006)
	Abduction	Associated with mixed methods and involves alternating between the above as necessary (Venkatesh et al., 2013)
Method & Strategy	Experiment	Rejected owing to resource constraints and preference for "real-life" data.
	Survey	Selected due to ease-of-use both for research and proposed implementation purposes and ability to collect qualitative and quantitative data.
	Case Study	Rejected as no suitable case(s) were available
	Others	Other approaches were considered and rejected (see narrative) with the exception of content analysis which was easily implemented as part of the survey and enabled mixed-methods.
	Multi/mixed-methods	Considered advantageous to use complementary toolkits of quantitative and qualitative approaches (Cornford and Smithson, 2006)
Data Collection Sampling	Probability	Not possible to obtain statistically representative sample which is common in IS research (Seddon and Scheepers, 2012)
	Non-probability	Used a variety of sampling techniques available in non-probability sample situations (Saunders et al., 2009)
Empirical Data Collection	Secondary Data	No secondary data available for addressing the research question.
	Observation	No opportunity to deploy observational techniques
	Semi-structure/In-depth	Due to time constraints used only minimally in validation.
	Questionnaire	Selected as the most efficient means of obtaining "real-life" qualitative and quantitative data.
Data Analysis	Quantitative	Fisher's Exact Test as the most appropriate means of analysing quantitative data set and mixed methods
	Qualitative	Content Analysis as the most efficient means of analysing qualitative data set.
	Multi-methods	Meta-inferences established as a result of combining quantitative and qualitative methods and data (Johnson and Onwuegbuzie, 2004, Venkatesh et al., 2013).
Evaluation	Validation of Quantitative	Using widely used methods associated with quantitative research (Venkatesh et al., 2013) i.e. Binomial Logistic Regression.
	Validation of Qualitative	Using widely used methods associated with qualitative research (ibid) i.e. Supply-side and Demand-side key informant.
	Validation of Meta-inferences	Using combination of methods specifically devised for mixed methods IS research (ibid) as for quantitative and qualitative approaches (above).

Table 3.1: Overview of Methodological Decisions

Chapter 4: Pre-test and Pilot Analysis, Findings and Discussion

4.1. Introduction

Having determined an appropriate research methodology and identified theoretical foundations for this research, this chapter now describes the pilot study. The reasons for a pilot study include; (a) refine the survey instrument to ensure ease-of-use, (b) establish that the required data is collected, (c) allow 'preliminary analysis' such that the research question can be answered (Saunders et al., 2009, p269). Therefore, this chapter will describe the initial development of the survey instrument which incorporated closed questions using Likert-type scales (yielding quantitative data), proposed literature-based factors (i.e. the self-reported driving and inhibiting forces) and the initial performance of the conceptual framework.

4.2. Preparation for Data Collection

The survey instrument was based on a number of theories and factors which have been successfully used in previous OSS/IS adoption research. For example, questions derived from TPB incorporated psychological constructs and self-reported salient beliefs of those considering particular behaviour (i.e. adoption of OSS). As previously discussed, TPB proposes that future behaviour is predicated by intention, which is predicated by a set of salient beliefs. The salient beliefs are categorised as: Firstly, by attitudes toward the behaviour (i.e. organisational OSS adoption); secondly, by subjective norm or the expectations and behaviours of others; and thirdly by PBC or the individual's ability to act (Fishbein and Ajzen 2010). The theoretical constructs were operationalised by devising questions based on various factors which were derived from existing IS research in the field of adoption and usage.

4.3. Pre-test

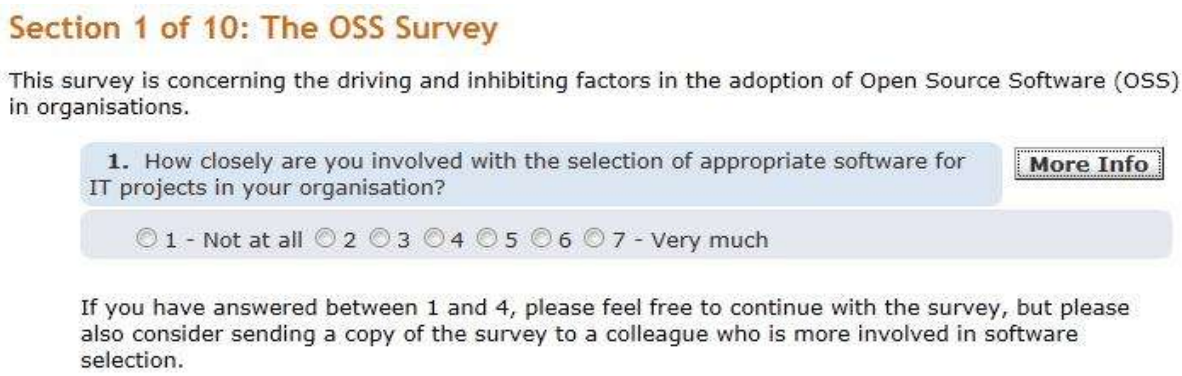
IS research has identified a number of elements which should be taken into consideration during pre-test of a survey instrument, including, (a) the length of the instrument, (b) the format of the scales and (c) construct validity (Karahanna et al., 1999, p191). Convenience and purposive sampling are common non-probability sampling techniques (Saunders et al., 2009). Therefore, a convenience and purposive sample of experienced pre-sales engineer co-workers was utilised as key informants to help address some of these elements, and asked to assess the questionnaire in face to face interviews. The participants were asked to complete the questionnaire and make any comments they perceived as pertinent. See Appendix L: Pre-test Feedback from Purposive Sample of Pre-sales Engineers.

4.3.1. Length of the Instrument

It has been argued that questionnaire fatigue as an important barrier to participation in surveys (Saunders et al., 2009). Therefore, it was considered important to keep the length of the questionnaire to a minimum and assess the length of time required to complete the survey. From the example interview, one pre-test participant suggested that a progress bar would allow respondents to gauge progress and assess how much time was needed to complete the survey. Therefore as a result of the pre-test exercise, the questionnaire was modified using some Hyper Text Mark-up Language (HTML) code to include a progress bar graphic. The BOS application has a feature which allows survey administrators to append code to the application. The pre-test also showed that it would take more than 45 minutes to complete the survey, and a goal was suggested to simplify the questionnaire so that its completion could be reasonably expected to take less than half an hour.

4.3.2. Format of the Scales

As previously discussed, research has identified that Likert scales are commonly used to establish the extent to which respondents agree with particular statements (Burns and Bush, 2007). Figure 4.1 shows an example of such a scale which was used to qualify the extent to which the respondent was involved in software selection and as a referral mechanism for other potential respondents.



Section 1 of 10: The OSS Survey

This survey is concerning the driving and inhibiting factors in the adoption of Open Source Software (OSS) in organisations.

1. How closely are you involved with the selection of appropriate software for IT projects in your organisation? **More Info**

○ 1 - Not at all ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 - Very much

If you have answered between 1 and 4, please feel free to continue with the survey, but please also consider sending a copy of the survey to a colleague who is more involved in software selection.

Figure 4.1: Example of Likert Scale and First Purposive Sampling Question

The same research described a variation of such a scale as a, "semantic differential scale", in which respondents choose from one extreme to another, e.g. extremely relevant to extremely irrelevant (Burns and Bush, 2007). See Figure 4.2.

Attitudes Toward Open Source Software (OSS)

18. For me to implement an IT project incorporating OSS within the year is

○ 1 Extremely good ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 Extremely bad

19. For me to implement an IT project incorporating OSS within the year is

○ 1 Extremely valuable ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 Extremely worthless

20. For my organisation to implement and IT project incorporating OSS within the year is

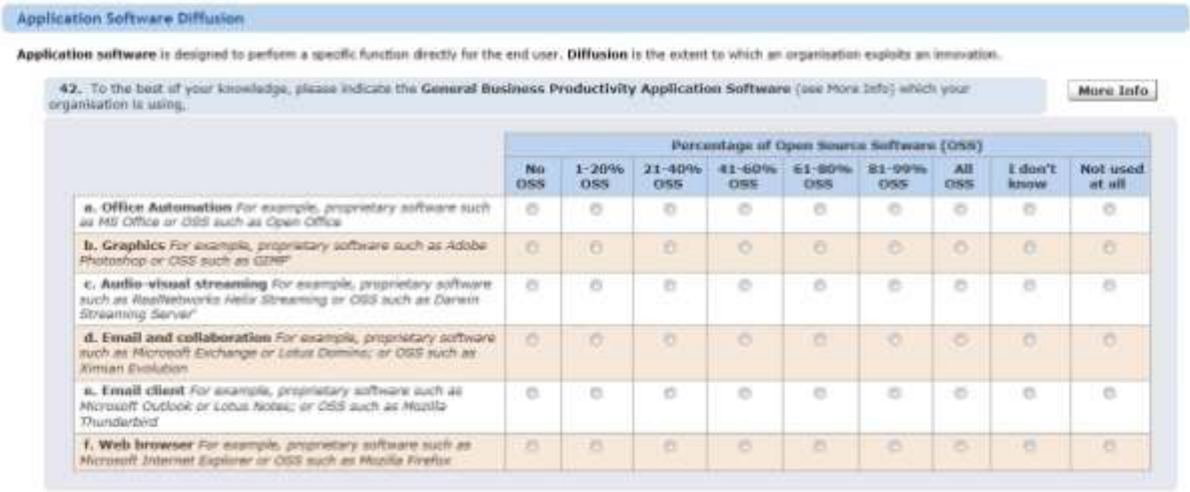
○ 1 Extremely beneficial ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 Extremely detrimental

21. Whether or not I implement an IT project incorporating OSS is

○ 1 Extremely relevant ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 Extremely irrelevant

Figure 4.2: Example of Semantic Differential Scale

Further feedback from pre-testers led to simplification of the diffusion section of the questionnaire. For example, one respondent suggested that (a) intention and adoption questions should be combined and (b) attempts to list PS and OSS alternatives were too complicated. See Figure 4.3.



Application Software Diffusion

Application software is designed to perform a specific function directly for the end user. **Diffusion** is the extent to which an organisation exploits an innovation.

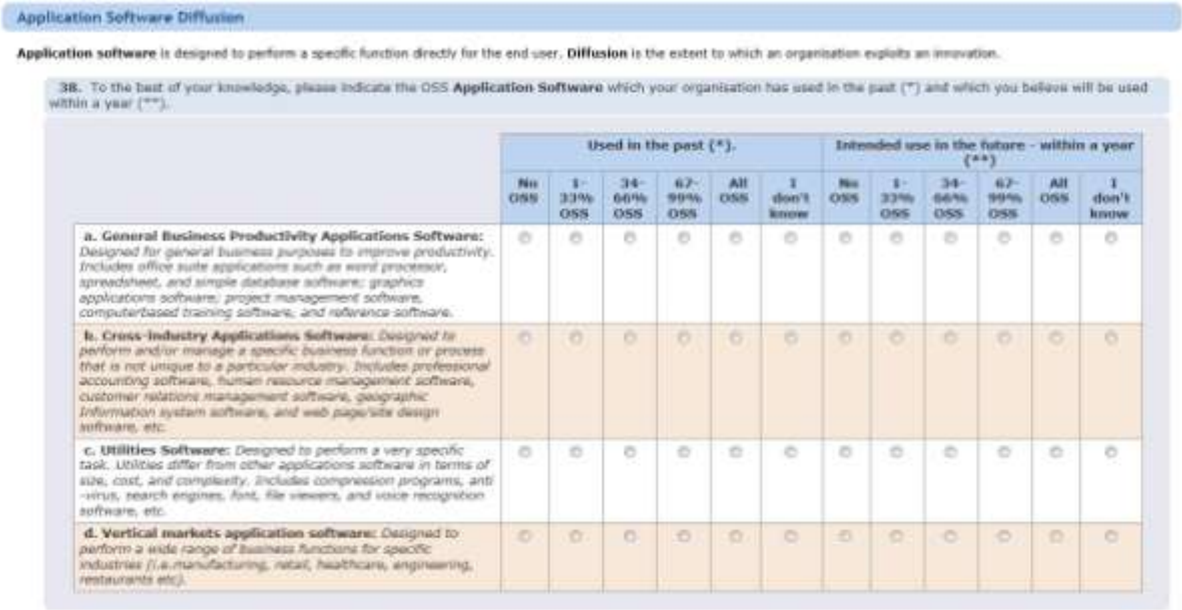
42. To the best of your knowledge, please indicate the **General Business Productivity Application Software** (see More Info) which your organisation is using.

More Info

	Percentage of Open Source Software (OSS)								
	No OSS	1-20% OSS	21-40% OSS	41-60% OSS	61-80% OSS	81-99% OSS	All OSS	I don't know	Not used at all
a. Office Automation *For example, proprietary software such as MS Office or OSS such as Open Office*									
b. Graphics *For example, proprietary software such as Adobe Photoshop or OSS such as GIMP*									
c. Audio-visual streaming *For example, proprietary software such as RealNetworks Helix Streaming or OSS such as Darwin Streaming Server*									
d. Email and collaboration *For example, proprietary software such as Microsoft Exchange or Lotus Domino; or OSS such as Ximian Evolution*									
e. Email client *For example, proprietary software such as Microsoft Outlook or Lotus Notes; or OSS such as Mozilla Thunderbird*									
f. Web browser *For example, proprietary software such as Microsoft Internet Explorer or OSS such as Mozilla Firefox*									

Figure 4.3: Example of Original Pre-test Diffusion Question

The question in Figure 4.3 has been designed using categorisations suggested by IS research ranging from (a) Office Automation through to (f) Web browser (Sen, 2007). However, after feedback from pre-testers this was adapted to use the previously identified NAPCS. In addition, pre-testers suggested that the scaling was too fine, ranging from "No OSS" to "All OSS" and should also be simplified. Figure 4.4 shows the revised question which, although now included adoption and intention responses, helped to reduce the overall number of questions and therefore the length of time needed to complete the whole survey.



Application Software Diffusion

Application software is designed to perform a specific function directly for the end user. **Diffusion** is the extent to which an organisation exploits an innovation.

38. To the best of your knowledge, please indicate the OSS **Application Software** which your organisation has used in the past (*) and which you believe will be used within a year (**).

	Used in the past (*).						Intended use in the future - within a year (**)					
	No OSS	1-33% OSS	34-66% OSS	67-99% OSS	All OSS	I don't know	No OSS	1-33% OSS	34-66% OSS	67-99% OSS	All OSS	I don't know
a. General Business Productivity Applications Software: *Designed for general business purposes to improve productivity. Includes office suite applications such as word processor, spreadsheet, and simple database software; graphics applications software; project management software, computerbased training software, and reference software.*												
b. Cross-industry Applications Software: *Designed to perform and/or manage a specific business function or process that is not unique to a particular industry. Includes professional accounting software, human resource management software, customer relations management software, geographic Information system software, and web page/site design software, etc.*												
c. Utilities Software: *Designed to perform a very specific task. Utilities differ from other applications software in terms of size, cost, and complexity. Includes compression programs, anti-virus, search engines, font, file viewers, and voice recognition software, etc.*												
d. Vertical markets application software: *Designed to perform a wide range of business functions for specific industries (i.e.manufacturing, retail, healthcare, engineering, restaurants etc).*												

Figure 4.4: Example of Revised Question Prepared for Pilot Study

4.3.3. Construct Validity for Pilot Study

IS research has defined construct validity as, "the extent to which an operationalization measures the concepts that it purports to measure... which are artificial, intellectual constructions not directly observable in nature (i.e., 'latent'), are being captured by the choices in the measurement instrumentation" (Boudreau et al., 2001, p5). Put another way, Cronbach's Alpha Coefficient has been defined as, "...the average correlation of each variable with all the other variables in the same scale," and regarded values greater than 0.7 as ‘satisfactory’ (Gallego et al., 2008, p2206). Table 4.1 shows the results of the Cronbach's Alpha analysis (using SPSS) which indicated all the constructs used in the pilot study were satisfactory by this measure (i.e. greater than 0.7).

Table 4.1: Results of Cronbach's Alpha Coefficient Analysis for Pilot Study (N=67)

Construct	Questions	Number of Items	Cronbach's Alpha
Attitude (A)			
Behavioural Beliefs - Driving Adoption (BB-DA)	22(a) to 22(q)	17	0.97
Behavioural Beliefs - Inhibiting Adoption (BB-IA)	23(a) to 23(h)	8	0.90
Subjective Norm (SN)			
Behaviour of Others (SN-BO)	25(a) to 25(c)	3	0.94
Influence of Others (SN-IO)	26(a) to 26(h)	8	0.90
Influence of Others' Expectations (SN-IOE)	27(a) to 27(l)	12	0.89
Perceived Behavioural Control (PBC)			
Organisational (PBC-O)	31(a) to 31(m)	13	0.92
Open Source Software (PBC-OSS)	32(a) to 32(f)	6	0.88

However, it has been argued that alpha values should not be too high (i.e. >0.9) as this may indicate 'redundancy' as well as 'homogeneity' (Streiner, 2003). Contrastingly, other scholars have expressed the opinion that alpha should be greater than 0.8 for 'basic research tools', and greater than 0.9 as the, "minimally tolerable estimate" in certain clinical research situations (Nunnally and Bernstein, 1994, cited in Streiner, 2003, p103). Such debates were considered somewhat beyond the scope of this research, and as all the items were derived from existing research, the alpha results were considered adequate. Further procedures exist in which variables can be eliminated which improve Cronbach's Alpha. Similarly, given the values were relatively high and the items were derived from existing research, it was left to later testing to eliminate factors which were not of statistical significance for the sample selected.

4.4. Pilot Study Results

4.4.1. Sampling

The plan for the pilot study was to use a self-selection, or convenience, sampling approach similar to other studies carried out in IS adoption and usage research (Alshare et al. 2009; Hilton et al. 2006). This was achieved by inviting a variety of potential respondents and offering a summary report as an incentive to participate in the research. This type of approach was successful in achieving an 18% response rate in similar OSS adoption research carried out in Australia (Goode 2005). Unfortunately, response rates fell well below this. For example, the top 150 Hertfordshire companies (by number of employees) were posted invitations and only one survey was returned completed. Similarly, invitations were posted on a number of OSS website discussion groups (e.g. linuxquestions.org) and only twelve completed responses achieved. Finally, as a result of a discussion held at one of the DBA review weekends, a fellow student offered a database of general enquiry email addresses for 378 UK local authorities which he compiled manually from the yougov.org website[4]. As a result, an additional 21 completed and 38 incomplete surveys were returned. This meant that the analysis phase of the pilot study could be completed. Table 4.2 shows the number of responses and completion rates experienced during the pilot study, and the comparative success of the local government phase of data collection.

Table 4.2: List of Attempts to Obtain Completed Surveys and Completion Rates

Publicised via	Start Date	End Date	Completed Surveys	Incomplete Surveys	Completion Rate
Direct Email invitation to 378 local government IT Managers obtained from the yougov.org website	28th Feb 2012	30th Mar 2012	21	38	36%
http://www.openforumeurope.org/	12th Feb 2012	29th Feb 2012	6	16	27%
http://www.linuxquestions.org/	12th Feb 2012	29th Feb 2012	6	12	33%
http://www.oss-survey.org/	6th Feb 2012	29th Feb 2012	1	2	33%
http://forums.mysql.com/	14th Feb 2012	29th Feb 2012	0	0	n/a
		Total	**34**	**68**	**33%**

4.4.2. Data Collection

BOS is a web-based tool designed for researchers who wish to collect data via the internet. Such a web-based tool was considered superior to paper-based methods of data collection for the following

[4] The author would like to thank Adrian Ash for providing this data.

reasons. The University of Hertfordshire has a license to use this facility and therefore there was no additional cost. It has an easy to use interface, can store large quantities of data which can then be exported in CSV (comma separate values) format suitable for most statistical packages (e.g. SPSS and MS Excel). Some researchers argue that web-based surveys should be treated with some caution due to sampling control issues. For example, the possibility of misrepresentation, false responses, or multiple responses from the same person (Simsek and Veiga 2001). However, as discussed the primary concern of this research was to attract adequate number of respondents to carry out initial statistical analysis for the pilot study. Therefore, such a web-based tool was considered adequate for the purposes of this phase of the research. A variety of individual, role-based and organisational data was also collected. Additionally, as already discussed, quantitative data items related to TPB were also collected on a Likert-type scale.

4.4.3. The Process for Data Analysis

IS Research has argued that Likert's assumption of equidistance (i.e. the assumption of agreement between respondents on the difference between scales) cannot be reliably upheld and that non-parametric techniques should be used in these scenarios (Khaiata and Zualkernan, 2009). In recent years, IS research has made use of non-parametric analysis (Danchev, 2006), and particularly IS research in the field of organisational adoption and usage of technology (Barbosa and Musetti, 2010, Ngai et al., 2008). As previously discussed, Chi-square and Fisher's Exact Tests have been successfully used in general IS research (Farzandipour et al., 2009, Harman and Koohang, 2005), and specifically IS research to do with adoption and usage of technology in organisations (Small and Yasin, 2000, Zhou et al., 2011). As also previously discussed, Chi-square is a method used for comparing the statistical relationship between groups and Fisher Exact Test is a similar approach specifically designed for low sample-sizes where Chi-square rules cannot be observed (Saunders et al., 2009, Cornford and Smithson, 2006, Yates, 1984). Figure 4.5 describes the research methodology and how the independent and dependent variables were analysed: Firstly, the quantitative survey data was collected. Secondly, the independent and dependent variables were tested for independence.

Thirdly, those relationships found to be significant were summarised, presented and discussed in the light of the existing literature.

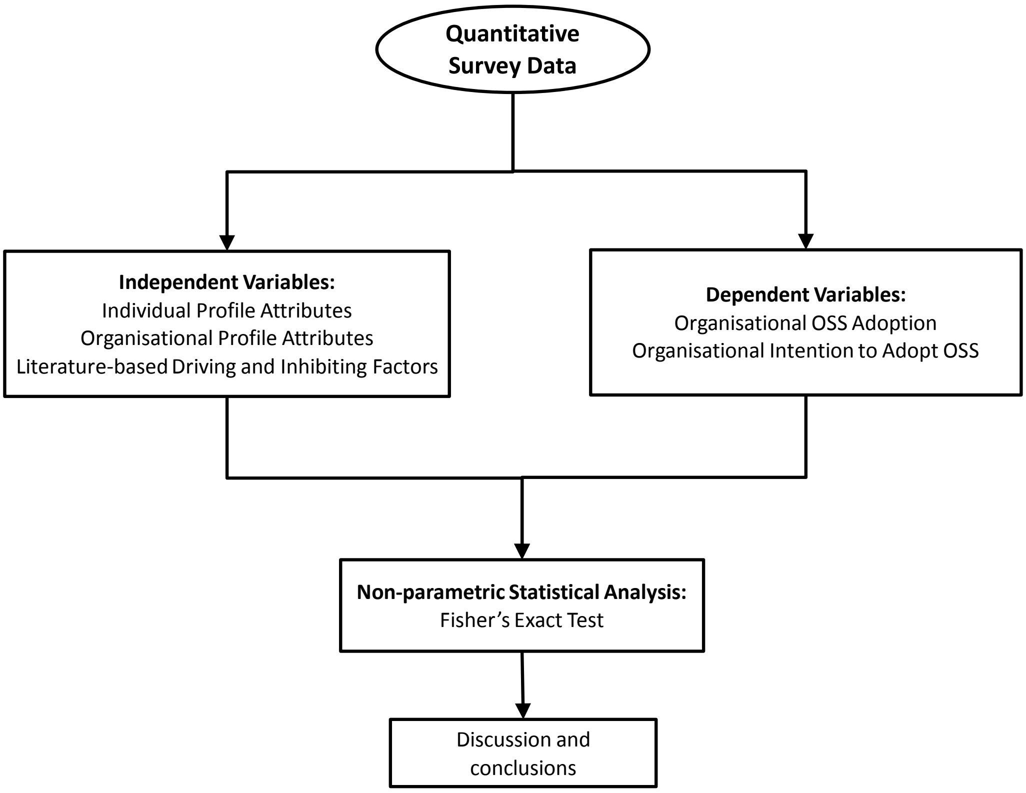


Figure 4.5: Research Methodology Incorporating Non-parametric Statistical Analysis

4.4.3.1. Measurement

Fisher's Exact Test is a statistical procedure for comparing 2x2 contingency tables normally used in cases of low sample sizes where certain restriction on Chi-square analysis cannot be met (Field, 2005). In this case, the table consisted of whether or not a respondent has adopted OSS and whether or not they agreed that the proposed driver/inhibitor was a salient factor. The test incorporated a calculation known as the hyper geometric distribution which is described as the probability (or p-value) of the contingency table (i.e. combination of frequency in rows and columns) arising for given fixed totals. This calculation is available as a function in Microsoft Excel. The test then involves the calculation of the sum of the more extreme combinations to produce a p-value which signifies the probability that the combination under analysis is the result of something other than randomness or chance. That is, a positive or negative association between the factor (e.g. job performance) and OSS adoption/non-adoption (or OSS intention/no intention) in line with the various literature-based theories and factors derived from existing research and discussed earlier.

4.4.4. Summary of Pilot Findings

4.4.4.1. Profile of Sample Population

4.4.4.1.1. Individual Profile

Table 4.3 shows the responses to the question of how involved the respondents considered themselves in the selection of organisational software. This question also asked the respondents to forward the questionnaire on to more appropriate respondents if they considered themselves to be not so involved. This process is also known as 'snowball' sampling (Saunders et al. 2009). This question meant that, if necessary, the responses could later be screened for those most closely involved with software selection. This process is known as 'key informant' methodology (Barbosa and Musetti 2010; Ngai et al. 2008) which typically incorporates 'purposive' (or 'judgemental') sampling (Saunders et al. 2009; Shafia et al. 2011) where respondents are specifically selected based on expertise, experience, authority or some other desirable qualifying factor. However, for the purposes of this pilot study the emphasis was on testing the data against the previously identified conceptual model. From the 34 respondents who completed the survey only two did not regard themselves as positively involved with software selection. Therefore, this pilot study can fortuitously claim respondents were largely purposefully sampled for those who believe that they were involved in software selection in their organisation.

Age and length service items were included in order to further assess claims of purposive sampling. Similarly, some researchers include educational measures and distinguish between: higher education, bachelor degree, master degree and doctoral degree (Karahanna et al. 1999). In this pilot study, 97%

of respondents reported having taken further education and 62% reported taking a first degree or above. Similarly, 76% of respondents reported over five years of experience and 91% were over 30 years of age. Therefore, to this extent respondents were fortuitously purposefully sampled in terms of education, age and experience.

The geographical profile showed that 88% of respondents originated from Europe. This was due to some of the responses being drawn from outside Europe by invitations posted on websites and newsgroups. Therefore, to this extent the pilot study was biased toward this geographical location.

The US Bureau of Labour Statistics (USBLS) has provided a list of occupations that are divided into 23 major groups, known as Standard Occupational Classification (SOC) (US Department of Labor, 2011). This grouping was used to establish the respondents' responsibilities. 79% of the respondents described themselves as management or computer/mathematical specialties. IS research has argued that IT interventions can be characterised by; strategic (top-down), divisional (middle-down) or operational (bottom-up) management priorities (Xue et al. 2008). 67% of the respondents described themselves as divisional (i.e. middle-down) or above concerns. Therefore, for this pilot study respondents were purposefully sampled in terms of managerial or computer roles and somewhat less so, in terms of management priorities.

None of the items gathered for individual profile were found to be of statistical significance in terms of organisational OSS adoption or intention to adopt OSS for the pilot study. That is, no significant associations were discovered between demographic items and the OSS adoption and intention to adopt OSS.

Table 4.3: Individual Profile for Pilot Study

Question	Completed Responses (n)	%
Q1 Responsibility for Software Selection		
1 - Not at all	0	0.0%
2	1	2.9%
3	0	0.0%
4 - Neutral	2	5.9%
5	3	8.8%
6	13	38.2%
7 - Very much	15	44.1%
Total	**34**	**100.0%**
Q2 Male/Female		
Male	25	80.6%
Female	6	19.4%
Total	**31**	**100.0%**
Q3 Age		
Under 20 years	0	0.0%
Between 21 and 30	3	8.8%
Between 31 and 40	11	32.4%
Between 41 and 50	10	29.4%
Between 51 and 60	8	23.5%
Over 60 years	2	5.9%
Total	**34**	**100.0%**
Q4 Length of service		
Under 5 years	8	23.5%
Between 5 and 10	14	41.2%
Between 11 and 15	5	14.7%
Between 16 and 20	0	0.0%
Over 20 years	7	20.6%
Total	**34**	**100.0%**
Q5 Education		
Secondary School/High School	1	2.9%
Further Education/College	12	35.3%
Higher Education (Bachelors)	13	38.2%
Higher Education (Masters)	6	17.6%
Higher Education (Doctorate)	2	5.9%
Total	**34**	**100.0%**
Q6 Geographical Region		
Africa	0	0.0%
Americas	2	5.9%
Asia	1	2.9%
Europe	30	88.2%
Oceania	1	2.9%
Total	**34**	**100.0%**
Q7 Position		
Management Occupation	11	32.4%
Computer and Mathematical	16	47.1%
Education, Legal, Community Service, Arts & Media	4	11.8%
Other	3	8.8%
Total	**34**	**100.0%**
Q8 Priorities		
Managing strategic "top-down" concerns	14	41.2%
Managing operational "middle-down" concerns	9	26.5%
Managing operational "bottom-up" concerns	11	32.4%
Total	**34**	**100.0%**

4.4.4.1.2. Organisational Profile

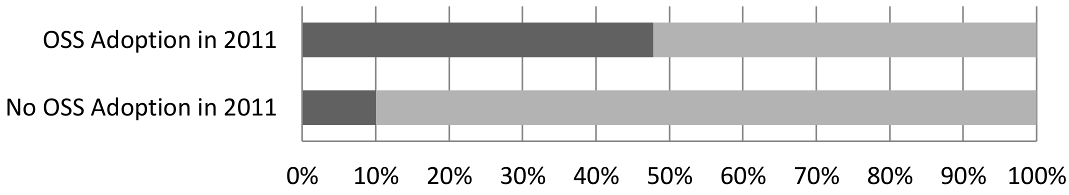
Table 4.4 shows the organisational profile represented in this pilot study.

Table 4.4: Organisational Profile for Pilot Study

Question	Completed Responses (n)	%
Q10 Number of Employees		
Less than 10	1	2.9%
Between 10 and 50	5	14.7%
Between 51 and 250	6	17.6%
Greater than 250	22	64.7%
Total	**34**	**100.0%**
Q11 Percentage of IT Staff who are		
Less than 10%	24	70.6%
Between 11% and 25%	3	8.8%
Between 26% and 50%	3	8.8%
Between 51% and 75%	2	5.9%
Greater than 76%	2	5.9%
Total	**34**	**100.0%**
Q12 Organisational Sector		
Public Sector	28	82.4%
Private Sector	5	14.7%
Other	1	2.9%
Total	**34**	**100.0%**
Q12b Public Sector		
Local Government	21	77.8%
Education (Secondary)	1	3.7%
Education (College/university)	4	14.8%
Other	1	3.7%
Total	**27**	**100.0%**

The European Commission (EC) categorises organisations of less than 250 employees as SMEs (European-Commission, 2011). Only 35% of respondents reported themselves as working for an organisation of less than 250 employees. For this reason it can be said that this study is biased toward larger organisations. It has been argued that this factor is important with small organisations having greater reason to adopt OSS (Macredie and Mijinyawa, 2011). This research applied the Fisher Exact Test to examine whether the proportion of OSS adopters and non-adopters varied significantly across

SMEs and larger organisational groupings. Consistent with previous IS research, this pilot study found that, 48% of OSS adopters categorised themselves as SMEs, whereas only 10% of OSS non-adopters fitted that category of organisation. Therefore, it was found there was a proportionally statistically significant difference between the of self-reported OSS adopters/OSS non-adopters in the SME/large organisation categories. Specifically, Fisher Exact Test (N=33) and p<0.05 (or greater than 95% confidence level)[5], where OSS adoption is negatively associated with organisational size. See Figure 4.6.



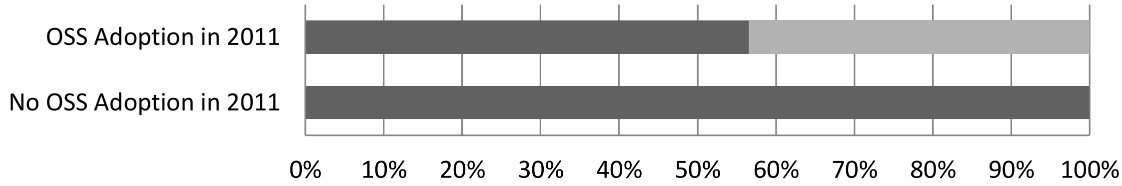
	No OSS Adoption in 2011	OSS Adoption in 2011
■ Less Than 250 Employees (SME)	1	11
■ Greater than 250 Employees (Large Organisation)	9	12

Figure 4.6: Comparison of OSS Adoption/No OSS adoption and SMEs (for Pilot Study)

It is logical that, other than in specialist software development organisations, relatively few software developers will be employed by a given organisation. 70.6% of respondents reported that their organisation employed 10% (or less) software developers. Therefore, to this extent this pilot study was biased toward such organisations. This research also applied the Fisher Exact Test to examine whether the proportion of OSS adopters and non-adopters varied significantly across the “greater than 10% developers” and “less than 10% developers” employed categories. This pilot study found that, 44% of OSS adopters categorised themselves as employing greater than 10% developers, whereas none of OSS non-adopters fitted this category of organisation. Therefore, it was found there was a

[5] p=0.04192

proportionally statistically significant difference between the self-reported “OSS adopters/OSS non-adopters” and the “greater than 10% developers/less than 10% developers” categories. Specifically, Fisher Exact Test (N=33) and p<0.05 (or greater than 95% confidence level)[6], where OSS adoption is positively associated with the number of developers employed. See Figure 4.7.



	No OSS Adoption in 2011	OSS Adoption in 2011
Less than 10% Software Developers Employed	10	13
Greater than 10% Software Developers Employed	0	10

Figure 4.7: Comparison of OSS Adoption/No OSS adoption and Percentage of Software Developers Employed (for Pilot Study)

Due to the nature of the data collection, i.e. most successfully completed responses came from UK local government, 82% were public sector and 78% local government. Therefore, to this extent, this pilot study was biased toward UK local government public sector organisations.

4.4.4.2. Driving/Inhibiting Factors and OSS Adoption

Figure 4.8 provides a summary of the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the dependent variable (organisational OSS adoption behaviour). See Appendix M: Pilot Study Data for OSS Adoption for a more detailed description. This analysis was achieved by combining results or “collapsing the categories” (Cornford and Smithson, 2006, p138). For example, where a Likert-scale ranged from (1) “Extremely Productive” to (7) “Extremely Counter-productive”, with (4) as

[6] p=0.01236

"Neutral": responses from (1) to (3) were coded and counted as "Agreed" Productive. This was analysed for independence via the previously described Fisher's Exact Test procedure.

Figure 4.8 also summarises the relationships identified as statistically significant and categorised into the three TPB constructs (i.e. Attitude, Subjective Norm and PBC). The testing condition was set to a p-value of greater than 95% confidence level as with previous IS research (Barbosa, 2010). The results show fourteen statistically significant factors, as opposed to original sixty-seven produced via the literature review described in the previous table.

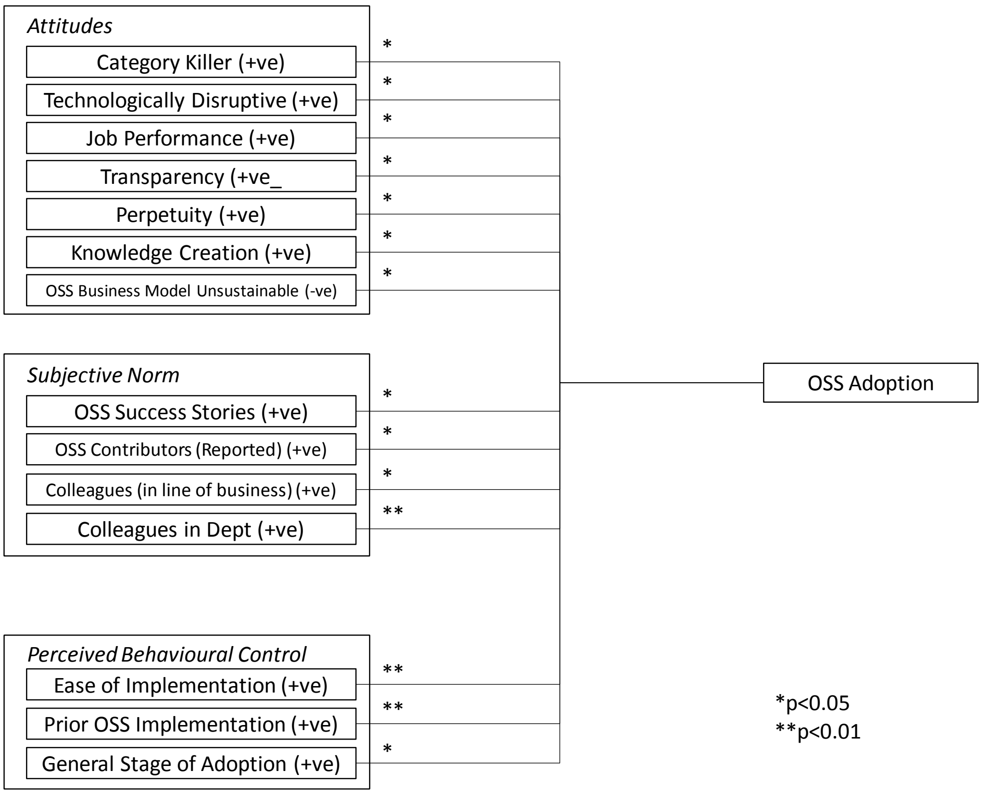
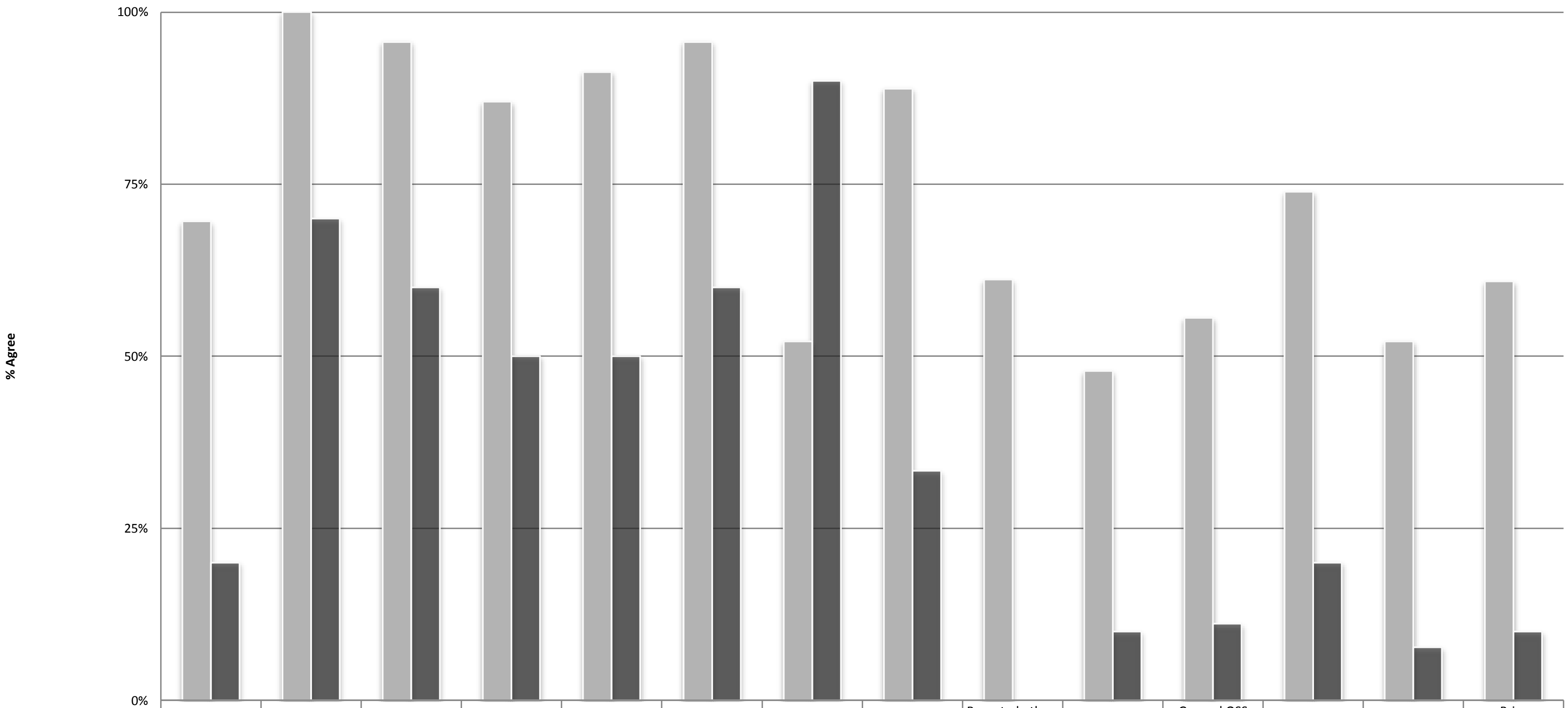


Figure 4.8: Statistically Significant Driving/Inhibiting Factors and OSS Adoption for Pilot Study

Figure 4.9 compares the extent to which respondents (a) described themselves as those who have adopted OSS, (b) those who did not adopt OSS; and agreed that the specified factors were important.



	Category Killer	Technologically Disruptive	Job Performance	Transparency	Perpetuity	Knowledge Creation	Unsustainable Business Model	Reported others success stories	Reported others contributing code to OSS projects	Colleagues (in line of business)	General OSS Adoption is Approval or Post-approval	IT Colleagues	Easy to implement	Prior implementation of OSS in organisation
% Adopters Agree	70%	100%	96%	87%	91%	96%	52%	89%	61%	48%	56%	74%	52%	61%
% Non-adopters Agree	20%	70%	60%	50%	50%	60%	90%	33%	0%	10%	11%	20%	8%	10%

Figure 4.9: Statistically Significant Driving/Inhibiting Factors and OSS Adoption for Pilot Study

4.4.4.3. Driving/Inhibiting Factors and Intention to Adopt OSS

Figure 4.10 illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to organisational intention to Adopt OSS behaviour. See Appendix N: Pilot Study Data for Intention to Adopt OSS for a more detailed description. This was analysed via the previously described Fisher's Exact Test procedure.

Figure 4.10 also summarises the relationships identified as statistically significant and categorised into the three TPB constructs (i.e. Attitude, Subjective Norm and Perceived Behavioural Control). The testing condition was set to a p-value of greater than 95% confidence level as with previous IS research (Barbosa, 2010). The results show fifteen statistically significant factors, as opposed to sixty seven from the literature review described in the previous table.

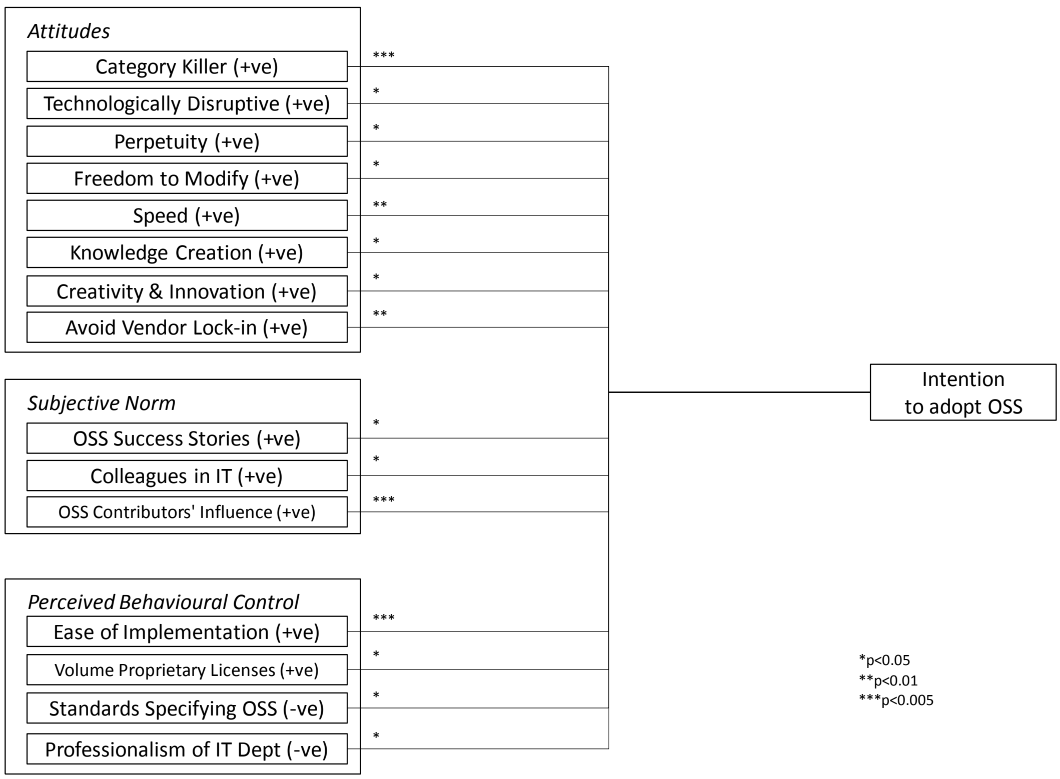
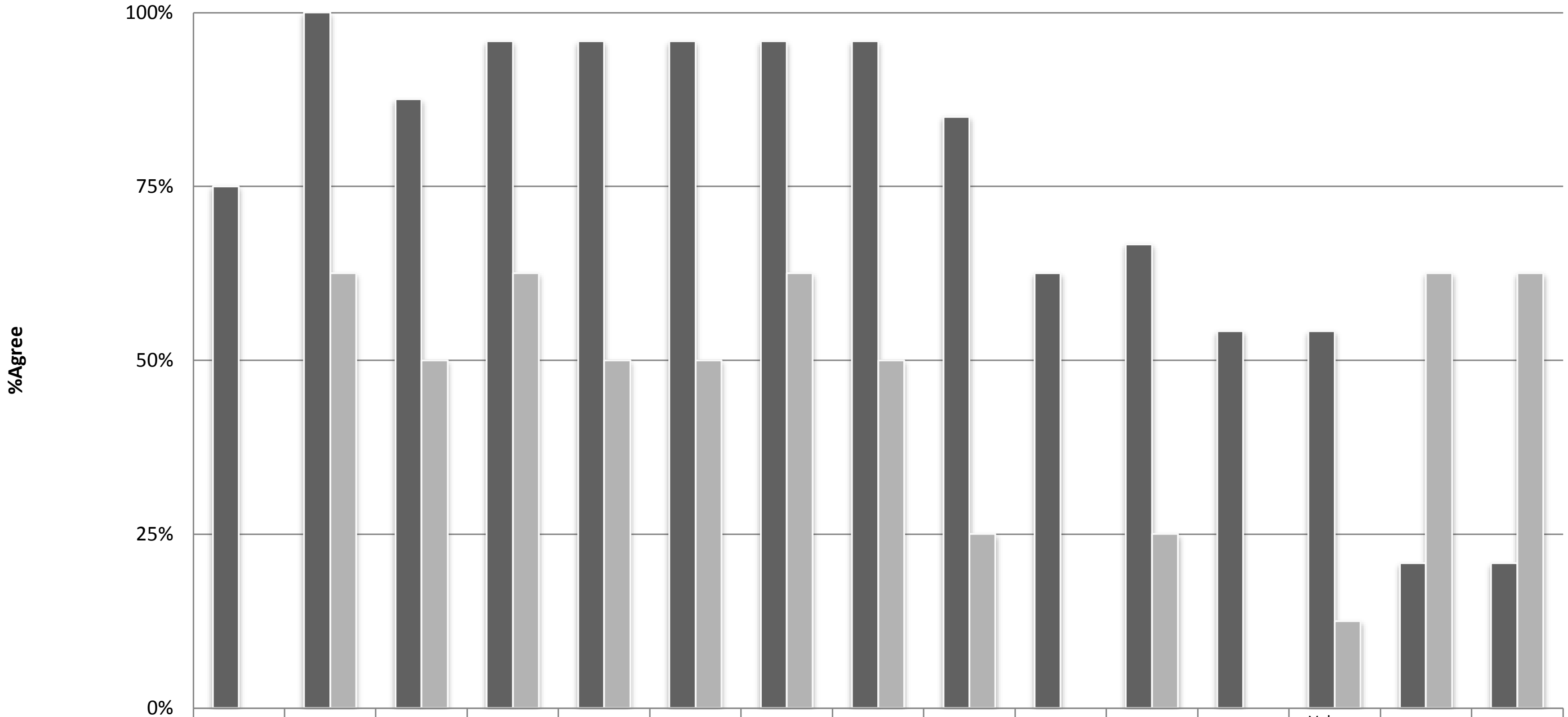


Figure 4.10: Statistically Significant Driving/Inhibiting Factors and Intention to Adopt OSS for Pilot Study

Figure 4.11 compares the extent to which respondents (a) described themselves as those who intended to adopt OSS, and (b) those who did not, agreed that the specified factors were important.



	Category Killer	Technologically Disruptive	Perpetuity	Freedom to modify	Speed	Knowledge Creation	Creativity & Innovation	Vendor Lock-in	Reported others success stories	OSS Contributors	IT Colleagues	Easy to implement	Volume Licenses for Proprietary Alternatives Inhibiting	Standards Specifying OSS	Professionalism of IT Department (inhibiting)
Q37c OSS intention	75%	100%	88%	96%	96%	96%	96%	96%	85%	63%	67%	54%	54%	21%	21%
Q37c OSS No intention	0%	63%	50%	63%	50%	50%	63%	50%	25%	0%	25%	0%	13%	63%	63%

Figure 4.11: Driving/Inhibiting Factors and Intention to Adopt OSS Bar Chart for Pilot Study

4.5. Discussion

In the sections which follow the factors that were identified as statistically significant are discussed in terms of attitudes, subjective norm and perceived behavioural control, the organisational OSS adoption (or Intention to Adopt OSS) behaviour and in the context of the existing literature.

4.5.1. Attitudes Identified as Associated with OSS Adoption and Intention to Adopt OSS

4.5.1.1. Category Killer

Managers responsible for software selection in organisations face challenges in determining technologies which are mature and which are least likely to be "orphaned" or abandoned by their manufacturers which can lead to a costly, unplanned switching exercise possibly at short-notice (Dedrick and West, 2003, Cavusoglu et al., 2010). Some research suggests that these anxieties are a result of consistently high-profile and disappointing success rates in IT projects (Flyvbjerg and Budzier, 2011). The phrase "category killer" refers to a products status as being such a dominant innovation (in a particular category) as to warrant being the only technology worth considering. IS research has claimed that OSS has achieved this status in certain NAPCS areas such as operating systems (i.e. Linux), web servers (i.e. Apache) and mail servers (i.e. Sendmail) (Ven et al., 2008). In the context of this pilot study, 70% of respondents who adopted OSS in 2011, and 20% of those who did not, regarded this to be the case. Furthermore, 75% of respondents who intended to adopt OSS in 2012, and none of those who had no intention, regarded this to be the case.

4.5.1.2. Disruptive Technology

IS research has argued that the OSS development model works best when programmers develop software intended for use by other programmers (e.g. Linux, Apache and Send Mail) (Brydon and Vining, 2008). All of these projects would have started as partial solutions which leveraged the world-wide, rapid development and testing possibilities which are considered unique to OSS communities (Brydon and Vining, 2008). However, the same research has argued that this situation does not yet prevail in the organisational context, where there is an apparent disconnect between business demand and OSS community production (ibid). A low-cost partial solution, which rapidly develops to address mainstream demand, is known as a “disruptive technology”, and one which does not is regarded as simply inferior (ibid). In terms of this pilot study, 100% of respondents who had adopted OSS in 2011, and 70% who did not, regarded OSS as possessing the quality of a disruptive technology. Furthermore, 100% of respondents who intended to adopt in 2012, and 63% of those who reported no such intention, also regarded this to be the case.

4.5.1.3. Perpetuity

As already discussed, longevity of a software innovation is important to organisations to avoid risk and unnecessary software switching exercises (Cavusoglu et al., 2010, Dedrick and West, 2003). A key related factor is also the perpetuity of the data and formats so as to enable continuity of access to archived and historical data (Casson and Ryan, 2006). So far as this pilot study is concerned, 91% of those who adopted OSS in 2011, and 50% of those who did not, believed this to be the case. Furthermore, 88% of respondents who intended to adopt in 2012, and 50% of those who had no such intention, also regarded this to be the case.

4.5.1.4. Knowledge Creation

IS research has identified a key principle behind OSS development methodologies as the ability to create knowledge and generate practical experiences (Vitharana et al., 2010). Solving practical problems by adapting existing software (i.e. code reuse) is considered a key skill in software development (ibid). So far as this pilot study is concerned, 96% of 2011 OSS adopters, and 60% of those who did not, reported this to be the case. Furthermore, 96% of respondents who intended to adopt OSS in 2012, and 50% of those who had no such intention, also regarded this to be the case.

4.5.2. Subjective Norm Identified as Associated with OSS Adoption and Intention to Adopt OSS

4.5.2.1. Success Stories

In order to mitigate risk against a potential costly, time consuming and unsuccessful implementation managers involved in software selection will often seek evidence from the external environment to support their decision. Consequently, any such exemplars or success stories will often be cited to support organisational adoption behaviour (Glynn et al., 2005). In the context of this pilot study, 89% of those who reported OSS adoption in 2011, and 33% of those who did not, reported this to be the case. Furthermore, 85% of respondents who intended to adopt OSS in 2012, and 25% of those who had no such intention, also regarded this to be the case.

4.5.2.2. Colleagues (in IT)

An organisation's IT department is often considered a key influencer in terms of IS adoption, not just in terms of capabilities and expertise, but also their preference for software selection (in this case OSS). IS research has claimed that this 'absorptive capacity' refers to an organisation's ability, and therefore preference, to productively deploy a particular innovation (Chengalur-Smith et al., 2010). So far as this pilot study is concerned, 74% of the 2011 OSS adopters and 10% of the non-adopters, reported that this was the case in terms of OSS. Furthermore, 67% of respondents who intended to adopt OSS in 2012, and 25% of those who had no such intention, also regarded this to be the case in terms of OSS.

4.5.3. Perceived Behavioural Control Identified as Associated with OSS Adoption and Intention to Adopt OSS

4.5.3.1. Ease of Implementation

TPB research suggests that relative ease and difficulty in carrying out the target behaviour should be investigated (Ajzen, 1991). Similarly, from IS research based on TAM-type models, 'perceived ease of use' is a key concern, which is more focused on end user acceptance rather than organisational implementation or adoption (Gwebu and Wang, 2011). In the context of this research, 52% of 2011 OSS adopters and only 8% of non-adopters, agreed that this was a significant factor. Furthermore, 54% of respondents who intended to adopt OSS in 2012, and none who had no such intention, also regarded this to be the case.

4.5.4. Attitudes Identified as Associated with OSS Adoption

4.5.4.1. Job Performance

One of the most successful and widely used adoption and usage theories in IS research is TAM (Davis, 1989). IS research has claimed that unless a technology is fully accepted by end users then any further consideration of wider adoption processes is of limited value (Bueno and Gallego, 2010, Gallego et al., 2007, Gallego et al., 2008). A key factor in TAM is the 'perceived usefulness' (or increased job performance) which users can expect (Jeyaraj et al., 2006). So far as this pilot study is concerned 96% of OSS adopters, and 60% of non-adopters, agreed that this was the case in terms of OSS.

4.5.4.2. Transparency

For some organisations who have adopted OSS the ability to contribute to OSS projects is a very important. Some researchers argue that since OSS provides the legal and practical framework to understand and adapt software that the specific benefits of transparency (i.e. the ability to understand software artefacts) is important to adopters (Vitharana et al., 2010, Haider, 2008). So far as this pilot study is concerned, 87% of the OSS adopters and 50% of the non-adopters, reported that this was the case.

4.5.4.3. OSS Business Model Unsustainable

IS research has questioned whether OSS, as a form of Commons Based Peer Production (CBPP) or public good, has a sustainable business model in a competitive environment (Brydon and Vining, 2008). This form of doubt is characterised by the 'tragedy of the commons' concept (Benkler, 2002).

The argument is that; firstly, none will invest in CBPP if they cannot benefit directly from the outcome, and secondly, none have the power to effectively organise the endeavour, therefore, the project will fail (Benkler, 2002). In terms of this pilot study, 90% of those respondents who reported themselves as non-adopters, and 52% of those who did, reported this was the case.

4.5.5. Subjective Norm Identified as Associated with OSS Adoption

4.5.5.1. OSS Contributors (Reported)

IS research has argued that the success of an OSS project is not just a function of its overall diffusion and adoption, but also the number and extent of those who contribute code. Specifically, evidence of a sufficient number of code contributors suggests a successful and sustainable OSS project (Toral et al., 2009). So far as this research is concerned, 61% of those who adopted OSS and none of those who did not, reported that this was the case.

4.5.5.2. Colleagues (in Line of Business)

As previously discussed, colleagues in the IT department can be influential in terms of software selection. Similarly, colleagues in line of business can also influence software selection decisions. As discussed, this 'absorptive capacity' refers to an organisation's ability to productively deploy and exploit a given innovation (Chengalur-Smith et al., 2010). So far as this pilot study is concerned, 48% of OSS adopters and 10% of those who did not reported this to be the case.

4.5.6. Perceived Behavioural Control Identified as Associated with OSS Adoption

4.5.6.1. Prior OSS Implementation

TPB research has suggested that prior behaviour, or in this case prior implementation of OSS, is an important indicator of 'volitional control' and therefore actual behaviour (Ajzen, 1991). So far as this research is concerned, 61% of OSS adopters and 10% of non-adopters, reported this to be the case.

4.5.6.2. General Stage of OSS Adoption

IS research has argued that organisational adoption should be regarded as a special situation with uniquely complicating factors (Fichman, 1992, Jeyaraj et al., 2006). Specifically, organisational adoption takes place in a multi-stage process of IT governance, i.e.; (i) prior initiation, (ii) initiation, (iv) development of plans, (v) management approval and (vi) post-approval, in which managers perform different roles at different stages (Xue et al., 2008). Although the sample size in this pilot did not permit Chi-square analysis of the different stages across different hierarchies of management the Fisher Exact Test did allow this factor to be identified as statistically significant for this sample. That is to say, of the OSS adopters 56% agreed the organisation was generally at approval or post approval stage, whereas only 10% non-adopters agreed the organisation was at that stage.

4.5.7. Attitudes Identified as Associated with Intention to Adopt OSS

4.5.7.1. Freedom to Modify

Many IS research studies have argued that that the ability to modify OSS by the adopting-organisations and users is a key factor (Vitharana et al., 2010, Bueno and Gallego, 2010, Mosoval et al., 2006, Glynn et al., 2005, Ven et al., 2008) (i.e. freedom to modify code). So far as this pilot study is concerned, 96% of those who intended to adopt OSS and 63% of those who had no such intention reported this to be the case.

4.5.7.2. Speed (Rapid Deployment)

Logically, the faster adopting organisations can deploy software technology, the sooner any identified benefits may be acquired. IS research has argued that OSS technology can provide a faster “time to market” or more rapid deployment (Allen and Ieee, 2010). So far as this pilot study was concerned, 96% of those who intended to adopt OSS and 50% of those who had no such intention reported this to be the case.

4.5.7.3. Creativity and Innovation

Vitharana (2010) has claimed that OSS can help deliver greater levels of creativity and innovation (Vitharana et al., 2010). So far as this pilot study was concerned, 96% of those who intended to adopt OSS and 63% of those who had no such intention reported this to be the case.

4.5.7.4. Avoid Vendor Lock-in

Several IS studies have cited 'vendor lock-in' as an issue which can be improved via OSS adoption (Brydon and Vining, 2008, Chengalur-Smith et al., 2010, Gwebu and Wang, 2011, Ven et al., 2008) (i.e. avoiding vendor lock-in). In the context of this pilot study, 96% of respondents who intended to adopt OSS and 50% of those who had no such intention reported this to be the case.

4.5.8. Subjective Norm Identified as Associated with Intention to Adopt OSS

4.5.8.1. OSS Contributors' Influence

IS research has argued that OSS community influence is a key factor in organisational OSS adoption (Chengalur-Smith et al., 2010). In the context of this pilot study, 100% of those who intended to adopt OSS, and none who had no such intention, reported this to be the case.

4.5.9. Perceived Behavioural Control Identified as Associated with Intention to Adopt OSS

4.5.9.1. Volume Proprietary Licenses

Glyn et al (2005) have argued that the presence of 'volume license agreements' for incumbent PS technology is an inhibitor to OSS adoption (Glynn et al., 2005) (i.e. a sunk cost). In terms of this research, 54% of those who intended to adopt OSS and 13% of those who had no such intention reported this to be the case

4.5.9.2. Standards Specifying OSS

Logically organisational standards in favour of a particular technology have a positive effect on adoption and continued usage. IS research has argued that OSS can be considered as an extension of

Open Systems (a widely accepted set of industry standards) which can furthermore aid OSS adoption (Dedrick and West, 2003) (i.e. Organisational or industry standards). In terms of this pilot study 21% of those who intended to adopt OSS, and 63% of those who had no such intention, reported this to be the case

4.5.9.3. Professionalism of IT Department

Jeyaraj et al. (2006) have argued that the skills, expertise or professionalism of the IT department is a key enabling factor in the adoption of technology (Jeyaraj et al., 2006). Additionally, Chengular-Smith et al. (2010) have claimed that an organisation's IT department is often considered a key influencer in terms of capabilities and expertise, and have used the phrase 'absorptive capacity' which refers to an organisation's ability to productively deploy a particular innovation (Chengalur-Smith et al., 2010). However in terms of this research, only 21% of respondents who intended to adopt OSS and 63% of who had no such intention, reported this to be the case.

4.6. Hypotheses and Conceptual Framework

4.6.1. Hypotheses

4.6.1.1. H1: Individual profile factors will be of statistical significance to organisational OSS adoption behaviour

The first hypothesis (H1) of this research stated that individual profile factors will be of statistical significance to OSS adoption. Individual factors were not found to be significantly associated with organisational OSS adoption (or intention to adopt OSS) for the pilot study's sample. One possible explanation is that as the survey instrument was concerning organisational OSS adoption, individual demographic-type data was therefore relatively of no consequence.

4.6.1.2. H2: Organisational profile factors will be of statistical significance to organisational OSS adoption behaviour.

The second hypothesis (H2) of this research stated that organisational profile factors will be of statistical significance to OSS adoption. Organisational factors were found to be significantly associated with organisational OSS adoption for the pilot study's sample. Specifically, size of organisations was found to be negatively associated with OSS adoption. This is consistent with some existing IS research which has claimed that smaller organisations are better placed to exploit OSS as an innovation (Macredie and Mijinyawa, 2011). Additionally, OSS adoption was found to be statistically significant and positively associated with the proportion of software developers employed, which is logically consistent with employing specialists who can exploit OSS (i.e. understand the code).

4.6.1.3. H3: Attitudinal factors will be of statistical significance to organisational OSS adoption behaviour.

The third hypothesis (H3) of this research stated that attitudinal factors will be of statistical significance to OSS adoption. A range of such factors were found to be of statistical significance to OSS adoption. Firstly, positively associated with; (a) Job Performance and (b) Transparency and negatively associated with (c) OSS Business Model Unsustainable, and those who had reported organisational OSS adoption. Secondly, positively associated with; (a) Freedom to Modify (b) Speed (i.e. rapid deployment) (c) Creativity & Innovation and (d) Avoid Vendor Lock-in, and those who reported an intention for the organisation to adopt OSS. Thirdly, positively associated with; (a) Category Killer (b) Disruptive Technology (c) Perpetuity and (d) Knowledge Creation, and those who had reported; (i) organisational OSS adoption and (ii) an intention for the organisation to adopt OSS.

4.6.1.4. H4: Subjective norm factors will be of statistical significance in OSS adoption outcomes.

The fourth hypothesis (H4) of this research stated that subjective norm factors will be of statistical significance to OSS adoption. A range of such factors were found to be of statistical significance to

OSS adoption. Firstly, positively associated with; (a) OSS Contributors (Reported) and (b) Colleagues (in Line of Business), and those who had reported organisational OSS adoption. Secondly, positively associated with OSS Contributors' (Influence) and those who reported an intention for the organisation to adopt OSS. Thirdly, positively associated with; (a) Success Stories (b) Colleagues (in IT) and those who had reported; (i) organisational OSS adoption and (ii) an intention for the organisation to adopt OSS.

4.6.1.5. H5: Perceived Behavioural Control factors will be of statistical significance in OSS adoption outcomes.

The fifth hypothesis (H5) of this research stated that perceived behavioural control factors will be of statistical significance to OSS adoption. A range of such factors were found to be of statistical significance to OSS adoption. Firstly, positively associated with; (a) Prior OSS Implementation and (b) General Stage of OSS Adoption, and those who had reported organisational OSS adoption. Secondly, positively associated with; (a) Volume Proprietary Licenses and negatively associated with (b) Standards Specifying OSS and (c) Professionalism of IT Dept, and those who reported an intention for the organisation to adopt OSS. Thirdly, positively associated with; (a) Ease of Implementation and those who had reported; (i) organisational OSS adoption and (ii) an intention for the organisation to adopt OSS.

4.6.2. Conceptual Framework

Figure 4.12 summarises the extent to which the original conceptual framework was successfully tested during the pilot study. The results were considered strong enough to warrant further analysis of other organisational OSS adoption behaviours in the main study.

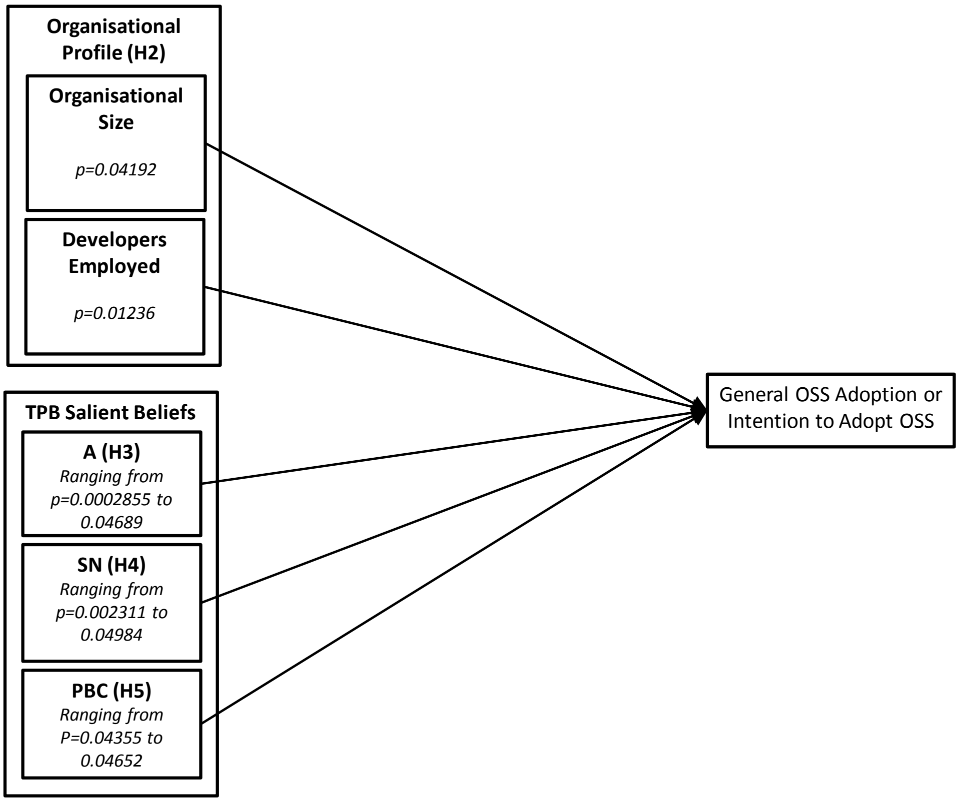


Figure 4.12: Summary of Conceptual Framework Successfully Tested in the Pilot Study

4.7. Summary

The results show that the pilot study was able to generate a parsimonious list of statistically significant driving and inhibiting factors associated with general OSS adoption and intention to adopt OSS. As a result of this pilot study; the questionnaire was further simplified in an attempt to further improve completion rates, a wider main study was considered possible making use of the mixed methods described in the previous chapter, an analysis of OSS adoption NAPCS sub-categories was considered possible and an analysis of driving/inhibiting factors across various ITG stages was also considered feasible. Furthermore, the relatively parsimonious nature of the results, i.e. a limited number of factors derived from 67 discussed in the literature review, was considered suitable to devise a practical management intervention via a FFA in line with the philosophical foundations of this research (i.e. practical adequacy). See Appendix E: FFA and TPB Proposed Process.

Chapter 5: Findings and Analysis Main Study

5.1. Introduction

This chapter is structured as follows. Firstly, the amendments made to the survey instrument as a result of the pilot study are outlined. Secondly, the main study results are presented in terms of the sampling, data collection, the process of data analysis, the summary of quantitative/qualitative findings, and the findings of the mixed-method analysis.

5.2. Pilot Study Amendments

The pilot study showed that out of the 378 Local Government IT managers who were approached, 21 provided completed survey responses (i.e. a 5.6% response rate). This means that of the 59 Local Government IT managers who began the survey instrument, 35.6% provided completed questionnaires (i.e. the completion rate). In line with previous research questionnaire fatigue was considered to be the main reason (Saunders et al. 2009). This led to the survey instrument being simplified in order to improve both response and completion rates in the main study.

5.2.1. Length of the Instrument

As discussed, in order to improve response and completion rates and in line with the recommendations from the pre-test, it was considered important to keep the length of the questionnaire to a minimum. Therefore, wherever possible questions were simplified as illustrated in Figure 5.1 and Figure 5.2. The survey instrument deployed in the main study is described in detail in Appendix C: Questionnaire (Main Study).


Attitudes Toward Open Source Software (OSS)

18. For me to implement an IT project incorporating OSS within the year is

1 Extremely good 2 3 4 5 6 7 Extremely bad

19. For me to implement an IT project incorporating OSS within the year is

1 Extremely valuable 2 3 4 5 6 7 Extremely worthless

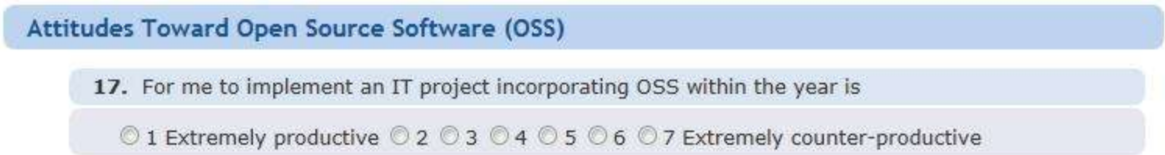
20. For my organisation to implement and IT project incorporating OSS within the year is

1 Extremely beneficial 2 3 4 5 6 7 Extremely detrimental

21. Whether or not I implement an IT project incorporating OSS is

1 Extremely relevant 2 3 4 5 6 7 Extremely irrelevant

Figure 5.1: Example Attitudinal Question Prepared for Pilot Study


Attitudes Toward Open Source Software (OSS)

17. For me to implement an IT project incorporating OSS within the year is

1 Extremely productive 2 3 4 5 6 7 Extremely counter-productive

Figure 5.2: Example of Simplified Attitudinal Question Prepared for Main Study

5.2.2. Format of the Scales

In line with the pre-test feedback, some scales were considered to be somewhat frustrating or confusing for respondents which, for example, specifically asked for assessments in percentage terms. When analysing the pilot study data it was considered that this level of detail was somewhat redundant and was therefore dispensed with in the main study. Therefore, wherever possible questions were simplified as illustrated in the examples in Figure 5.3 and Figure 5.4.

Behaviour of others

25. How would you say others that you are aware of have implemented OSS?

	Adoption and contribution of others to OSS					
	None	1-33% OSS	34-66% OSS	67-99% OSS	All	I don't know
a. Proportion of others that you are aware of who have adopted OSS	○	○	○	○	○	○
b. Proportion of others that you are aware of who describe "OSS success stories"	○	○	○	○	○	○
c. Proportion of others that you are aware of who have contributed (i.e. actually written code) to OSS projects.	○	○	○	○	○	○

Figure 5.3: Example of Subjective Norm Behaviour of Others Question (SN-BO) Prepared for Pilot Study

Behaviour of others

23. How would you say others that you are aware of have implemented OSS?

	Adoption and contribution of others to OSS				
	None	Some	Most	All	I don't know
a. Proportion of others that you are aware of who have adopted OSS	○	○	○	○	○
b. Proportion of others that you are aware of who describe "OSS success stories"	○	○	○	○	○
c. Proportion of others that you are aware of who have contributed (i.e. actually written code) to OSS projects.	○	○	○	○	○

Figure 5.4: Example of Subjective Norm Behaviour of Others Question (SN-BO) Simplified for Main Study

For the same reason, scales in other sections were considered somewhat frustrating and confusing for respondents, redundant for analytical purposes and were similarly simplified as shown in Figure 5.5 and Figure 5.6.

Systems Software Diffusion

System software is designed to manage computer resources and support the production or execution of application programs but which is not specific to any particular application.
Diffusion is the extent to which an organisation exploits an innovation.

39. To the best of your knowledge, please indicate which OSS **System Software** your organisation has used in the past (*), and which you believe will be used within a year (**).

	Used in the past (*)						Intended use in the future - within a year (**)					
	No OSS	1-33% OSS	34-66% OSS	67-99% OSS	All OSS	I don't know	No OSS	1-33% OSS	34-66% OSS	67-99% OSS	All OSS	I don't know
a. Operating Systems Software: *Designed to handle the interface to peripheral hardware, schedules tasks, allocate storage, and present a default interface to the user when no application program is running. Includes all client and network operating systems.*												
b. Network Systems Software: *Designed to control, monitor, manage and communicate with operating systems, networks, network services, databases, storage, and networked applications in an integrated and cooperative fashion across a network from a central location. Includes all network management software, server software, security and encryption software, and middleware, etc.*												
c. Database Management Systems Software: *Designed to enable storage, modification, and extraction of information from a database. Includes DBMSs ranging from small systems that run on personal computers to huge systems that run on mainframes.*												
d. Development Tools and Programming Languages Software: *Designed to assist in the development and/or authoring of computer programs. Includes software products that support the professional developer in the design, development, and implementation of a variety of software systems and solutions; and all program development tools and programming languages software.*												

Figure 5.5: Systems Software Diffusion Question Prepared for Pilot Study

Systems Software Diffusion & Intention

System software is designed to manage computer resources and support the production or execution of application programs but which is not specific to any particular application.
Diffusion is the extent to which an organisation exploits an innovation.

37. To the best of your knowledge, please indicate which OSS **System Software** your organisation has used in the past (*), and which you believe will be used within a year (**).

	Used in the past (*)					Intended use in the future - within a year (**)				
	None	Some	Most	All	I don't know	None	Some	Most	All	I don't know
a. Operating Systems Software: *Designed to handle the interface to peripheral hardware, schedules tasks, allocate storage, and present a default interface to the user when no application program is running. Includes all client and network operating systems.*										
b. Network Systems Software: *Designed to control, monitor, manage and communicate with operating systems, networks, network services, databases, storage, and networked applications in an integrated and cooperative fashion across a network from a central location. Includes all network management software, server software, security and encryption software, and middleware, etc.*										
c. Database Management Systems Software: *Designed to enable storage, modification, and extraction of information from a database. Includes DBMSs ranging from small systems that run on personal computers to huge systems that run on mainframes.*										
d. Development Tools and Programming Languages Software: *Designed to assist in the development and/or authoring of computer programs. Includes software products that support the professional developer in the design, development, and implementation of a variety of software systems and solutions; and all program development tools and programming languages software.*										

Figure 5.6: Systems Software Diffusion Question Prepared for Main Study

Similarly, in other sections scales were also considered somewhat confusing for respondents, specifically those which asked respondents to choose from a 9 point scale. When analysing the pilot study data it was found this level of detail was also redundant for analytical purposes. As an example, Figure 5.7 and Figure 5.8 illustrate how this was reduced from a 9 to a 5 point scale.

Influence of others

26. To what extent do the following factors enable or inhibit incorporating OSS in your organisation's IT projects?

	Impact of factors on OSS adoption								
	Absolutely imperative or requirement	Strongly enabling	Moderately enabling	Weakly enabling	Neutral	Weakly inhibiting	Moderately inhibiting	Strongly inhibiting	Absolute block or obstruction
a. Personal identification (i.e. the degree to which you have a personal sense of belonging to the OSS community)	○	○	○	○	○	○	○	○	○
b. Strong network effects (i.e. enhanced utility due to a sufficient number of others using OSS)	○	○	○	○	○	○	○	○	○
c. Internal politics	○	○	○	○	○	○	○	○	○
d. External politics	○	○	○	○	○	○	○	○	○
e. Organisational culture	○	○	○	○	○	○	○	○	○
f. Champion or sponsor for OSS	○	○	○	○	○	○	○	○	○
g. Localism (i.e. a commitment to support local suppliers and consultants)	○	○	○	○	○	○	○	○	○
h. Lack of legally responsible third party	○	○	○	○	○	○	○	○	○

Figure 5.7: Example of Subjective Norm Influence of Others Question (SN-IO) Prepared for Pilot Study

Influence of others

24. To what extent do the following factors enable or inhibit incorporating OSS in your organisation's IT projects?

	Impact of factors on OSS adoption				
	Absolutely imperative or requirement	Enabling	Neutral	Inhibiting	Absolute block or obstruction
a. Personal identification *(i.e. the degree to which you have a personal sense of belonging to the OSS community)*	○	○	○	○	○
b. Strong network effects *(i.e. enhanced utility due to a sufficient number of others using OSS)*	○	○	○	○	○
c. Internal politics	○	○	○	○	○
d. External politics	○	○	○	○	○
e. Organisational culture	○	○	○	○	○
f. Champion or sponsor for OSS	○	○	○	○	○
g. Localism *(i.e. a commitment to support local suppliers and consultants)*	○	○	○	○	○
h. Lack of legally responsible third party	○	○	○	○	○

Figure 5.8: Example of Subjective Norm Influence of Others Question (SN-IO) Simplified for Main Study

From the experience of the pilot study, these and other amendments were considered sufficient to simplify the look and feel of the questionnaire, without any detriment to the quality of the data for analytical purposes.

5.3. Construct Validity for Main Study

As with the pilot study, the main study results were tested for construct validity using the procedure associated with the Cronbach's Alpha Coefficient available within SPSS. Table 5.1 shows the results of the analysis which indicated all the constructs used in the main study were satisfactory by IS research standards, (i.e. greater than 0.7). See Pilot Study Chapter, Section 4.3.3, Page 157.

Table 5.1: Results of Cronbach's Alpha Coefficient Analysis for Main Study (N=65)

Construct	**Questions**	**Number of Items**	**Cronbach's Alpha**
Attitude (A)			
Behavioural Beliefs - Driving Adoption (BB-DA)	20(a) to 20(p)	16	0.940
Behavioural Beliefs - Inhibiting Adoption (BB-IA)	21(a) to 21(g)	7	0.792
Subjective Norm (SN)			
Behaviour of Others (SN-BO)	23(a) to 23(c)	3	0.896
Influence of Others (SN-IO)	24(a) to 24(h)	8	0.762
Influence of Others' Expectations (SN-IOE)	25(a) to 25(l)	12	0.747
Perceived Behavioural Control (PBC)			
Organisational (PBC-O)	29(a) to 29(j)	10	0.873
Open Source Software (PBC-OSS)	30(a) to 32(i)	9	0.834

5.4. Main Study Results

5.4.1. Sampling

The main study used a self-selection, or convenience, sampling approach similar that carried out in the pilot study. As the Local Government IT manager database was shown to be (a) the most responsive (i.e. 5.6% vs zero in some cases in the pilot study) and (b) the most likely to complete the questionnaire (i.e. 35.6% vs 27% in Pilot Study) it was considered important to approach the public sector IT managers in this study. Furthermore, at the time of data collection the public sector was considered to be under pressure to cut costs as a result of the UK coalition government's austerity measures, and therefore more likely to consider responding to an OSS survey. In addition, IS research has argued that the public sector could be more responsive to OSS for similar reasons (Haider, 2008). As a result, a commercial arrangement was made with an email marketing company with the capability to invite managers (who had previously consented) to respond to the survey via a database of UK public sector IT managers. Table 5.2 illustrates the subsectors of the Public Sector IT Managers who were approached for the Main Study.

Table 5.2: Subsectors of Public Sector IT Managers Approached for Main Study

Sub Sector	**Frequency**
Central Government	483
Further and Higher Education	1037
Housing Associations	497
Local Government	823
NHS	707
Total	**3547**

As previously discussed, IS research has obtained response rates as high as 18% (Goode, 2005) and the pilot study of this research obtained 5.6%. For the purposes of this main study, 45 respondents completed surveys (i.e. 1.0%) and 42 provided incomplete responses. This meant that response rates were down considerably from the pilot study (i.e. 1.0% vs 5.6%). However, completion rates were considerably improved from 33% to 51%, which was considered, at least in part, due to the various simplification measures described earlier. Table 5.3 provides details of the sample for the main study.

Table 5.3: Main Study Sample

Publicised or Invitations via	**Start Date**	**End Date**	**Completed Surveys**	**Incomplete Surveys**	**Completion Rate**
Direct email invitation to 3,547 public sector IT managers	25th Oct 2012	31st Dec 2012	45	42	51%

5.4.2. Data Collection

As described in the pilot study, the BOS web-based tool was considered superior to paper-based methods of data collection.

5.4.3. The Process for Data Analysis

As previously discussed, the main study has adopted a mixed-methods research approach whereby quantitative data has been augmented with qualitative data via the questionnaire. This has been described by IS research as 'complementarity' mixed-methods (Venkatesh et al., 2013). Specifically, over half of the respondents elected to participate in the survey with qualitative as well as quantitative contributions.

Figure 5.9 provides an overview of how the Drivers/Inhibitors (i.e. independent variables) and organisational OSS adoption (i.e. dependent variables) were analysed in the quantitative part of the main study.

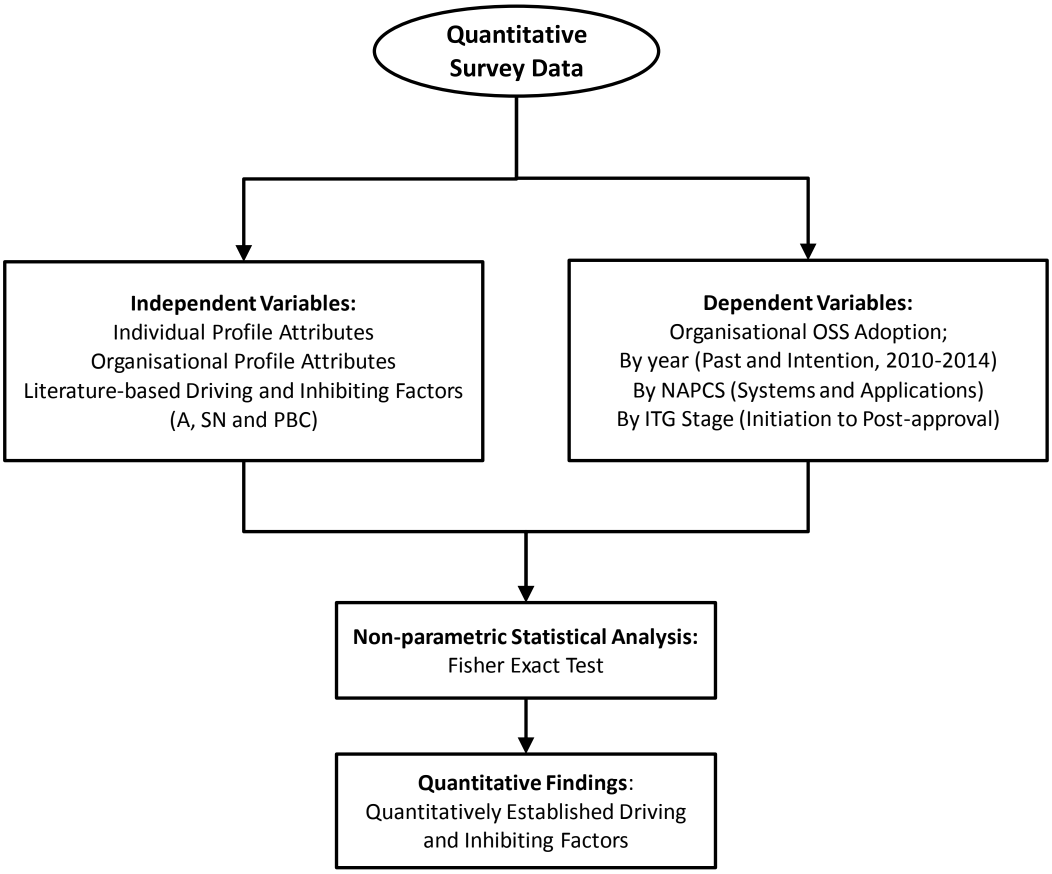


Figure 5.9: Quantitative Research Methodology Overview (Adapted from Barbosa and Musetti, 2010, p794, Figure 2)

5.4.3.1. Measurement

5.4.3.1.1. Quantitative Data

A similar approach to that which was used in the pilot was used in the main study, with the addition of an Excel Add-in program which calculated the Fisher Exact Test probability (Zaiontz, 2014), followed by the same computation via SPSS. This proved a valuable tool for triangulating results with SPSS and helping to highlight and eliminate any computational errors.

5.4.3.1.2. Qualitative Data

As described in the research methodology chapter, qualitative data was primarily measured using a content analysis process specifically for the purpose of augmenting the quantitative data or 'complementarity' (Venkatesh et al., 2013). Broad categories were defined, consistent with the research question, the literature review (to establish driving and inhibiting factors in OSS adoption) or any themes which emerged from the data and then data was encoded as necessary. See Appendix O: Qualitative Data Set from Main Study.

5.4.4. Summary of Main Study Findings

This section will summarise the findings of the main study in terms of the profile of the sample (individual and organisational), the quantitative driving and inhibiting factors for OSS adoption (by year, category and ITG stage), the qualitatively established driving and inhibiting factors, those established via data consolidation and mixed-methods and followed by a summary of hypotheses and conceptual model.

5.4.4.1. Profile of Sample Population

5.4.4.1.1. Individual Profile

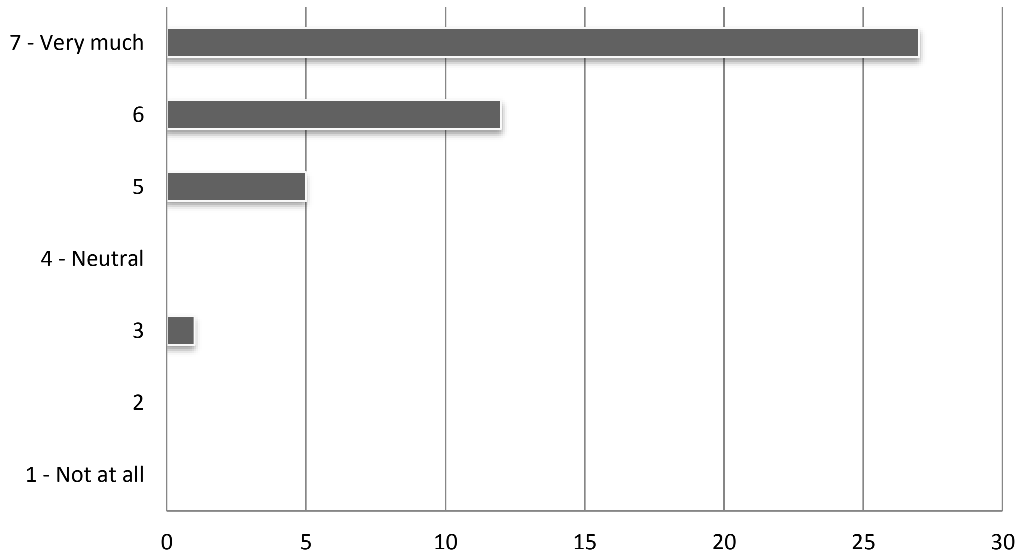
Table 5.4 shows the individual profile of the respondents who successfully completed the questionnaire represented in the main study and further described below.

Table 5.4: Individual Profile by Various Attributes for Main Study

	Completed Responses (n)	%
Q1 Responsibility for Software Selection		
1 - Not at all	0	0.0%
2	0	0.0%
3	1	2.2%
4 - Neutral	0	0.0%
5	5	11.1%
6	12	26.7%
7 - Very much	27	60.0%
Total	**45**	**100.0%**
Q2 Male/Female		
Male	40	88.9%
Female	5	11.1%
Total	**45**	**100.0%**
Q3 Age		
Under 20 years	0	0.0%
Between 21 and 30	2	4.4%
Between 31 and 40	6	13.3%
Between 41 and 50	17	37.8%
Between 51 and 60	16	35.6%
Over 60 years	4	8.9%
Total	**45**	**100.0%**
Q4 Length of service		
Under 5 years	13	28.9%
Between 5 and 10	11	24.4%
Between 11 and 15	9	20.0%
Between 16 and 20	6	13.3%
Over 20 years	6	13.3%
Total	**45**	**100.0%**
Q5 Education		
Secondary School/High School	3	6.7%
Further Education/College	9	20.0%
Higher Education (Bachelors)	16	35.6%
Higher Education (Masters)	16	35.6%
Higher Education (Doctorate)	1	2.2%
Total	**45**	**100.0%**
Q6 Geographical Region		
Africa	0	0.0%
Americas	0	0.0%
Asia	0	0.0%
Europe	45	100.0%
Oceania	0	0.0%
Total	**45**	**100.0%**
Q7 Position		
Management Occupation	20	44.4%
Computer and Mathematical	17	37.8%
Education, Legal, Community Service, Arts & Media	3	6.7%
Other	5	11.1%
Total	**45**	**100.0%**
Q8 Priorities		
Managing strategic "top-down" concerns	26	57.8%
Managing operational "middle-down" concerns	10	22.2%
Managing operational "bottom-up" concerns	9	20.0%
Total	**45**	**100.0%**

5.4.4.1.1.1. Responsibility for Software Selection

Figure 5.10 shows the responses to the question of how involved the respondents considered themselves in the selection of organisational software. As with the pilot study, and other IS research, this question meant that this research could claim to some extent to have selectively sampled respondents, which is also known as 'key informant' methodology (Barbosa and Musetti 2010; Ngai et al. 2008) which typically incorporates 'purposive' (or 'judgemental') sampling technique (Saunders et al. 2009; Shafia et al. 2011). In such an approach respondents are specifically selected based on expertise, experience, authority or some other qualifying or desirable factor. From the 45 respondents who completed the survey only one did not regard themselves as positively involved with software selection. Therefore, similar to the pilot study, to this extent the main study can fortuitously claim that respondents were purposefully sampled for (or more accurately positively biased toward) those who believe they are involved in software selection in their organisation.

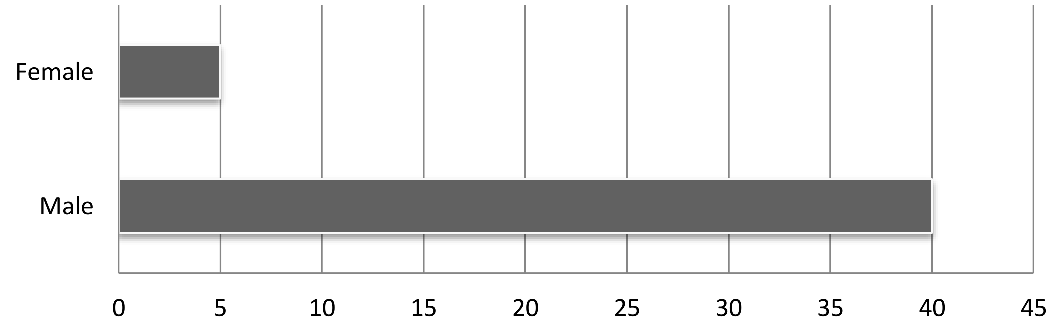


	1 - Not at all	2	3	4 - Neutral	5	6	7 - Very much
■ Q1 Responsibility for Software Selection	0	0	1	0	5	12	27

Figure 5.10: Responsibility for Software Selection for Main Study

5.4.4.1.1.2. Gender

Figure 5.11 also shows the respondents' gender answers with 89% recorded as male and 11% female. This shows that this research was considerably biased toward male respondents.

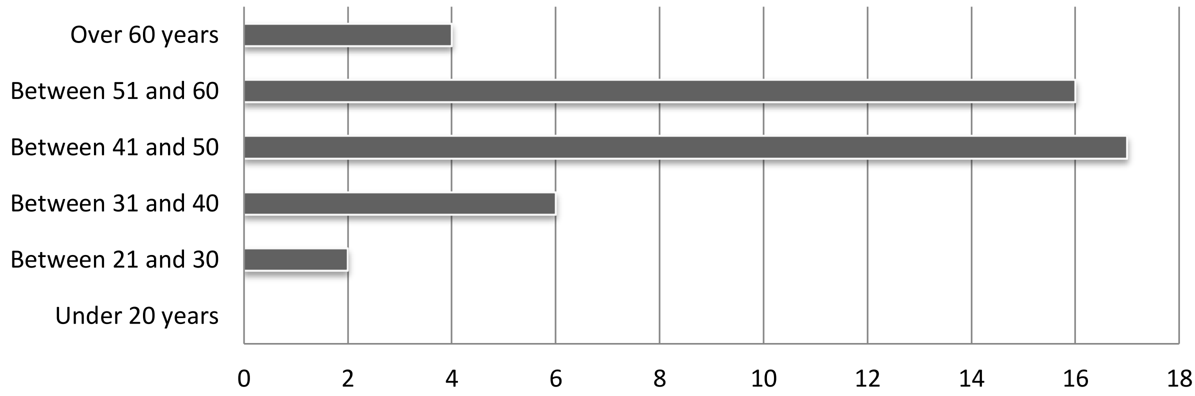


	Male	Female
Q2 Male/Female	40	5

Figure 5.11: Number of Respondents by Gender for Main Study

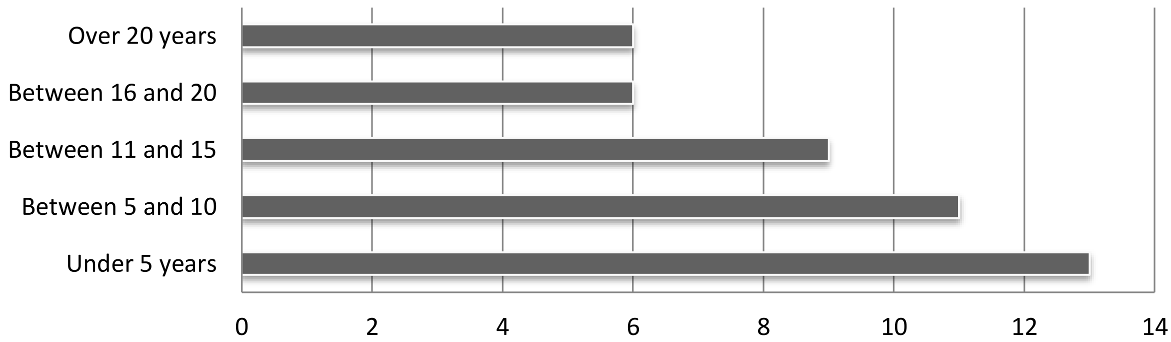
5.4.4.1.1.3. Age and Length of Service

As with the pilot study, age and length service items were included in order to assist the reader further to assess claims of purposive sampling or issues of bias. IS research has included educational items and distinguished between: higher education, bachelor degree, master degree and doctoral degree (Karahanna et al. 1999). So far as this main study was concerned 93% of respondents reported having taken further education and 74% reported taking a first degree or above. Similarly, 71% of respondents reported over five years of experience and 96% were over 30 years of age. See Figure 5.12 and also Figure 5.13. Therefore to this extent, this main study can fortuitously claim respondents were purposefully sampled (or positively biased toward) these groups in terms of education, age and experience.



	Under 20 years	Between 21 and 30	Between 31 and 40	Between 41 and 50	Between 51 and 60	Over 60 years
Q3 Age	0	2	6	17	16	4

Figure 5.12: Number of Respondents by Age for Main Study



	Under 5 years	Between 5 and 10	Between 11 and 15	Between 16 and 20	Over 20 years
Q4 Length of service	13	11	9	6	6

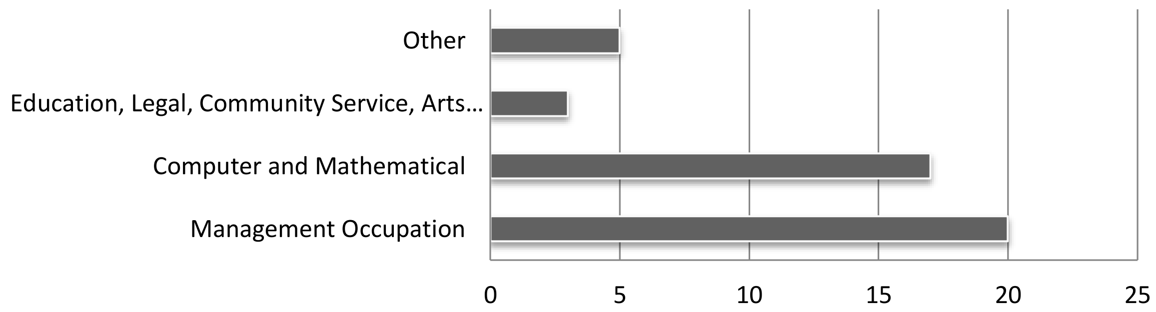
Figure 5.13: Number of Respondents by Experience for Main Study

5.4.4.1.1.4. Geographical Profile

The geographical profile showed that 100% of respondents originated from Europe. As a result of the sampling approach used, the main study was wholly biased toward the European, and specifically the UK, geographical location. That is, 44 respondents were reported as located in the United Kingdom of Great Britain and Northern Ireland, and one respondent reported as The Isle of Man (a British Crown Dependency).

5.4.4.1.1.5. Position and Priorities

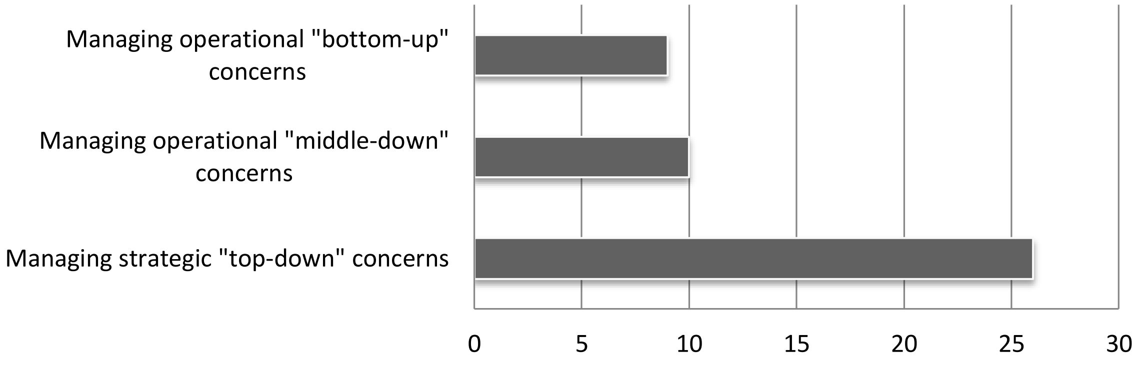
As with the pilot study, the USBLS classification system of occupations was used, which has divided roles into four major groups (US Department of Labor, 2011). 82% of respondents described themselves as management or computer/mathematical specialties. See Figure 5.14: Number of Respondents by Position for Main Study.



	Management Occupation	Computer and Mathematical	Education, Legal, Community Service, Arts & Media	Other
Q7 Position	20	17	3	5

Figure 5.14: Number of Respondents by Position for Main Study

Xue et al. (2008) have argued that IT interventions can be characterised as strategic (top-down), divisional (middle-down) or operational (bottom-up) concerns (Xue et al. 2008). 80% of respondents described themselves as divisional (i.e. middle-down) or above concerns. Figure 5.15: Number of Respondents by Managerial Priority for Main Study.



	Managing strategic "top-down" concerns	Managing operational "middle-down" concerns	Managing operational "bottom-up" concerns
■ Q8 Priorities	26	10	9

Figure 5.15: Number of Respondents by Managerial Priority for Main Study

Therefore, this main study can claim respondents were accordingly purposefully sampled for, or positively bias toward, managerial or computer roles (i.e. 82%) and somewhat less so (i.e. 80%), in terms of senior management concerns.

5.4.4.1.1.5. Summary of Individual Profile for The Main Study

None of the items gathered for individual profile for the main study were found to be of statistical significance in terms of organisational OSS adoption, intention to adopt OSS or stage of OSS adoption. Therefore, for the purposes of this main study, the first hypothesis (H1) was rejected.

5.4.4.1.2. Organisational Profile

Table 5.5 shows the organisational profile of the respondents who successfully completed the questionnaire in the main study.

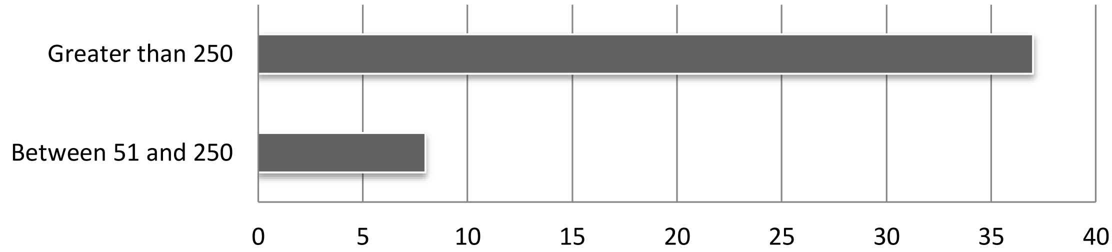
Table 5.5: Organisational Profile of Attributes for Main Study

	Completed Responses (n)	%
Q10 Number of Employees		
Less than 10	0	0.0%
Between 10 and 50	0	0.0%
Between 51 and 250	8	17.8%
Greater than 250	37	82.2%
Total	**45**	**100.0%**
Q11 Percentage of IT Staff who are software developers		
None	7	15.6%
Between 1 and 10%	29	64.4%
Between 11% and 25%	8	17.8%
26% and Over	1	2.2%
Between 51% and 75%	0	0.0%
Greater than 76%	0	0.0%
Total	**45**	**100.0%**
Q12 Organisational Sector		
Public Sector	43	95.6%
Private Sector	2	4.4%
Other	0	0.0%
Total	**45**	**100.0%**
Q12b Public Sector		
Local Government	14	32.6%
Health Service	9	20.9%
Education (College/university)	17	39.5%
Other	3	7.0%
Total	**43**	**100.0%**

5.4.4.1.2.1. Number of Employees

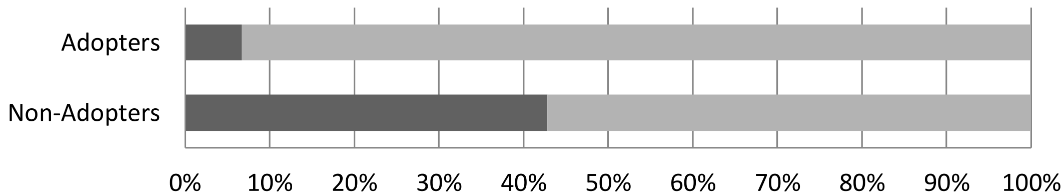
The EC categorises organisations of less than 250 employees as SMEs (European-Commission, 2011). So far as the main study was concerned, only 18% of respondents reported themselves as working for an organisation of less than 250 employees. Therefore to this extent, the main study was purposefully sampled for, or biased toward, large organisations. See Table 5.6: Number of Respondents by Organisation Size for Main Study

Table 5.6: Number of Respondents by Organisation Size for Main Study



	Between 51 and 250	Greater than 250
Q10 Number of Employees	8	37

As discussed in the pilot study organisational size can have an impact on adoption of innovation in general, and OSS in particular. The Fisher Exact Test was used to examine whether the proportion of OSS adopters/non-adopters and OSS intention/no intention varied significantly across SMEs and large organisations. However, so far as this main study is concerned, a positive association was found between organisation size and OSS adoption in 2012. See bar chart below. That is, there was a proportionally statistically significant difference between the self-reported OSS adopters/OSS non-adopters in 2012 in the SME/large organisation categories. Specifically, Fisher's Exact Test ($N=44$, $p(a>=28)=0.007968$). That is, $p<0.01$.



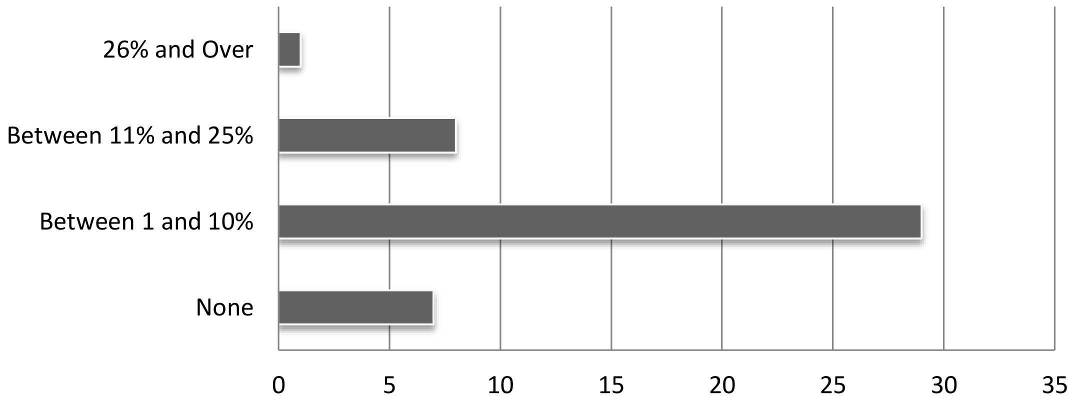
	Non-Adopters	Adopters
SME (Less than 250)	6	2
Large (Greater than 250)	8	28

Figure 5.16: Organisational Size and OSS Adoption for Main Study

Similarly, for OSS intention to adopt in 2013 and 2014, the Fisher Exact Test produced (N=41, p(a>=28)=0.04749) and (N=40, p(a>=29)=0.02016) respectively. However so far as; (a) OSS adoption (in 2010 and 2011), (b) OSS stage of adoption (in 2012) and (c) OSS adoption of any sub-categories of software (in 2012) organisational size was not found to be of statistical significance.

5.4.4.1.2.2. Employment of Software Developers

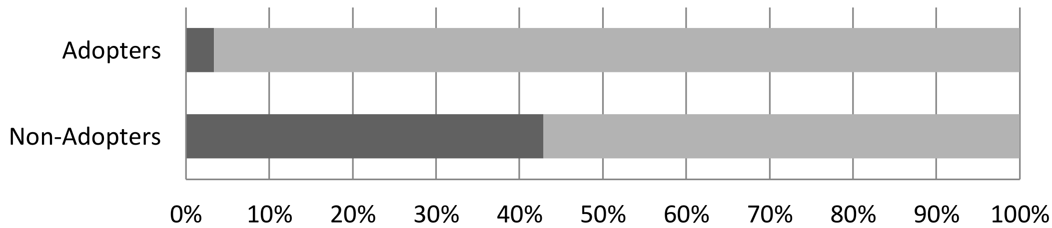
During the analysis of the pilot study it was identified that the survey instrument did not include the option for respondents to record that there were no developers working for their organisation. This was amended in the main study. The figure below shows that a majority of respondents' organisations employed between 1 and 10% of employees as software developers. This shows that this main study was bias toward organisations that have reportedly employed developers and furthermore to those organisations who employ a relatively small minority (i.e. 1 to 10%).



	None	Between 1 and 10%	Between 11% and 25%	26% and Over
Q11 Percentage of IT Staff who are software developers	7	29	8	1

Figure 5.17: Number of Respondents by Percentage Employed as Software Developers for Main Study

Logically, whether or not an organisation employs relevant specialists (i.e. software developers) will be an important factor in OSS adoption through greater understanding of the innovation itself and the specialist skills required to exploit it. So far as the main study was concerned, the Fisher Exact test was used to identify if this was a statistically significant factor. In terms of 2012 OSS adoption, 97% of adopters reportedly employed software developers, whereas only 57% of non-adopters employed staff who were described in this way. See figure below. Specifically, Fisher Exact Test (N=44, p(a>=29)=0.002441) for OSS adoption in 2012. Similarly, for OSS intention to adopt in 2013, Fisher's Exact Test produced (N=41, p(a>=29)=0.02350). However, with respect to self-reported (a) OSS adoption (in 2010 and 2011), (b) OSS stage of adoption (in 2012) and (c) OSS adoption of any sub-categories of software (in 2012) whether or not developers were employed was not found to be of statistical significance.

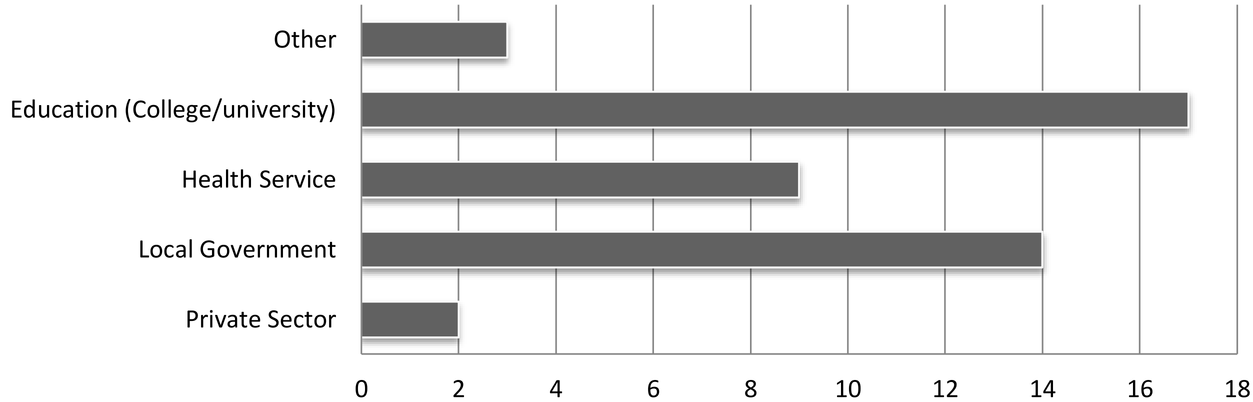


	Non-Adopters	Adopters
No Developers Employed	6	1
Developers Employed	8	29

Figure 5.18: Software Developer Employment and OSS Adoption for Main Study

5.4.4.1.2.3. Sector

As discussed, due to the nature of the sampling technique, 96% of respondents were public sector of which; 40% were education (college/university), 21% health service, 33% local government and 7% other. See figure below. Therefore to this extent, this main study was biased toward these types of organisations.



	Private Sector	Local Government	Health Service	Education (College/university)	Other
■ Sector	2	14	9	17	3

Figure 5.19: Number of Respondents by Sector of Organisation for Main Study

5.4.4.1.2.4. Summary of Organisational Profile for Main Study

So far as this main study was concerned, other than (a) Number of Developers Employed and (b) Size of Organisation, no other factors were found to be statistically significantly associated with organisational OSS adoption/non-adoption (or any other aforementioned organisational OSS adoption variable). As such, the second hypothesis (H2) was partially upheld.

5.4.4.2. Quantitatively Established Driving/Inhibiting Factors

5.4.4.2.1. General OSS Adoption and Intention to Adopt

As found in the pilot study, there can be important differences between factors associated with OSS adoption and those with intention to adopt OSS. Appendix P: Quantitative Analysis for General OSS Adoption (2010 to 2012) and Intention to Adopt OSS (2013/14) shows how driving and inhibiting factors were established for the specified organisational OSS adoption behaviour in a format similar to that of the pilot study. These findings are summarised below.

This analysis has shown a relatively parsimonious twelve different factors which were found to be of statistical significance to varying degrees with respect to self-reported OSS adoption and intention to adopt OSS in the period between the years 2010 to 2014. As this is considerably less than those identified in the literature review it was considered to be potentially operational value to managers implementing OSS projects, particular for those using intervention techniques such as FFA as a means of planning and implementation.

Figure 5.20 illustrates statistically significant association of factors in respect of organisational OSS adoption or intention to adopt (i.e. $p<0.05$). See Appendix P: Quantitative Analysis for General OSS Adoption (2010 to 2012) and Intention to Adopt OSS (2013/14) for a more comprehensive description. As described in the Research Methodology chapter, each respondent was asked to report the generic organisational OSS adoption by year (i.e. 2010-13) and intention to adopt, by year (2013-14) as dependent variables. That is, within the same questionnaire. This analysis would suggest that there are certain factors which are of importance across all five years which were analysed (i.e. the attitude toward OSS and Security as a driver for adoption) and others which are statistically significant for shorter time periods (e.g. the subjective norm of Colleagues in Line of Business as a driving factor in the near term intention to adopt in 2013). Logically, this type of finding should allow managers to prioritise their interventions to those most likely to successfully affect change to OSS adoption and intention to adopt OSS for a given group of respondents.

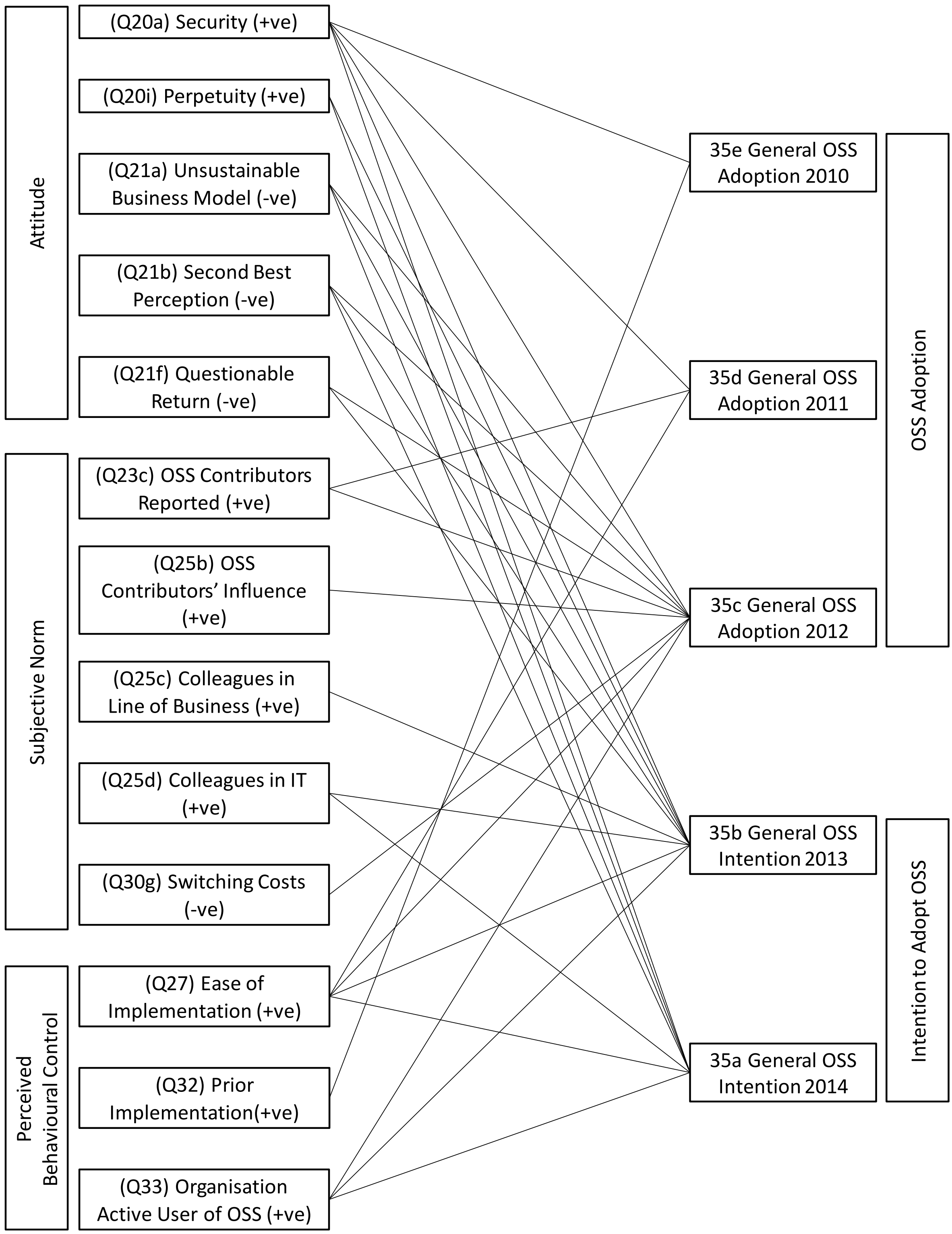


Figure 5.20: Path Diagram of Driving/Inhibiting Factors and OSS Adoption/Intention to Adopt OSS (p<0.05)

IS research has claimed that having identified statistically significant relationships it is also important to reflect the strength of the relationship via a suitable correlation coefficient (Cornford and Smithson, 2006, p139). See Research Methodology Chapter, Section: 3.6.1.1.4. Strength of Association, Page 142. Table 5.5 also shows that all of the factors were considered ‘moderate’ (i.e. phi > 0.3 or phi <-0.3) with the exception of the OSS Contributors Reported factor (Q23c) which was ‘strongly’ correlated with OSS Adoption in 2011/12 (i.e. phi > 0.5).

Table 5.7: Correlation Coefficient (Phi) for Driving/Inhibiting Factors and OSS Adoption Behaviour by Year (p<0.05)

Question	Construct, Factor (+ve/-ve)	35e General OSS Adoption 2010	35d General OSS Adoption 2011	35c General OSS Adoption 2012	35b General OSS Intention 2013	35a General OSS Intention 2014
	Attitude Factors					
20a	Security (+ve)	0.397	0.306	0.371	0.384	0.355
20i	Perpetuity (+ve)				0.329	0.329
21a	Unsustainable business model (-ve)			-0.33	-0.388	-0.327
21b	Second best perception (-ve)			-0.3	-0.414	-0.35
21f	Questionable return (-ve)			-0.314	-0.328	
	Subjective Norm Factors					
23c	OSS contributors (reported) (+ve)		0.555	0.555		
25b	OSS contributors (influence) (+ve)			0.325		
25c	Colleagues (in line of business) (+ve)				0.338	
25d	Colleagues(in IT Dept) (+ve)				0.468	0.375
	Perceived Behavioural Control Factors					
27	Ease of implementation (+ve)		0.309	0.442	0.454	0.408
30g	Switching costs (-ve)			-0.309		
32	Prior implementation (+ve)	0.327				
33	Organisation active OSS user (+ve)			0.442	0.409	0.347

5.4.4.2.2. OSS Adoption and Intention to Adopt OSS by Software Categories

It has been argued that OSS adoption has occurred in waves and therefore it is important to consider different categories of software in adoption studies (Chengalur-Smith et al., 2010). As previously discussed the US federal government has provided a system of classification. See Appendix A: NAPCS Software Industry Classification.

Appendix Q: Quantitative Analysis for OSS Adoption and Intention to Adopt OSS by NAPCS Category shows how driving and inhibiting factors were established for the specified organisational OSS adoption behaviour. These findings are summarised below.

5.4.4.2.2.1. Summary of OSS Adoption in 2012 (by NAPCS Category)

The path diagram in Figure 5.21 provides a summary of the statistically significant factors and various OSS adoption behaviours (by NAPCS category). The diagram also shows that nine out of twenty factors were found to be associated with the OSS adoption of more than one systems or applications software NAPCS subcategory. See Appendix Q: Quantitative Analysis for OSS Adoption and Intention to Adopt OSS by NAPCS Category for a more comprehensive description.

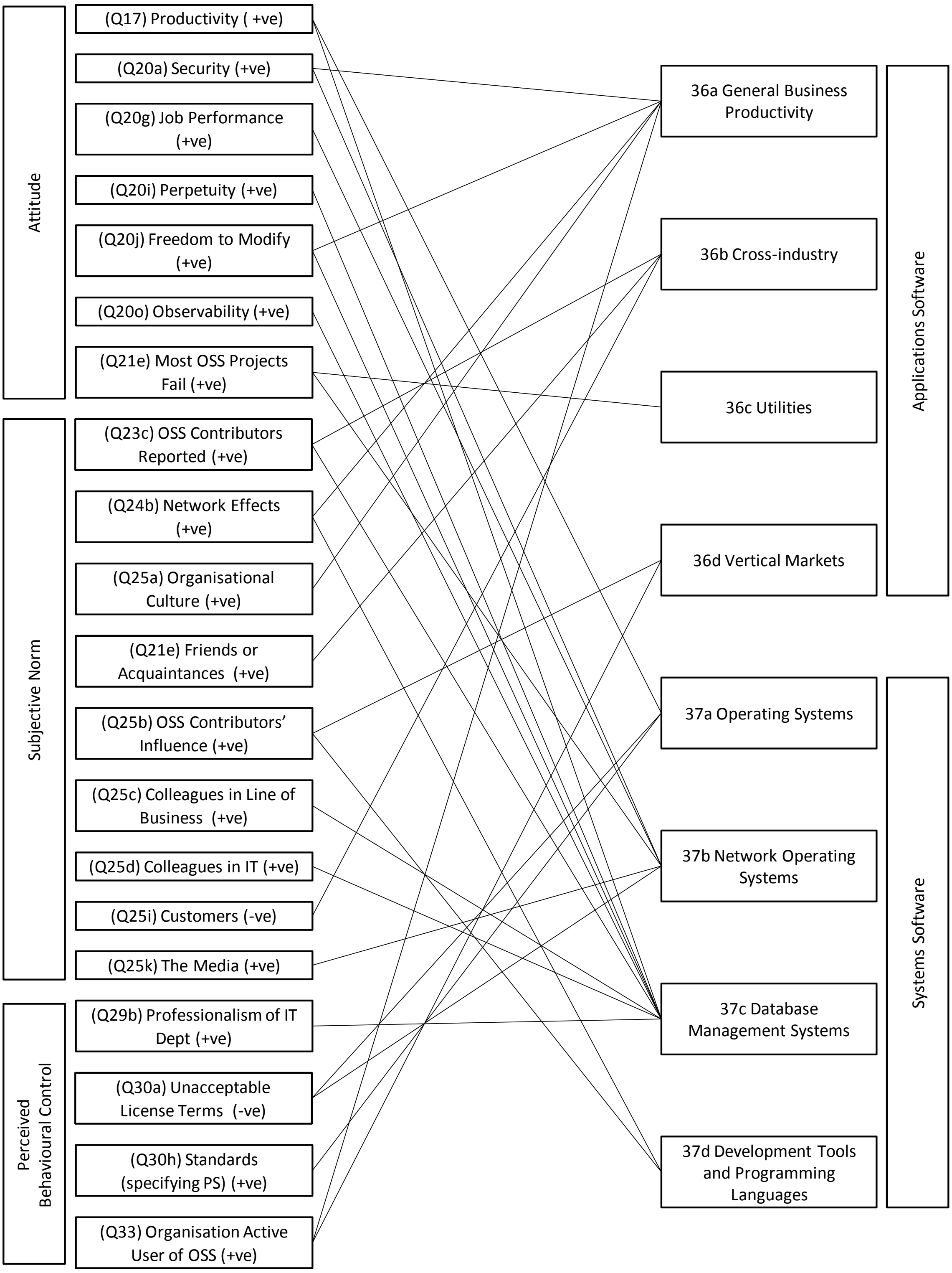


Figure 5.21: Path Diagram of Driving/Inhibiting Factors and OSS Adoption by NAPCS Category (p<0.05)

As previously discussed, IS research has recommended that statistically significant factors are also analysed for strength of association (Cornford and Smithson, 2006, p139). Table 5.8 illustrates the correlation coefficient (phi) between factors and OSS adoption behaviour (by NAPCS category). The table also shows that all of the factors were found to be moderately correlated (i.e. - 0.3 >phi< +0.3), with the exception of; (a) the Freedom to Modify factor and OSS adoption of Database Management subcategory and (b) the OSS Contributors Reported factor and OSS adoption of Development Tools and Programming Languages subcategory, which were found to be strongly positively correlated (i.e. phi >+0.5).

Table 5.8: Correlation Coefficient (Phi) for Driving/Inhibiting Factors and OSS Adoption in 2012 by NAPCS Subcategory (p<0.05)

Question	Construct, Factor (+ve/-ve)	Adoption 2012							
		Applications Software Sub Category				Systems Software Sub Category			
		36a General Business Productivity	36b Cross Industry	36c Utilities	36d Vertical Markets	37a Operating Systems	37b Network Systems	37c Database Management Systems	37d Development Tools and Prog Languages
	Attitude Factors								
17	Productivity (+ve)					0.336		0.37	
20a	Security (+ve)	0.39					0.325		
20g	Job Performance i.e. Usefulness (+ve)						0.306		
20i	Perpetuity (+ve)							0.39	
20j	Freedom to modify (+ve)	0.311						0.503	
20o	Observability (+ve)							0.324	
21e	Most OSS projects fail (-ve)			-0.325			0.323		
	Subjective Norm Factors								
23c	OSS contributors (reported) (+ve)		0.363					0.369	0.503
24b	Network Effects (+ve)	0.364							0.336
24e	Organisational Culture (+ve)	0.325							
25a	Friends or acquintances (+ve)		0.301						
25b	OSS contributores (influence) (+ve)				0.353				0.377
25c	Colleagues (in line of business) (+ve)							0.314	
25d	Colleageus (in IT) (+ve)								0.336
25i	Customers (-ve)		-0.312						
25k	The media (broadcast, trade press etc) (+ve)						0.323		
	Perceived Behavioural Control Factors								
29b	Professionalism of IT dept (+ve)							0.356	
30a	Unacceptable license terms (-ve)					-0.309	-0.331		
30h	Standards (specifying proprietary) (-ve)					-0.31			
33	Organisation active OSS user (+ve)	0.336			0.407				

5.4.4.2.2.2. Summary of Intention to Adopt OSS in 2013 (by NAPCS Category)

The path diagram in Figure 5.22 provides a summary of the statistically significant factors and intention to adopt OSS behaviours (by NAPCS category) rather than OSS adoption (i.e. intention to adopt OSS rather than already adopted OSS). The diagram also shows that fifteen out of twenty-six factors were found to be associated with the OSS adoption of more than one systems or applications software NAPCS subcategory. Notably, and consistent with the preceding findings in relation to OSS adoption behaviour (by year), the Security factor was found to be associated with intention to adopt OSS in five out of eight NAPCS subcategories. See Appendix Q: Quantitative Analysis for OSS Adoption and Intention to Adopt OSS by NAPCS Category for a more comprehensive description.

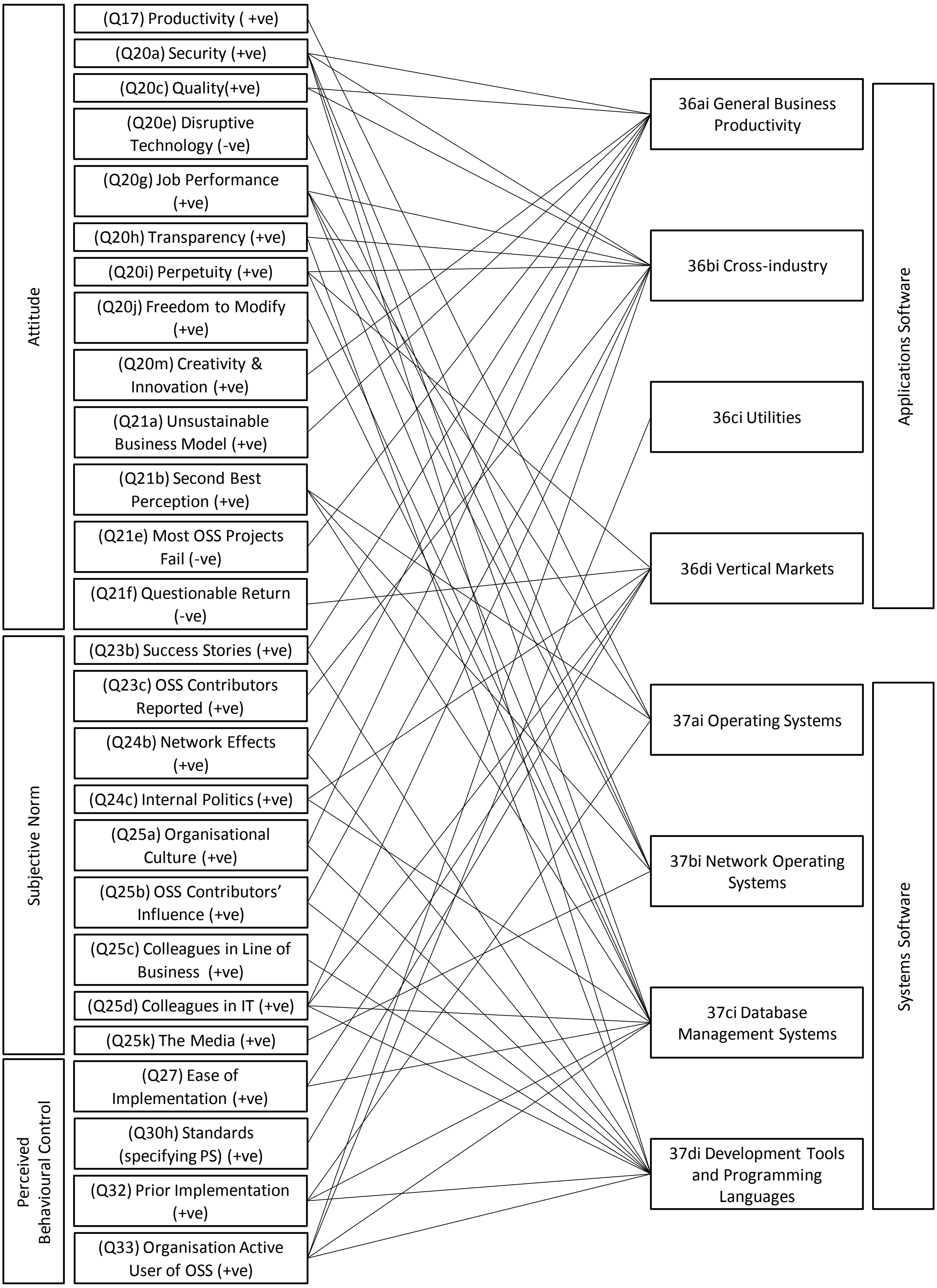


Figure 5.22: Path Diagram of Driving/Inhibiting Factors and Intention to Adopt OSS by NAPCS Category (p<0.05)

As previously discussed, IS research has recommended that statistically significant factors should also analysed for strength of association (Cornford and Smithson, 2006, p139). Table 5.9 illustrates the correlation coefficient (phi) between factors and the intention to adopt OSS behaviour (by NAPCS category). The table also shows that all of the factors were found to be moderately correlated (i.e. -0.3 > phi < +0.3), without exception.

Table 5.9: Correlation Coefficient (Phi) for Driving/Inhibiting Factors and Intention to Adopt OSS by NAPCS Subcategory (p<0.05)

Question	Construct, Factor (+ve/-ve)	Intention 2013							
		Applications Software Sub Category				Systems Software Sub Category			
		36ai General Business Productivity	36bi Cross Industry	36ci Utilities	36di Vertical Markets	37ai Operating Systems	37 bi Network Systems	37ci Database Management Systems	37di Development Tools and Prog Languages
	Attitude Factors								
17	Productivity (+ve)					0.345			
20a	Security (+ve)	0.316	0.392				0.361	0.332	0.357
20c	Quality (+ve)	0.303	0.355						
20e	Disruptive Technology (-ve)						-0.331		
20g	Job Performance i.e. Usefulness (+ve)		0.311			0.379	0.336	0.429	
20h	Transparency (+ve)		0.352						0.373
20i	Perpetuity (+ve)		0.311		0.33			0.323	
20j	Freedom to modify (+ve)							0.485	
20m	Creativity & innovation (+ve)	0.313							
21a	Unsustainable business model (-ve)	-0.338							
21b	Second best perception (-ve)					-0.318	-0.311	-0.372	
21e	Most OSS projects fail (-ve)	-0.343							
21f	Questionable return (-ve)				-313				
	Subjective Norm Factors								
23b	Success stories (+ve)	0.417							
23c	OSS contributors (reported) (+ve)		0.449						0.383
24b	Network Effects (+ve)	0.343							0.37
24c	Internal politics (+ve)				0.341			0.325	
24e	Organisational Culture (+ve)	0.356							0.323
25b	OSS contributores (influence) (+ve)		0.352						0.487
25c	Colleagues (in line of business) (+ve)								0.333
25d	Colleageus (in IT) (+ve)		0.392		0.332			0.393	0.453
25k	The media (broadcast, trade press etc) (+ve)						0.333		
	Perceived Behavioural Control Factors								
27	Ease of implementation (+ve)				0.313			0.342	
30h	Standards (specifying proprietary) (-ve)				0.241				
32	Prior implementation (+ve)					0.342		0.35	0.303
33	Organisation active OSS user (+ve)		0.419	0.306				0.364	0.403

5.4.4.2.3. OSS Adoption by ITG Stage

The path diagram in Figure 5.23 illustrates of the statistically significant factors associated with the organisational OSS adoption behaviours (by stage), and the extent to which these factors intersect the four stages. See Appendix R: Quantitative Analysis for OSS Adoption Analysis by ITG Adoption Stage for a detailed description.

This analysis illustrates that there were four factors which overlapped across all four stages (i.e. from Initiation to Approval). Specifically; (i) the Security factor (+ve), (ii) the Questionable Return factor (-ve) (iii) the Organisational Culture factor (+ve) and (iii) the Organisation is an Active OSS User factor (+ve) were all found to be associated with all of the four stages of organisational adoption. As with previous analysis of this kind in this dissertation, this would suggest that these four factors would be a logical place to start in any proposed management intervention. Other than these factors, the following factors were also found to intersect multiple stages of OSS adoption, which are therefore also worth noting.

In the final three stages; (i) the Media factor, (ii) the Ease of Implementation factor and (iii) the Prior Implementation factor were found to be positively associated with OSS adoption across the last three stages. In contrast, the Unsustainable Business Model factor was found to be negatively associated with OSS adoption across the last three stages.

In the final two stages; (i) the Third Party Partners factor, (ii) the Customers factor (iii) the Network Effect factor and (iv) the Category Killer factor were found to be positively associated with these stages of OSS adoption.

In the mid-stage area, the Knowledge Creation factor was the only factor which was positively associated with both these stages of OSS adoption.

In the first two stages; (i) the OSS Contributors' Influence factor, (ii) the Colleagues in IT Dept. factor and (iii) the Productivity factor were found to be positively associated with these stages of OSS adoption.

All the remaining factors were only found to be statistically significant for single stages. Notably the Second Best Perception factor was negatively associated in the initiation stage only

.

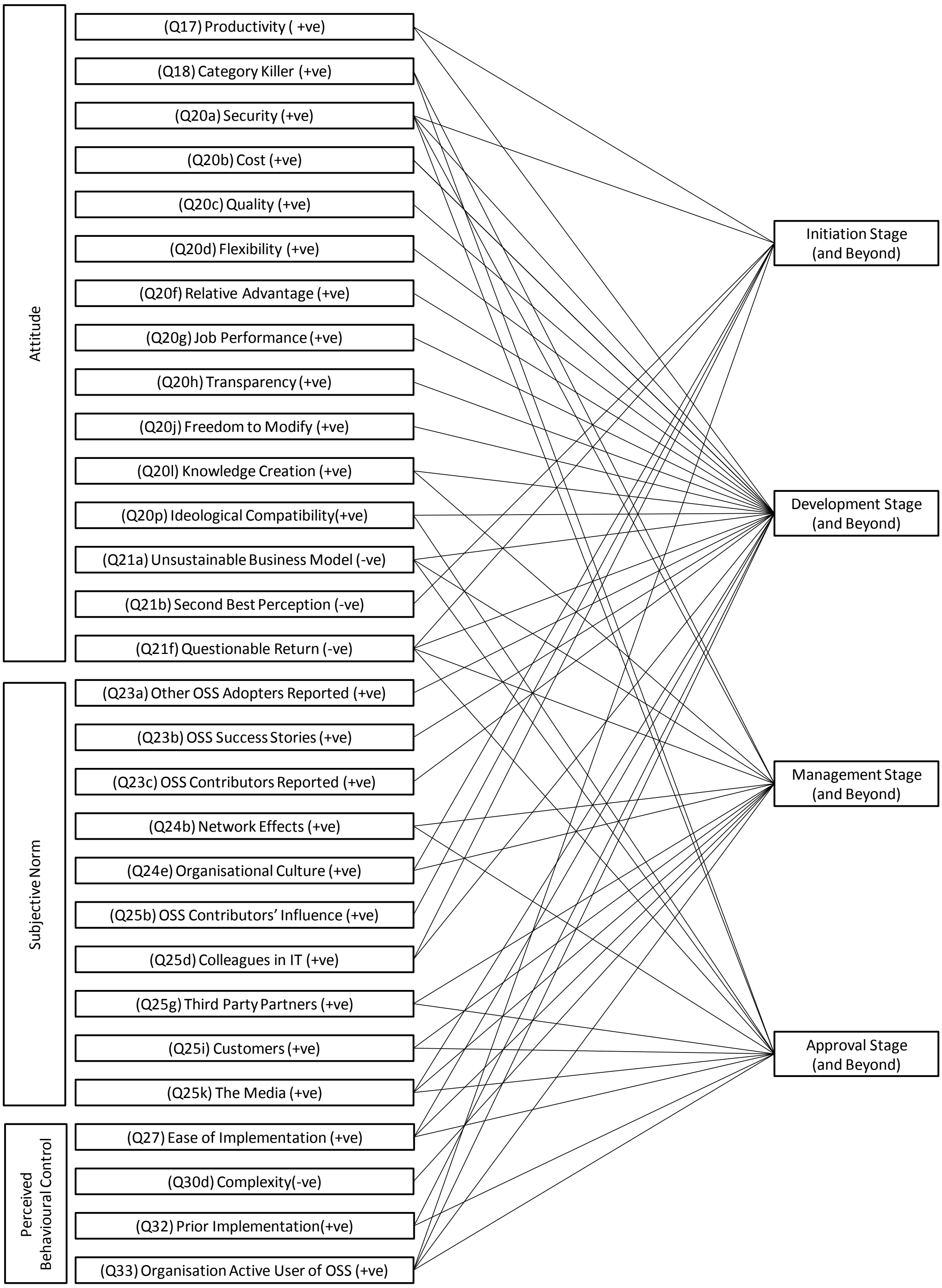


Figure 5.23: Path Diagram of Driving/Inhibiting Factors and OSS Adoption by ITG Stage (p<0.05)

As previously discussed, IS research has recommended that statistically significant factors should also analysed for strength of association (Cornford and Smithson, 2006, p139). Table 5.10 illustrates the correlation coefficient (phi) between factors and the intention to adopt OSS behaviour (by NAPCS category). The table also shows that all of the factors were found to be moderately correlated (i.e. -0.3 > phi < +0.3), with the exception of; (a) the Security factor and the Development Stage, (b) the Success Stories factor and the Development Stage and (c) the Organisation is an Active User factor and the Development and Management Stages, (i.e. phi > 0.5).

Table 5.10: Correlation Coefficient (Phi) for Driving/Inhibiting Factors and OSS Adoption by ITG Stage (p<0.05)

Question	Construct, Factor (+ve/-ve)	IT Governance Stage			
		Initiation Stage (and beyond)	Development Stage (and Beyond)	Management Stage (and Beyond)	Approval Stage (and Beyond)
	Attitude Factors				
17	Productivity (+ve)	0.312	0.457		
18	Category Killer (+ve)			0.46	0.448
20a	Security (+ve)	0.426	0.541	0.4	0.347
20b	Cost (+ve)		0.426		
20c	Quality (+ve)		0.386		
20d	Flexibility (+ve)		0.305		
20f	Relative Advantage (+ve)		0.362		
20g	Job Performance i.e. Usefulness (+ve)		0.312		
20h	Transparency (+ve)		0.312		
20j	Freedom to modify (+ve)		0.378		
20l	Knowledge Creation (+ve)		0.35	0.3	
20p	Ideological Compatibility (+ve)		0.3		0.322
21a	Unsustainable business model (-ve)		-0.312	-0.411	-0.417
21b	Second Best Perception (-ve)	-0.312			
21f	Questionable return (-ve)	-0.343	-0.353	-0.361	-0.346
	Subjective Norm Factors				
23a	Other OSS adopters (reported) (+ve)		0.405		
23b	Success stories (+ve)		0.511		
23c	OSS contributors (reported) (+ve)		0.349		
24b	Network Effects (+ve)			0.314	0.329
24e	Organisational Culture (+ve)	0.343	0.486	0.366	0.436
25b	OSS contributors (influence) (+ve)	0.328	0.312		
25d	Colleageus (in IT) (+ve)	0.315	0.424		
25g	Third Party Partners (+ve)			0.35	0.399
25i	Customers (+ve)			0.35	0.399
25k	The media (broadcast, trade press etc) (+ve)		0.367	0.477	0.538
	Perceived Behavioural Control Factors				
27	Ease of implementation (+ve)		0.295	0.324	0.413
30d	Complexity (-ve)			-0.32	
32	Prior implementation (+ve)		0.382	0.475	0.436
33	Organisation active OSS user (+ve)	0.426	0.605	0.5	0.381

5.4.4.3. Qualitatively Established Driving and Inhibiting Factors and OSS Adoption

Appendix O: Qualitative Data Set from Main Study details how respondents replied when they were asked to augment their quantitative assessments with qualitative descriptions. The questions asked were as follows:

- Survey Question Ref. Q19: How else would you describe your general attitude toward implementing an IT project incorporating OSS within the year?
- Survey Question Ref. Q22: In your opinion, are there any other outcomes you would expect from implementing an IT project incorporating Open Source Software (OSS)?
- Survey Question Ref. Q26: To your knowledge, are there any other significant groups or individuals who would have expectation one way or another, for you to implement IT projects incorporating OSS?
- Survey Question Ref. Q31. In your opinion, are there any other factors that may drive or inhibit your implementation of IT projects incorporating OSS?

Twenty six participants elected to offer qualitative responses. This data were then aggregated into single passages per respondent, as a unit of analysis, and then coded as factors as described in Table 5.11.

Table 5.11: Qualitatively Established Factors Associated with OSS Adoption

Factor	Total	% of 26 Respondents
Suitability/Matching Requirements	21	80.8%
Cost	14	53.8%
Support	11	42.3%
Ease of Implementation	10	38.5%
Sustainability	7	26.9%
Supplier	7	26.9%
Colleagues in Line of Business or End Users	6	23.1%
Colleagues in IT	5	19.2%
Development and Freedom to Modify	5	19.2%
Skills	4	15.4%
Risk	2	7.7%
Training	2	7.7%

The qualitative data was further coded into units which were broadly considered; (a) Driving (towards OSS) (b) Neutral to OSS and (c) Inhibiting (toward OSS) and cross referenced against the previously established factors, as described in Figure 5.24, using the Weft QDA package.

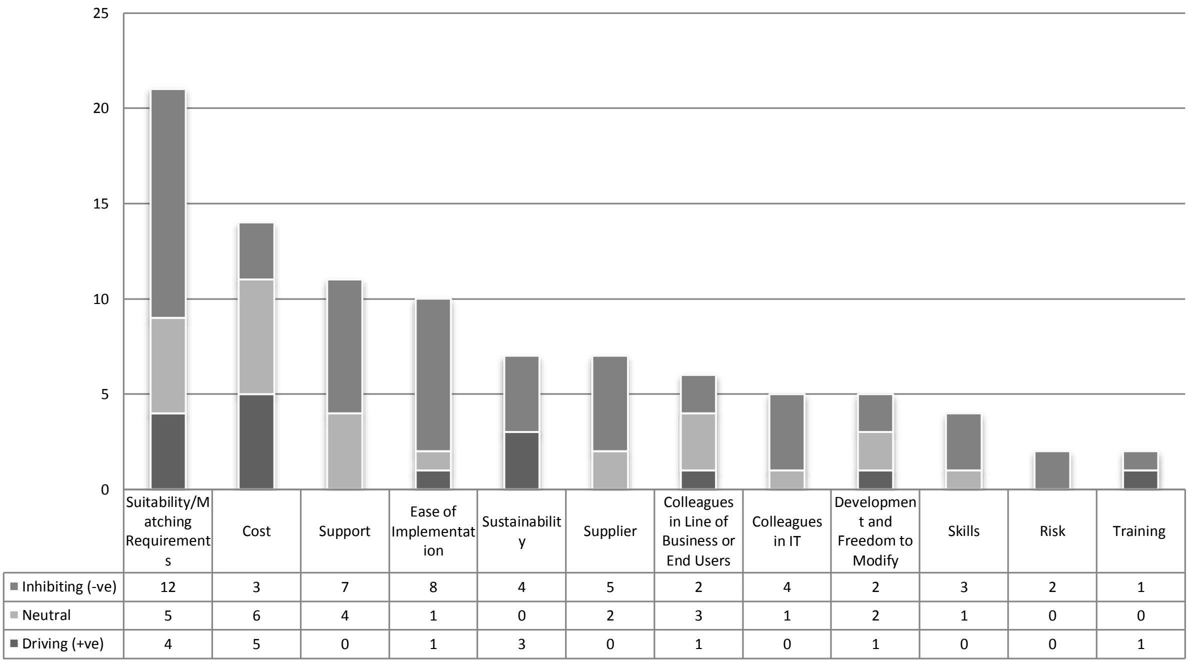


Figure 5.24: Number of; Driving, Inhibiting or Neutral Factors Qualitatively Associated with OSS Adoption

Some of the qualitative findings appeared to support quantitative findings, known as ‘bridging’, and others were somewhat contradictory, known as ‘bracketing’ (Venkatesh et al., 2013). See Chapter 6: Evaluation of Research and Discussion, p229 for a more in-depth description

Having discussed the qualitatively established findings the next section will describe how results were formed from mixed-methods.

5.4.4.4. Driving and Inhibiting Factors Established from Mixed Methods

As with other IS research mixed methods inference or ‘meta-inference’ was made possible by quantitative and qualitative ‘data consolidation’ (Johnson and Onwuegbuzie, 2004). See also Research Methodology Chapter. That is to say, factors established via qualitative methods were combined with the quantitatively data regarding the various organisational OSS adoption behaviours to assess whether they were significantly associated (i.e. greater than 95% confidence level) via SPSS. The screenshot Figure 5.25 shows how qualitative established data was imported into SPSS for statistical analysis using Fisher’s Exact Test as before. The figure illustrates the qualitatively established Cost (negative) factor, and the three instances which were coded as such (i.e. URNs: 10071152, 10226395 and 10480490). The figure also shows that Cost (negative) factor was left blank for those who elected not to respond qualitatively, and zero for those who did not present a cost (negative) coded factor (i.e. N=26 max). This importing process was repeated for the other qualitatively established factors, after which the relationships were tested for statistical significance as before.

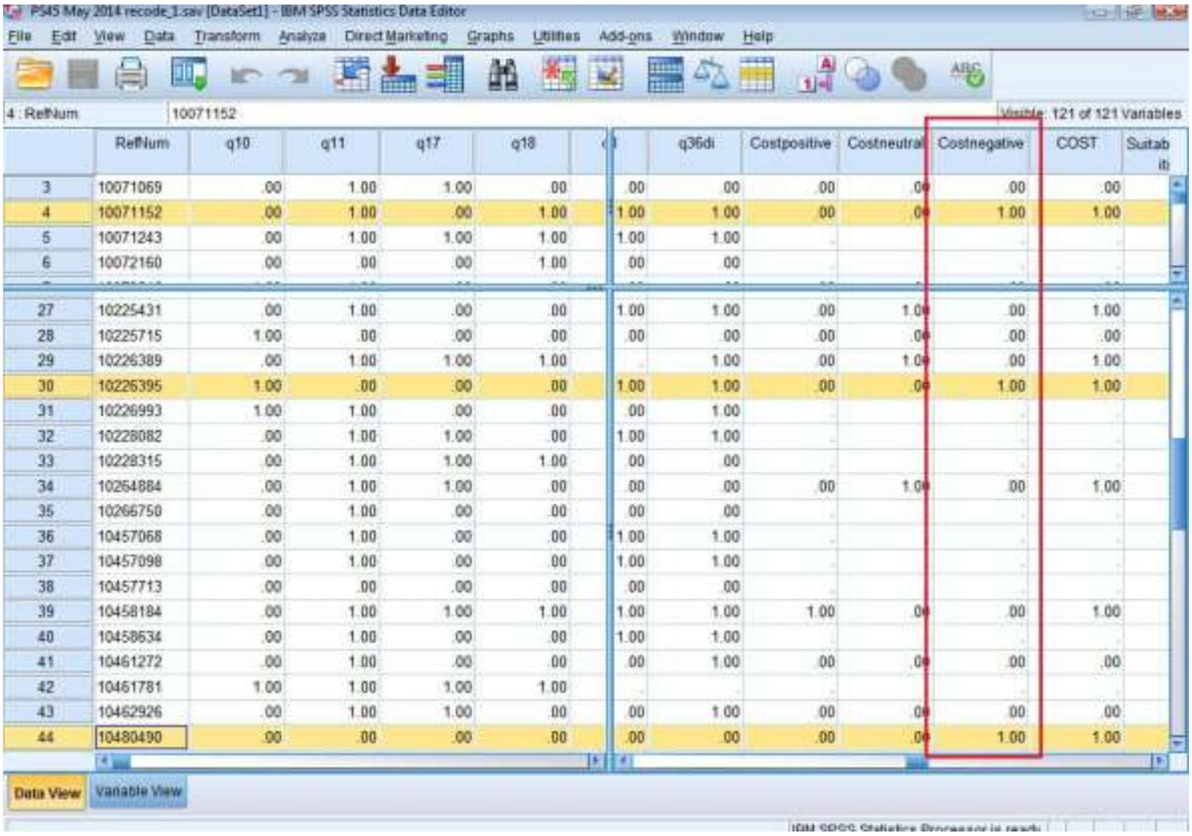


Figure 5.25: Example of Qualitatively Established Factors Imported into SPSS for Analysis (N=26 Max)

Table 5.12 provides an overview of these findings with statistically significant factors (*), and the corresponding vector (i.e. inhibiting/neutral/driving) in grey. These indicated factors were all found to be significantly associated with various OSS adoption behaviours. Put another way, the table answers the question, of the qualitatively established driving, neutral and inhibiting factors; which factors were found to be statistically significantly associated with OSS adoption? For instance, the fact that the three individuals who elected to augment their quantitative response with a qualitative response coded as "cost", and furthermore coded as "inhibiting", were found to be of statistical significance when compared with whether or not any organisational OSS adoption behaviour was actually reported.

Table 5.12: Driving, Neutral and Inhibiting Factors and Factors (*) Established via Data Consolidation

Factor	Driving (+ve)	Neutral	Inhibiting (-ve)	Total
Suitability	*4*	*5*	*12*	**21**
*Cost**	*5*	*6*	*3*	**14**
Support	*0*	*4*	*7*	**11**
*Ease of Implementation**	*1*	*1*	*8*	**10**
Sustainability	*3*	*0*	*4*	**7**
*Supplier**	*0*	*2*	*5*	**7**
Colleagues in Line of Business or End Users	*1*	*3*	*2*	**6**
*Colleagues in IT**	*0*	*1*	*4*	**5**
*Development and Freedom to Modify**	*1*	*2*	*2*	**5**
Skills	*0*	*1*	*3*	**4**
*Risk**	*0*	*0*	*2*	**2**
Training	*1*	*0*	*1*	**2**
Total	**16**	**25**	**53**	**94**

Key: *p<=0.05

The qualitatively established factors and specific organisational OSS adoption behaviours are detailed in Table 5.13, along with the corresponding Fisher Exact Test details. Appendix S: Mixed Methods Analysis details the SPSS output for these mixed-methods results. Specifically, of the 45 completed questionnaires, a maximum of 26 individuals elected to respond with qualitative as well as quantitative responses. Table 5.13 answers the question: Of those 26 qualitative respondents (and following the coding described above) are the actual OSS organisational adoption behaviours statistically significantly associated? The organisational adoption behaviours found to be so, include Generic OSS adoption (by year), OSS adoption (by NAPCS category) and OSS adoption (ITG stage).

Table 5.13: Inhibiting Factors Associated with OSS Adoption Established via Mixed-methods (N=26max)

Factor	Fisher Exact Test	OSS Organisational Adoption Behaviour
Cost (-ve)	N=26, p=0.04615*	OSS Cross-industry Intention 2013
Ease of Implementation (-ve)	N=26, p=0.01738*	OSS Cross-industry Intention 2013
Supplier (-ve)	N=25, p=0.04032*	OSS Adoption 2010
Colleagues in IT (-ve)	N=26, p=0.01405*	OSS Cross-industry Intention 2013
Risk (-ve)	N=26, p=0.04614*	OSS Approval Stage (and Beyond)

Key: *p<0.05

Further data consolidation was achieved when the qualitatively established factors were combined with the larger main study quantitative data. For example, returning to the three individuals who elected to respond qualitatively, who were subsequently coded as providing ‘cost’ as inhibiting OSS adoption. On this occasion, those responses loaded into SPSS and compared with organisational OSS adoption behaviour across all quantitative and qualitative respondents (N=44 maximum) rather than just those who had responded qualitatively (N=26 maximum). Figure 5.26 shows that Cost (negative) factor was coded as zero for those who elected not to respond qualitatively (i.e. N=44 max). This importing process was repeated for the other qualitatively established factors, after which the relationships were tested for statistical significance as before.

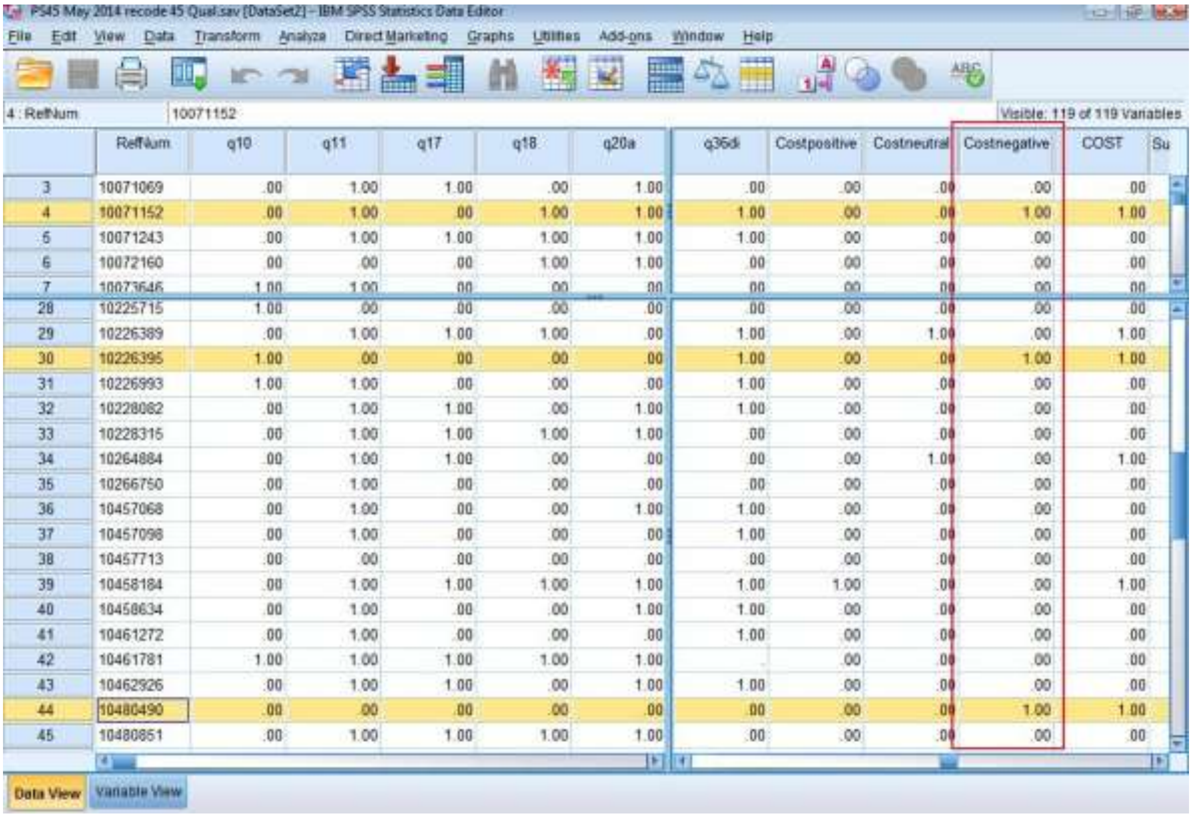


Figure 5.26: Example of Qualitatively Established Factors Imported into SPSS for Analysis (N=44 Max)

Table 5.14 illustrates the factors found to be statistically significant, along with the corresponding organisational OSS adoption behaviour. Appendix S: Mixed Methods Analysis details the SPSS output associated with these factors. This shows that the mixed method approach successfully augmented quantitatively and qualitatively established factors with exclusively inhibiting factors for certain OSS organisational adoption behaviours.

Table 5.14: Inhibiting Factors Associated with OSS Adoption Established via Mixed-methods (N=44max)

Factor. Driving (+ve)/Inhibiting (-ve)	**Fisher Exact Test**	**Organisational OSS Adoption Behaviour**
Cost (-ve)	N=42, p(a<=0)=0.04878*	OSS Cross-industry Intention 2013
Suitability (-ve)	N=42, p(a<=4)=0.04869*	OSS Cross-industry Intention 2013
Ease of Implementation (-ve)	N=42, p(a<=2)=0.02468*	OSS Cross-industry Intention 2013
Development/Freedom to Modify (-ve)	N=44, p(a<=0)=0.04757*	OSS Utilities Adoption 2012

Key: *p<0.05

IS research has been criticised for not producing 'meta-inferences' (Venkatesh et al., 2013). Therefore, so far as the mixed-methods part of this study is concerned, the results previously reported for relevant organisational OSS adoption behaviour derived from quantitative and qualitative data can also be augmented by the above 'meta-inferences'. Appendix T: Mixed Methods Results details this.

5.5. Hypotheses and Conceptual Framework

5.5.1. Hypotheses

5.5.1.1. OSS Adoption and Intention to Adopt OSS by Year

Table 5.15 has summarised the hypotheses proposed for this main study for the OSS adoption and intention to adopt OSS (by year) and by confidence level observed. This showed that the hypotheses for the individual factors were entirely rejected. The hypotheses for the organisational factors were partially supported for recent adoption (i.e. 2012) and near-term intention (i.e. 2013). The table also shows that the TPB constructs were almost entirely supported (i.e. with the exception of 2010 Subjective Norm) and also showed the highest confidence levels (i.e. greater than 99.5% confidence levels) in the recent adoption (i.e. 2012) and near-term intention to adopt (i.e. 2013) categories.

Table 5.15: Summary of Hypotheses by OSS Adoption (by year) and Confidence Level Observed

Hypothesis Reference	Hypothesis Description	35e General OSS Adoption 2010	35d General OSS Adoption 2011	35c General OSS Adoption 2012	35b General OSS Intention 2013	35a General OSS Intention 2014
H1	Individual profile factors will be of statistical significance	Rejected	Rejected	Rejected	Rejected	Rejected
H2	Organisational profile factors will be of statistical significance	Rejected	Rejected	Supported*	Supported*	Rejected
H3	Attitude factors will be of statistical signficance	Supported*	Supported*	Supported*	Supported**	Supported*
H4	Subjective Norm Factors will be of statistical signficance	Rejected	Supported*	Supported***	Supported***	Supported*
H5	Perceived Behavioral Control factors will be of statistical significance	Supported*	Supported*	Supported***	Supported***	Supported**

Key: ***p<0.05**
****p<0.01**
*****p<0.005**

5.5.1.2. OSS Adoption and Intention to Adopt OSS by Software Category

Table 5.16 summarises the hypotheses proposed for this main study for the OSS adoption and intention to adopt OSS, by NAPCS software category and confidence level observed. This also showed that the hypotheses for the individual and organisational factors were entirely rejected across all subcategories. The table also showed that at least one of the TPB constructs was supported across the all of subcategories.

Table 5.16: Summary of Hypotheses by OSS Adoption (by NAPCS Category) and Confidence Level Observed

		Adoption 2012								Intention 2013							
		Applications Software Sub Category				Systems Software Sub Category				Applications Software Sub Category				Systems Software Sub Category			
Hypotheses	**Hypothesis Description**	**36a General Business Productivity**	**36b Cross Industry**	**36c Utilities**	**36d Vertical Markets**	**37a Operating Systems**	**37b Network Systems**	**37c Database Management Systems**	**37d Development Tools and Prog Languages**	**36ai General Business Productivity**	**36bi Cross Industry**	**36ci Utilities**	**36di Vertical Markets**	**37ai Operating Systems**	**37 bi Network Systems**	**37ci Database Management Systems**	**37di Development Tools and Prog Languages**
H1	Individual profile factors will be of statistical significance	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected
H2	Organisational profile factors will be of statistical significance	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected
H3	Attitude factors will be of statistical signficance	Supported*	Rejected	Supported*	Rejected	Supported*	Supported*	Supported***	Rejected	Supported*	Supported*	Rejected	Supported*	Supported*	Supported*	Supported*	Supported*
H4	Subjective Norm Factors will be of statistical signficance	Supported*	Supported*	Rejected	Supported*	Rejected	Supported*	Supported*	Supported**	Supported*	Supported*	Rejected	Supported*	Rejected	Supported*	Supported***	Supported***
H5	Perceived Behavioral Control factors will be of statistical significance	Supported*	Rejected	Rejected	Supported*	Supported*	Supported*	Supported*	Rejected	Rejected	Supported**	Supported*	Supported**	Supported*	Rejected	Supported**	Supported**

Key: ***p<0.05**
****p<0.01**
*****p<0.005**

5.5.1.3. OSS Adoption by Stage of Adoption

Table 5.17 summarises the hypotheses proposed for this main study for the OSS adoption and intention to adopt OSS, by stage of adoption. This also shows that the hypotheses for the individual and organisational factors were entirely rejected across all stages. The table also shows that the TPB constructs were supported across all stages.

Table 5.17: Summary of Hypotheses by OSS Adoption (by ITG Stage) and Confidence Level Observed

Hypothesis	Hypothesis Description	IT Governance Stage			
		Initiation Stage (and beyond)	Development Stage (and Beyond)	Management Stage (and Beyond)	Approval Stage (and Beyond)
H1	Individual profile factors will be of statistical significance	Rejected	Rejected	Rejected	Rejected
H2	Organisational profile factors will be of statistical significance	Rejected	Rejected	Rejected	Rejected
H3	Attitude factors will be of statistical signficance	Supported**	Supported***	Supported***	Supported**
H4	Subjective Norm Factors will be of statistical signficance	Supported*	Supported***	Supported***	Supported***
H5	Perceived Behavioral Control factors will be of statistical significance	Supported ***	Supported*	Supported***	Supported**

Key: ***p<0.05**
****p<0.01**
*****p<0.005**

5.5.2. Conceptual Framework

Figure 5.27 summarises the extent to which the original conceptual framework was successfully tested during the main study. The results show that the hypotheses in relation TPB were largely supported (H3-5). Organisational size was found to be of statistical significance. Additionally, whether or not the organisation employed as small number of developers was found to be statistically significant during the main study for certain organisational OSS adoption behaviour. Therefore, H2 was partially supported. The individual profiled factors were not statistically significant across any organisational OSS adoption behaviours. Therefore, H1 was rejected.

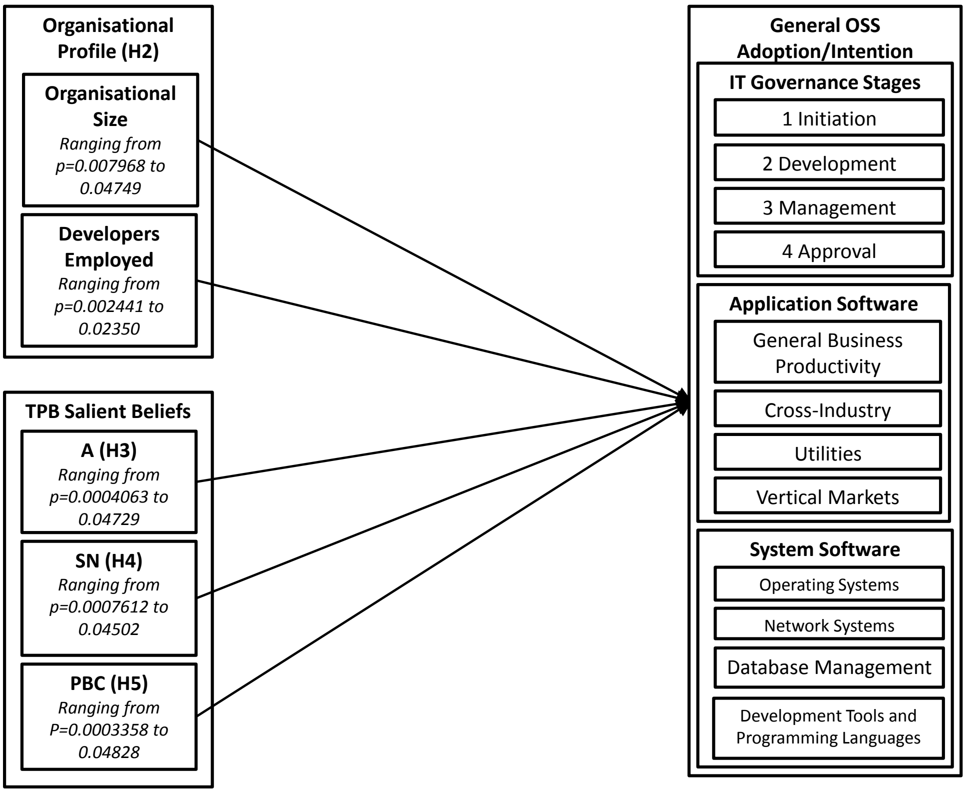


Figure 5.27: Summary of Conceptual Model Successfully Tested during the Main Study

5.6. Summary

The results show that the main study was able to extend the pilot study, and generate a relatively parsimonious list of statistically significant driving and inhibiting factors associated with a number of organisational OSS adoption behaviours. As a result of the pilot study the questionnaire was further simplified and significantly improved the completion rates. The main study has; demonstrated further results from qualitative methods and mixed methods described in this chapter, produced an analysis of OSS adoption NAPCS sub-categories and an analysis of driving/inhibiting factors across various ITG stages was also achieved. As with the pilot study, a limited number of factors derived from 67 discussed in the literature review, was considered suitable to devise a practical management intervention via a FFA in line with the philosophy of this research (i.e. practical adequacy).

Chapter 6: Evaluation of Research and Discussion

6.1. Introduction

'Evaluation' has been defined as, "the ability to judge materials or methods in terms of internal accuracy and consistency or by comparison with external criteria" (Rowntree (1977), cited in Saunders et al., 2009, p388). For the purposes of this research, this chapter will evaluate the research findings against certain criteria published in the existing IS research which is of particular relevance to mixed-methods research such as those which were used in this study. The research findings will then be discussed in the context of the existing IS/OSS research.

Furthermore, evaluation research can be broadly categorised by 'formative' and 'summative' evaluation (Brown and Kiernan, 2001). Formative evaluation can be described by; (1) Conceptualisation (2) Methods and Design and (3) Findings (ibid).

Firstly, in terms of conceptualisation, formative evaluation is distinguished from summative in terms of the rationale, use of data, frequency and timing, overlap with process evaluation and epistemology. Secondly, in terms of methods and design, decisions include (a) identifying who should participate (b) how many to include and how (c) type of data (e.g. qualitative or quantitative) (d) data collection techniques and (e) comparison of pilot and main studies. Thirdly, in terms of formative evaluation findings, there is little consensus on whether to include data, problems identified or changes made. However, Brown (2001) argue there is consensus as to the effectiveness of formative evaluation leading to a 'stronger' research programme (Brown and Kiernan, 2001).

In terms of this research, as a doctoral programme, there were numerous opportunities to formatively evaluate findings with research experts and fellow students. These included formal mechanisms such as; quarterly meetings with student cohort (the DBA weekends), supervisory meetings, examinations (i.e. registration, first and second progression examination), problem-solving discussions with tutors and other students at the University's Generic Training for Researchers programme. There were also less formal interactions via study groups, communications with fellow students and correspondence with supervisors and scholarly authors. An example, of such an interaction was presenting issues with data collection at one of the DBA weekends which produced an appropriate solution as detailed in the Reflexivity Chapter. Furthermore, and similar to other research (Goode, 2005), respondents were offered a summary report after the pilot and main study which produced significant informal feedback, encouragement and support (typically by email), and formally assisted the research as forming a structure for the subsequent demand-side and buy-side key informant interviews which are discussed later. The above measures mostly describe the formative evaluation of this research. The remaining sections address the question of summative evaluation, or specifically the appropriate validation of research outcomes (Brown and Kiernan, 2001).

6.2. Evaluation of Mixed-methods Approach

Venkatesh (2013) has described 'meta-inferences' as, "integrative findings from both quantitative and qualitative studies" (Venkatesh et al., 2013, p3), and has identified a set of criteria which can be used to specifically to evaluate 'true mixed-methods design': (1) Purpose of mixed-methods research (2) Methods Employed and Paradigm Selection (i.e. quantitative, qualitative and dominant method/paradigm) (3) Meta-inferences and (4) Discussion of Validation (i.e. quantitative, qualitative and meta-inferences) (Venkatesh et al., 2013, pp8-10, Table 2). As this research has collected quantitative and qualitative data, carried out mixed-methods analysis and also sought to integrate the findings, this approach has been adopted as a suitable form of evaluation, an explanation of which follows.

6.2.1. Purpose of Mixed-methods Research

It has been argued that, "the decision to conduct mixed methods research should hinge on the research question, purpose, and context" (Venkatesh et al., 2013, p2). Therefore, for the purposes of this study and the extent to which organisational OSS adoption could be shown to be a function of the salient beliefs of the managers involved, it was considered necessary to (a) ask mainly closed questions yielding quantitative data for statistical analysis which produced a degree of research breadth, and (b) augmented with complementary open questions yielding qualitative data for content analysis which produced a degree of research depth. Hence, the purpose of deploying mixed-methods in this instance was primarily 'complementarity', which is defined by, "Mixed methods are used in order to gain complementary views about the same phenomena or relationships" (Venkatesh et al., 2013, p7, Table 1). Put another way, this study was largely quantitative, augmented by qualitative (i.e. methods, data and analysis). Specifically, 26 of the 45 respondents elected to augment their quantitative responses with qualitative descriptions.

6.2.2. Methods Employed and Paradigm

Methods associated with qualitative and quantitative data were used as described earlier. Venkatesh et al (2013) has pointed out that the majority of mixed-methods research have selected a positivist world view. However, by devising a practical approach to implement this research (via FFA), this study has claimed some of the key philosophical assumptions associated with pragmatism. See Research Methodology Chapter, Section, 3.2.5.3, Page 117.

6.2.3. Meta-inferences

IS research has claimed that the purpose of mixed methods research is to devise 'meta-inferences' which, "discover, develop, or extend a substantive theory in richer ways than possible with single method" (Venkatesh et al., 2013, p11). Therefore, as shown in the previous chapter, this study has sought to combine quantitative and qualitative methods, data and analysis to produce findings which would otherwise not be possible via a mono-method approach alone.

6.3. Quantitative Validation of Quantitative Findings

Johnson and Onwueguzie (2004) have claimed that there are over 50 quantitative 'sources of invalidity' in mixed methods research (Johnson and Onwuegbuzie, 2004). However, such an exhaustive evaluation was considered beyond the scope of this study. Alternatively, Venkatesh et al (2013) have argued that quantitative validation approaches which are widely used in IS can be considered as, (a) quantitative design (b) quantitative measurement and (c) quantitative inferential validity (Venkatesh et al., 2013).

6.3.1. Quantitative Design Validity

Venkatesh et al. (2013) have claimed that quantitative design validity consists of (a) 'internal validity', in which, "The validity of the inference about whether the observed co-variation between independent and dependent variables reflects a causal relationship (e.g., the ability to rule out alternative explanations)", and (b) 'external validity', in which, "The validity of the inference about whether the cause-effect relationship holds over variation in persons, settings, treatment variables, and measurement variables" (Venkatesh et al., 2013, p13, Table 4).

Firstly, so far as this research is concerned, independent variables were introduced as a result of a comprehensive literature review of generic innovation and OSS-specific adoption and usage in organisations (see literature review chapter). The risk of extraneous variables (i.e. alternative explanations) was identified, which was mitigated by the introduction of additional open questions in the survey instrument.

Secondly, the TPB is considered well established in IS research (Macredie and Mijinyawa, 2011) and its falsification or verification is beyond the scope of this research. Specifically, no knowledge claims beyond the sample identified in this research are made and statistical representation of any wider population is denied. However, the methodology would transfer to other settings for the reasons set out in the Methodology chapter.

6.3.2. Quantitative Measurement Validity

Venkatesh et al. (2013) have claimed that measurement validity consists of; (a) 'reliability', in which, "The term reliability means repeatability or consistency. A measure is considered to be reliable if it produces the same result over and over again", and (b) 'Construct validity', "The degree to which inferences can legitimately be made from the operationalizations in a study to the theoretical constructs on which those operationalizations are based." (Venkatesh et al., 2013, p13, Table 4).

As previously discussed, Cronbach's Alpha Coefficient is described as a statistic procedure available in SPSS which is used to calculate the reliability of a measurement scale. Therefore, for the purposes of this research such a method was used to determine reliability of scales, which proved acceptable in both stages of research. See Pilot Study and Main Study Chapters.

6.3.3. Quantitative Inferential Validity

IS research has claimed that inferential validity is concerned with statistical conclusion validity, in that, "The validity of inferences about the correlation (co-variation) between independent and dependent variables" (Venkatesh et al., 2013, p13, Table 4). Therefore, this research has selected statistical techniques best suited to the sample size and non-parametric nature of the data collected i.e. Fisher Exact Test. Additionally, and as previously discussed, this research has developed a conceptual model based on TPB which has been extensively tested in adoption and usage in IS research and elsewhere.

Furthermore, this evaluation chapter has made use of a binomial logistic regression procedure to evaluate the predictive capabilities of the driving and inhibiting factors identified (i.e. the dependent variables) and the various organisational adoption behaviour (i.e. the independent variables). A discussion of which now follows.

6.3.3.1. Binomial Logistic Regression Analysis

Common uses of logistic regression analysis include, "Establishing the extent to which it is possible to predict, with several predictor variables, which of two or more categories people are in" (Dewberry, 2004, p289). For the purposes of this research, factors identified as statistically significant have been used to establish how well self-reported organisational OSS adoption behaviour can be predicted within the sample using the logistic regression procedure available in SPSS.

6.3.3.1.1. OSS Adoption and Intention to Adopt (by Year)

The table below shows the previously identified dependent variables compared with the self-reported OSS organisational adoption behaviours by year for the main study. This shows that there were as few as two statistically significant factors (i.e. greater than 95% confidence level) identified for 2010 OSS adoption and as many as nine for 2012 OSS adoption and intention to adopt in 2013. The implications of this are that the conceptual model had more predictive power in the recent past and near future. This is to be expected by the nature of the questions in the survey instrument, asking about beliefs toward intentions to deploying projects incorporating OSS. A more detailed description by OSS organisational adoption by year behaviour now follows.

Table 6.1: Binomial Logistic Regression Analysis for Factors Associated with General OSS Adoption (by Year)

Question	Construct, Factor (+ve/-ve)	35e General OSS Adoption 2010	35d General OSS Adoption 2011	35c General OSS Adoption 2012	35b General OSS Intention 2013	35a General OSS Intention 2014
	Attitude Factors					
20a	Security (+ve)	*0.01134	*0.04863	*0.01824	*0.02234	*0.03857
20i	Perpetuity (+ve)				*0.04163	*0.04685
21a	Unsustainable business model (-ve)			*0.02967	*0.01414	*0.04407
21b	Second best perception (-ve)			*0.04621	**0.009007	*0.03137
21f	Questionable return (-ve)			*0.03732	*0.03207	
	Subjective Norm Factors					
23c	OSS contributors (reported) (+ve)		*0.01631	***0.001631		
25b	OSS contributors (influence) (+ve)			*0.03429		
25c	Colleagues (in line of business) (+ve)				*0.03207	
25d	Colleagues(in IT Dept) (+ve)				***0.003311	*0.02180
	Perceived Behavioural Control Factors					
27	Ease of implementation (+ve)		*0.04023	***0.003141	***0.002916	**0.009563
30g	Switching costs (-ve)			*0.04036		
32	Prior implementation (+ve)	*0.03018				
33	Organisation active OSS user (+ve)			**0.00953	**0.007525	*0.02887
	Binomial Logistic Regression Analysis	χ^2=(2, N=44)=11.097, p=0.004	χ^2=(3, N=34)=12.929, p=0.005	χ^2=(9, N=34)=37.375, p=0.000	χ^2=(9, N=41)=42.781, p=0.000	χ^2=(7, N=40)=21.815, p=0.003
	Block Zero: Beginning Block Prediction	63.60%	70.60%	70.60%	75.60%	80.00%
	True Negative (eg No OSS Adoption or No Intention to Adopt OSS)	50.00%	70.00%	90.00%	90.00%	62.50%
	True Positive (eg OSS Adoption or Intention to Adopt OSS)	85.70%	83.30%	100.00%	100.00%	93.80%
	Overall Percentage	72.70%	79.40%	97.10%	97.60%	87.50%
	Improvement on Block Zero	14.31%	12.46%	37.54%	29.10%	9.37%

Key: **p>=0.05 (No statistical significance)**
***p<0.05**
****p<0.01**
*****p<0.005**

6.3.3.1.1.1. OSS Adoption in 2010

A logistic regression analysis was carried out using the Security and Prior Implementation factors as predictor variables and whether or not respondents reported OSS adoption in 2010 as the dependent variable. A test of the model using both predictors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (2, N=44) = 11.097, p=0.004}, indicating that the predictor variables reliably predict whether or not self-reported organisational OSS adoption took place in 2010. The model correctly predicted 85.7% of those who did adopt OSS in 2010, and 50% of those who did not. This meant there was an overall percentage of 72.7% correctly predicted via the model, which represented a 14.31% improvement over “block zero” (or simple probability based on overall percentage of self-reported OSS adoption in 2010). See Table 6.1.

6.3.3.1.1.2. OSS Adoption in 2011

Similarly, a logistic regression analysis was carried out using the Security, OSS Contributors (Reported) and Ease of Implementation factors as predictor variables and whether or not respondents reported OSS adoption in 2011 as the dependent variable. A test of the model using all predictors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (3, N=34) = 12.929, p=0.005}, indicating that the predictor variables reliably predict whether or not self-reported organisational OSS adoption took place in 2011. The model correctly predicted 83.3% of those who did adopt OSS in 2011, and 70% of those who did not. This meant there was an overall percentage of 79.4% correctly predicted via the model, which represented a 12.46% improvement over “block zero” (or simple probability based on overall percentage of self-reported OSS adoption in 2010). See Table 6.1.

6.3.3.1.1.3. OSS Adoption in 2012

Similarly, a logistic regression analysis was carried out using the Security, Unsustainable Business Model, Second Best Perception, Questionable Return, OSS Contributors (Reported), OSS Contributors (Influence), Ease of Implementation, Switching Costs and Organisation is an Active OSS User factors as predictor variables, and whether or not respondents reported OSS adoption in 2012 as the dependent variable. A test of the model using all predictors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (9, N=34) = 37.375, p=0.000}, indicating that the predictor variables reliably predict whether or not self-reported organisational OSS adoption took place in 2012. The model correctly predicted 100% of those who did adopt OSS in 2012, and 90% of those who did not. This meant there was an overall percentage of 97.10% correctly predicted via the model, which represented a 37.54% improvement over “block zero” (or simple probability based on overall percentage of self-reported OSS adoption in 2012). See Table 6.1.

6.3.3.1.1.4. Intention to Adopt OSS in 2013

Similarly, a logistic regression analysis was carried out using the Security, Perpetuity, Unsustainable Business Model, Second Best Perception, Questionable Return, Colleagues in Line of Business (in Line of Business), Colleagues (in IT Department), Ease of Implementation and Organisation is an Active OSS User factors as predictor variables, and whether or not respondents reported the intention to adopt OSS in 2013 as the dependent variable. A test of the model using all predictors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (9, N=41) = 42.781, p=0.000}, indicating that the predictor variables reliably predict whether or not organisational intention to adopt OSS in 2013 was reported. The model correctly predicted 100% of those who did report an intention to adopt OSS in 2013, and 90% of those who did not. This meant there was an overall percentage of 97.60% correctly predicted via the model, which represented a 29.10% improvement over “block zero” (or simple probability based on overall percentage of self-reported OSS adoption in 2013). See Table 6.1.

6.3.3.1.1.5. Intention to Adopt OSS in 2014

Similarly, a logistic regression analysis was carried out using the Security, Perpetuity, Unsustainable Business Model, Second Best Perception, Colleagues (in IT Department), Ease of Implementation and Organisation is an Active OSS User factors as predictor variables, and whether or not respondents reported the intention to adopt OSS in 2014 as the dependent variable. A test of the model using all predictors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (7, N=40) = 21.815, p=0.003}, indicating that the predictor variables reliably predict whether or not organisational intention to adopt OSS in 2014 was reported. The model correctly predicted 93.8% of those who did report an intention to adopt OSS in 2014, and 62.5% of those who did not. This meant there was an overall percentage of 87.50% correctly predicted via the model, which represented a 9.37% improvement over “block zero” (or simple probability based on overall percentage of self-reported OSS adoption in 2014). See Table 6.1.

6.3.3.1.1.6. Summary of Evaluation of OSS Adoption and Intention to Adopt OSS (by Year) Models

The preceding analysis shows that the predictive reliability of the models associated with the various organisational OSS behaviours range from 72.7% to 97.6% for overall accuracy. In addition, the predictive reliability peaks at 100% for true positive and 90% for true negative in the near-term adoption (2012) and intention to adopt (2013). Furthermore, the improvement on block zero (or straight forward probability) ranged from 9.37% for intention to adopt OSS in 2014, and peaked at 37.54% for OSS adoption in 2012.

6.3.3.1.2. OSS Adoption and Intention to Adopt OSS (by Software Category)

Table 6.1 shows the previously identified dependent variables compared with the self-reported organisational OSS adoption behaviour (by NAPCS category) for the main study. This shows that there were as little as a single statistically significant factor (greater than 95% confidence level) identified for Utilities (OSS adoption in 2012 and intention to adopt in 2013) and as many as ten for the Database Management Systems and Development Tools and Programme Languages software categories (intention to adopt OSS in 2013).

As in the previous sections, a logistic regression analysis was carried out using the statistically significant factors indicated in Table 6.1 as predictor variables and whether or not respondents reported the organisational OSS adoption behaviour specified.

Table 6.2: Binomial Logistic Regression Analysis for Factors Associated with General OSS Adoption (by NAPCS Category)

Question	Construct, Factor (+ve/-ve)	Adoption 2012								Intention 2013							
		Applications Software Sub Category				Systems Software Sub Category				Applications Software Sub Category				Systems Software Sub Category			
		36a General Business Productivity	36b Cross Industry	36c Utilities	36d Vertical Markets	37a Operating Systems	37b Network Systems	37c Database Management Systems	37d Development Tools and Prog Languages	36ai General Business Productivity	36bi Cross Industry	36ci Utilities	36di Vertical Markets	37ai Operating Systems	37 bi Network Systems	37ci Database Management Systems	37di Development Tools and Prog Languages
	Attitude Factors																
17	Productivity (+ve)					*0.02632		*0.01457						*0.02513			
20a	Security (+ve)	*0.01085					*0.03805			*0.04103	*0.03274				*0.02416	*0.03864	*0.02846
20c	Quality (+ve)									*0.0464	*0.02261						
20e	Disruptive Technology (+ve)														*0.03261		
20g	Job Performance i.e. Usefulness (+ve)						*0.04671				*0.04479			*0.01710	*0.03274	**0.007575	
20h	Transparency (+ve)										*0.02514						*0.01997
20i	Perpetuity (+ve)							*0.01182			*0.04479		*0.03322			*0.04075	
20j	Freedom to modify (+ve)	*0.04729						***0.002441								**0.006388	
20m	Creativity & innovation (+ve)									*0.04429							
20o	Observability (+ve)							*0.03329									
21a	Unsustainable business model (-ve)									*0.02735							
21b	Second best perception (-ve)													0.03817*	*0.04381	*0.01697	
21e	Most OSS projects fail (-ve)			*0.03444			*0.03427			*0.0258							
21f	Questionable return (-ve)												*0.04313				
	Subjective Norm Factors																
23b	Success stories (+ve)									*0.01849							
23c	OSS contributors (reported) (+ve)		*0.03739					*0.03801	***0.004635		*0.01288						*0.04308
24b	Network Effects (+ve)	*0.01683							*0.02731	*0.0258							*0.01873
24c	Internal politics (+ve)												*0.03161			*0.03636	
24e	Organisational Culture (+ve)	*0.03444								*0.02088							*0.03365
25a	Friends or acquintances (+ve)		*0.04551														
25b	OSS contributores (influence) (+ve)				*0.02135				*0.01481		*0.02514						***0.002521
25c	Colleagues (in line of business) (+ve)							*0.03732									*0.03047
25d	Colleageus (in IT) (+ve)								*0.02731		*0.01234		*0.03223			*0.01278	***0.003557
25i	Customers (-ve)		*0.04892														
25k	The media (broadcast, trade press etc) (+ve)						*0.03674								*0.03292		
	Perceived Behavioural Control Factors																
27	Ease of implementation (+ve)												*0.04313			*0.02742	
29b	Professionalism of IT dept (+ve)							*0.02035									
30a	Unacceptable license terms (-ve)					*0.04253	*0.03194										
30h	Standards (specifying proprietary) (-ve)					*0.03931							**0.006644				
32	Prior implementation (+ve)													*0.02313		*0.02246	*0.04828
33	Organisation active OSS user (+ve)	*0.02731			*0.0115						**0.006463	*0.04844				*0.01816	**0.006844
	Binomial Logistic Regression Analysis	χ^2=(5, N=44)=12.699, p=0.026	χ^2=(3, N=44)=10.582, p=0.014	c^2=(1, N=44)=4.659, p=0.031	χ^2=(2, N=43)=8.736, p=0.013	χ^2=(3, N=44)=13.788, p=0.003	χ^2=(5, N=43)=23.063, p=0.000	χ^2=(7, N=34)=15.209, p=0.033	χ^2=(4, N=34)=13.882, p=0.008	χ^2=(8, N=38)=13.812, p=0.087	χ^2=(9, N=33)=21.314, p=0.011	χ^2=(1, N=43)=4.036, p=0.045	χ^2=(6, N=42)=15.642, p=0.016	χ^2=(4, N=43)=16.046, p=0.03	χ^2=(5, N=42)=16.046, p=0.001	χ^2=(10, N=42)=33.153, p=0.000	χ^2=(10, N=32)=23.247, p=0.010
	Block Zero: Beginning Block Prediction	50.00	56.80	77.30	69.80	70.50	65.10	73.50	73.50	63.20	63.60	83.70	52.40	72.10	64.30	69.00	81.30
	True Negative (eg No OSS Adoption or No Intention to Adopt OSS)	68.20	80.00	0.00	83.30	61.50	80.00	44.40	33.30	57.10	91.70	0.00	80.00	58.30	60.00	84.60	83.30
	True Positive (eg OSS Adoption or Intention to Adopt OSS)	72.70	57.90	100.00	61.50	93.50	78.60	92.00	92.00	83.30	90.50	100.00	81.80	90.30	88.90	89.70	96.20
	Overall Percentage	70.50	70.50	77.30	76.70	84.10	79.10	79.40	76.50	73.70	90.90	83.70	81.00	81.40	78.60	88.10	93.80
	Improvement on Block Zero	41.00	24.12	0.00	9.89	19.29	21.51	8.03	4.08	16.61	42.92	0.00	54.58	12.90	22.24	27.68	15.38

Key: **p>=0.05 (No statistical significance)**
***p<0.05**
****p<0.01**
*****p<0.005**

6.3.3.1.2.1. OSS Adoption 2012

6.3.3.1.2.1.1. Application Software Category

A test of the model using the predictors shown against a constant only model was statistically reliable for all the OSS adoption by application software subcategories, indicating that the predictor variables reliably predicted whether or not self-reported organisational OSS adoption was recorded by respondents in 2012. The model correctly predicted from 70.5% to 76.7%, which represented an improvement over "block zero" (or simple probability based calculation) from zero (for Utilities category) to 41% (for the General Business Productivity software category). See Table 6.2.

6.3.3.1.2.1.2. Systems Software Category

Similarly, a test of the model using the predictors shown against a constant only model was statistically reliable for all the OSS adoption by systems software subcategories, indicating that the predictor variables reliably predicted whether or not self-reported organisational OSS adoption was recorded by respondents in 2012. The model correctly predicted from 76.5% to 84.10% in terms of overall percentage, which represented an improvement over "block zero" (or simple probability based calculation) from 4.08% (i.e. for Development Tools and Programming Languages category) to 21.51%% (i.e. for the Network Systems category). See Table 6.2.

6.3.3.1.2.2. OSS Intention to Adopt in 2013

The figure below provides a summary of the predictive reliability of the models for the various organisational OSS intention behaviours by category.

6.3.3.1.2.2.1. Application Software Category

A test of the model using the predictors shown against a constant only model was statistically reliable for all the OSS adoption by application software subcategories, indicating that the predictor variables reliably predicted whether or not self-reported organisational OSS adoption was intended in 2013. The model correctly predicted from 73.7% to 90.9% in terms of overall percentage, which represented an improvement over "block zero" (or simple probability based calculation) from zero (for Utilities category) to 54.58% (for the Vertical Markets software category).

6.3.3.1.2.2.2. Systems Software Category

A test of the model using the predictors shown against a constant only model was statistically reliable for all the OSS adoption by systems software subcategories, indicating that the predictor variables reliably predict whether or not self-reported organisational OSS adoption was intended in 2013. The model correctly predicted from 78.6% to 93.8% in terms of overall percentage, which represented an improvement over "block zero" (or simple probability based calculation) from 12.9% (for Operating Systems category) to 27.68% (for the Database Management Systems category).

6.3.3.1.2.3. Summary of Evaluation of OSS Adoption and Intention to Adopt OSS (by Software Category) Models

The analysis above shows that the predictive reliability of the models associated with the various organisational OSS behaviours range from 70.5% to 93.8% for overall accuracy. In addition, the predictive reliability peaks at 100% for true positive (for the Utilities software category OSS adoption and intention to adopt OSS) and 91% for true negative in the Cross-industry software category and intention to adopt in 2013. Furthermore, the improvement on block zero (or straight forward probability) ranged from zero for OSS adoption and intention to adopt OSS in the Utilities category, and peaked at 54.58% % for intention to adopt OSS in the Vertical Markets software category.

6.3.3.1.3. OSS Adoption and Intention to Adopt OSS (by ITG Adoption Stage)

The table below shows the previously identified dependent variables compared with the self-reported OSS organisational adoption behaviours (by IT adoption stage) for the main study. This shows that there were between eight statistically significant factor (i.e. greater than 95% confidence level) identified for the initiation (and beyond) stage, and twenty three for the development stage (and beyond). The SPSS package was not able to return results for the development stage (and beyond), and therefore the 99.5% confidence level (CL) factors were used for the analysis as shown.

Table 6.3: Binomial Logistic Regression Analysis of Factors Associated with OSS Adoption by ITG Stage

Question	Construct, Factor (+ve/-ve)	IT Governance Stage			
		Initiation Stage (and beyond)	Development Stage (and Beyond)	Management Stage (and Beyond)	Approval Stage (and Beyond)
	Attitude Factors				
17	Productivity (+ve)	*0.03702	***0.002342		
18	Category Killer (+ve)			***0.003078	*0.004148
20a	Security (+ve)	**0.006885	***0.0004063	**0.006775	*0.01941
20b	Cost (+ve)		**0.006428		
20c	Quality (+ve)		*0.01046		
20d	Flexibility (+ve)		*0.04186		
20f	Relative Advantage (+ve)		*0.01649		
20g	Job Performance i.e. Usefulness (+ve)		*0.03689		
20h	Transparency (+ve)		*0.03689		
20j	Freedom to modify (+ve)		*0.01666		
20l	Knowledge Creation (+ve)		*0.02130	*0.04324	
20p	Ideological Compatibility (+ve)		*0.04598		*0.02989
21a	Unsustainable business model (-ve)		*0.03588	**0.007071	**0.006555
21b	Second Best Perception (-ve)	*0.03702			
21f	Questionable return (-ve)	*0.02105	*0.01838	*0.01884	*0.02508
	Subjective Norm Factors				
23a	Other OSS adopters (reported) (+ve)		*0.02213		
23b	Success stories (+ve)		***0.002455		
23c	OSS contributors (reported) (+ve)		*0.04502		
24b	Network Effects (+ve)			*0.03554	*0.02883
24e	Organisational Culture (+ve)	*0.01907	***0.0007612	*0.02017	**0.006744
25b	OSS contributors (influence) (+ve)	*0.03221	*0.01838		
25d	Colleageus (in IT) (+ve)	*0.03691	*0.005089		
25g	Third Party Partners (+ve)			*0.03598	*0.01978
25i	Customers (+ve)			*0.03598	*0.01978
25k	The media (broadcast, trade press etc) (+ve)		*0.01450	***0.003451	***0.001248
	Perceived Behavioural Control Factors				
27	Ease of implementation (+ve)		*0.04632	*0.03290	**0.007757
30d	Complexity (-ve)			*0.03877	
32	Prior implementation (+ve)		*0.0107	*0.002797	**0.006744
33	Organisation active OSS user (+ve)	***0.003007	***0.0003358	***0.001355	*0.01462
	Binomial Logistic Regression Analysis	χ^2=(8, N=45)=28.342, p=0.002428 (Using>95%CL)	χ^2=(6, N=39)=38.434, p=0.000001 (Using>99%CL)	χ^2=(14, N=45)=45.198, p=0.000038 (Using>95%CL)	χ^2=(13, N=45)=43.013, p=0.000045 (Using>95%CL)
	Block Zero: Beginning Block Prediction	73.30%	59.00%	66.70%	71.10%
	True Negative (eg Prior to Stage of OSS Adoption)	66.60%	87.50%	100.00%	90.60%
	True Positive (eg Stage of OSS Adoption and Beyond)	90.90%	91.30%	86.70%	92.30%
	Overall Percentage	84.30%	89.70%	95.60%	91.10%
	Improvement on Block Zero	15.01%	52.03%	43.33%	28.13%

Key: **p>=0.05 (No statistical significance)**
***p<0.05**
****p<0.01**
*****p<0.005**

As in the previous sections, a logistic regression analysis was carried out using the statistically significant factors previously indicated as predictor variables and whether or not respondents reported the organisational OSS adoption behaviour shown.

A test of the model using the predictors shown against a constant only model was statistically reliable for all stages, indicating that the predictor variables reliably predicted whether or not self-reported organisational OSS adoption behaviours were recorded by respondents to be at the stage shown. As also shown the models correctly predicted from 87.2% (for the development stage) to 95.6% (for the management stage) in terms of overall percentage, which represented an improvement over "block zero" (or simple probability based calculation) ranging from 15% (for the initiation stage) to 47.8%

(for the development stage). Additionally, the models correctly predicted true negative from 66.6% (for the initiation stage) to 100% (for the management stage), and true positive from 84.3% (for the initiation stage) to 95.6% (for the management stage).

6.3.3.2. Summary of Logistic Regression Analysis

Table 6.4 summarises the above analyses and the extent to which the driving and inhibiting factors identified as statistically significant were able to predict organisational OSS behaviour in terms of maximum and minimum performance. This shows that, so far as quantitative methods used in this research are concerned, the conceptual model was able to predict organisational OSS adoption ranging from, 97.6% (i.e. Intention to Adopt OSS in 2013) to (b) 70.5% (i.e. OSS Adoption in the General Business Productivity and Cross-industry NAPCS subcategories). This was considered adequate for informing management interventions in an operational setting via the proposed FFA.

Table 6.4: Maximum and Minimum Predictive Performance of Organisational OSS Adoption Behaviour

OSS Organisational Adoption Behaviour	***Maximum Predictive Capability (Overall Percentage)***	***Minimum Predictive Capability (Overall Percentage)***
OSS Adoption or Intention to Adopt (by Year)	97.6% (Intention to adopt OSS in 2013)	72.7% (OSS adoption in 2010)
OSS Adoption or Intention to Adopt OSS (by Software Category)	93.8% (Intention to Adopt OSS, Development Tools and Programming Languages Category)	70.5% (OSS adoption, General Business Productivity and Cross Industry Category)
OSS Adoption (by Stage)	95.6% (Management Stage and beyond)	84.3% (Initiation Stage and beyond)

6.3.4. Summary of Quantitative Validation

As discussed, this section has been structured in accordance to recent IS research recommendations on quantitative validity (Venkatesh et al., 2013).

In terms of Design Validity, the questionnaire was based on a conceptual model developed through a thorough literature review which produced a comprehensive list of driving and inhibiting factors for testing. The risk of extraneous or missing variables was mitigated by the introduction of a number of open questions to elicit qualitative data where necessary (discussed in the next section). This research has explicitly excluded any external validity or claim to generalisation, and is only externally valid in so much it was specifically designed so that it could be reproduced in an operational setting.

In terms of Measurement Validity, this research has used analysis of Cronbach's Alpha Coefficient to establish satisfactory results (i.e. >0.7 (Venkatesh et al., 2013)) for both Pilot Study (ranged from 0.88 to 0.97) and Main study (ranged from 0.74 to 0.94).

In terms of inferential validity, via binomial logistic regression analysis, the conceptual model was shown to produce a minimum of 70.5% for adoption of certain software categories and a maximum of 97.6% for intention to adopt OSS in 2013, so far as overall percentage predictive capability was concerned. As discussed, this was considered adequate for most practical purposes management interventions.

6.4. Qualitative Validation of Qualitative Findings

Johnson and Onwueguzie (2004) have claimed that there are over 29 'elements of legitimation' in the qualitative component of mixed methods research (Johnson and Onwuegbuzie, 2004). However, similar to the quantitative component of this study, such an exhaustive evaluation was considered beyond the scope of this research. Alternatively, Venkatesh et al. (2013) have proposed that qualitative validation criteria which are widely used in IS research can be considered as, (a) qualitative design (b) qualitative analytical and (c) qualitative inferential validity (Venkatesh et al., 2013).

6.4.1. Qualitative Design Validity

IS research has claimed that qualitative design validity consists of (a) 'descriptive validity', in that, "The accuracy of what is reported (e.g., events, objects, behaviours, settings) by researchers", (b) 'credibility', such that, "… establishing that the results of qualitative research are credible or believable from the perspective of the participants in the research to convincingly rule out alternative explanations", and (c) 'transferability', which is, "The degree to which the results of qualitative research can be generalized or transferred to other contexts or settings" (Venkatesh et al., 2013, p13, Table 4).

Firstly, this research has made use of web-based data collection technology which means that accuracy of responses is heightened as much as possible and the possibility any data collection errors were also considered minimal.

Secondly, the opinion of domain experts was sought to establish the credibility of the findings and discuss the possibility of extraneous variables. This was considered via demand-side and supply-side key informant interviews. See Appendix U: Demand-side and Supply-side Key Informant Interview Data.

Finally, this research makes no explicit claims as to generalisation or representativeness of any wider population, other than that which the reader may choose to draw based on their own experiences. For instance, an individual who participated in this study may consider the findings relevant to their situation. Similarly, a reader outside this study whose organisation broadly matched the profile described earlier may also consider the findings relevant. Finally, a reader whose organisation did not match the profile of this main study may consider a similar study for his or her organisation using similar methods.

6.4.2. Qualitative Analytical Validity

Venkatesh et al. (2013) have claimed that qualitative analytical validity consists of; (a) 'theoretical validity', in which, "The extent to which the theoretical explanation developed fits the data and, therefore, is credible and defensible", (b) 'dependability', which, "Emphasizes the need for the researcher to describe the changes that occur in the setting and how these changes affected the way the researcher approached the study", (c) 'consistency', which, " Emphasizes the process of verifying the steps of qualitative research through examination of such items as raw data, data reduction products, and process notes", and (d) 'plausibility', which is, "Concerned with determining whether the findings of the study, in the form of description, explanation or theory, fit the data from which they are derived" (Venkatesh et al., 2013, p13, Table 4).

Firstly, this research had developed a conceptual model which combined FFA and TPB. The qualitative results highlight factors which are potentially driving, inhibiting and neutral forces in terms of OSS organisational adoption behaviour. Similarly, the qualitative data provided factors which also translate successfully across all three constructs postulated within TPB; attitude, subjective norm and perceived behavioural control.

Secondly, this research has selected a questionnaire as the data collection technique and therefore can dismiss any changes in setting. The data represented a snapshot of the salient beliefs of managers at the time the questionnaires were completed, as did the findings.

Thirdly, the content analysis process was documented, recorded and produced in this dissertation for consistency with the aid of the WeftQDA software package.

Finally, the findings, description and data were clearly recorded for review so as to ensure plausibility and enable inspection by a third party.

6.4.3. Qualitative Inferential Validity

Venkatesh et al. (2013) have claimed that qualitative inferential validity consists of (a) 'interpretive validity', in which, "The accuracy of interpreting what is going on in the minds of the participants and the degree to which the participants' views, thoughts, feelings, intentions, and experiences are accurately understood by the researcher", and (b) 'confirm-ability', in which, "The degree to which the results could be confirmed or corroborated by others" (Venkatesh et al., 2013, p13, Table 4).

In the first instance, open questions were devised to establish complementary qualitative data in addition to the quantitative data that was collected at the same time. Such open questions have limitations, but as previously discussed, provide greater depth than closed questions alone as established in other adoption and usage research (Jinwei et al., 2006).

Secondly, the results of qualitative analysis (and associated data) were presented in such a way that could be inspected by other researchers and readers for interpretation and corroboration.

6.4.3.1. Qualitative Findings Validation

The key informant, semi-structured interview format was chosen as a suitable means of validation as it allowed; (a) a variety of points of view to be expressed and discussed, (b) a number of key concepts within the report (i.e. TPB and FFA) were explored and evaluated and (c) reactions to the findings of the research from some key informants were discussed and tested (Saunders et al., 2009). Two separate key informant interviews were held to help assess the findings, the first from the supply-side (i.e. a large PS vendor), and the second from the demand-side (i.e. a government agency). Both groups were provided with a copy of a summary report of the research findings which was used as an informal structure for the interview itself. The key informant interviews were held shortly after the previously discussed respondents' report was written (after the main study), lasted approximately one hour and were attended by three participants each.

6.4.3.1.1. Suitability/Matching Requirements

Themes from the qualitative findings of the Suitability and Matching Requirement factor as important were largely supported. For instance, a participant from the supply-side key informant interview report claimed, "a theme of a technologist's 'bottom-up' rather than strategist's 'top-down' approach to delivering IT and that OSS was an enabler in this respect". Furthermore, another participant from the supply-side report argued, "customers regarded OSS adoption as something which competitors are using to develop advantage... and that as a result 'more was being achieved with less'…" Finally, a supply-side participant reported, "… the combination of organisations, vendors and analysts as a 'battleground' between COTS (Custom-off-the-shelf) packages and more agile SaaS (Software as a Service) variants...", and claimed, "… a conflict between technologists and management".

Similarly, from the demand-side group, "One of the goals of the [mandatory procurement] review [process] was to establish 'a level playing field' for OSS with proprietary software in line with the UK government's coalition agreement." Additionally, "...government tenders had actually included software branded products. This was regarded as an inhibitor to competition in general, and OSS in particular. Some agencies were observed circumventing a ban on this practice by listing functions and features, effectively specifying a [proprietary] product, in all but name." Finally, "An OSS toolkit and a 'myth-busting guide' for government IT managers thinking of using OSS [was published]. The participants' department had produced a range of technology code of practice documents, a rule-set for review/analysis. This included a policy that all things being equal OSS should be the preferred decision."

6.4.3.1.2. Cost

Themes from the qualitative findings of Cost as an important factor were also supported. For example, a participant from the supply-side key informant interview reported, "a strong driver in cost savings in customer behaviour, largely as a result of the consequences of the global financial crisis. He regarded OSS as a part of a wider theme of customers seeking out alternatives to mature proprietary incumbents (or traditional client-server variants) for example cloud-computing."

Similarly, from the demand-side key informant interview, "The agency had recently set-up a new system of governance incorporating a review triggered by certain levels of expenditure. For example, an IT project with greater than GBP5million spend would receive a thorough review where management could expect project decisions to be challenged and reviewed for establishing value for money." In addition, "Some positive discrimination toward OSS was noted in the sense that when a business case for an IT project was presented for review, it would also have to include switching costs as part of the TCO (total cost of ownership)." Finally, "Further inhibitors were noted as cost with OSS considered just as expensive [as proprietary]."

6.4.3.1.3. Support

There was also evidence of Support as an important factor in line with the qualitative findings described earlier. A participant from the supply-side group cited, "… that customers had built up experience in [OSS projects such as] Linux and Android as standardised building blocks. This had led to an expectation of an 'instant-on community' with no twelve month wait for infrastructure to be designed, procured, engineered, maintained and etc." Additionally, from the demand-side group, "[Resources were being made available for] project support, recruitment advice, supplier data and improved approval procedures. All of which would be expected to have OSS experience (as well as other relevant experience)."

6.4.3.1.4. Ease of Implementation

Themes from the qualitative findings of Ease of Implementation as an important factor were somewhat supported. For example, from the supply-side report, a participant commented, "…customers were supporting a drive to commodity computing infrastructure which OSS also helped facilitate. Time-to-market (or rapid deployment) was also viewed as a key enabler for OSS with users expecting easy-access to OSS development tools." However, no explicit reference to ease of implementation was made by the demand-side key informant interview.

6.4.3.1.5. Sustainability

There was no explicit reference to Sustainability as an important factor to support the qualitative findings. However, such concerns were implied by a demand-side participant who claimed OSS preferences were at a policy level, "... a range of technology code of practice documents, a rule-set for review/analysis. This included a policy that all things being equal OSS should be the preferred decision."

6.4.3.1.6. Supplier

Themes from the qualitative findings of Supplier as an important factor were also supported. For example, from the supply-side report, "the emergence of 'next generation' style of businesses (such as Amazon, Google, Apple and Facebook) as being less dependent on the incumbent models." However, from the demand-side, a participant referred to an, "oligopoly", whereby, "a large government spend was being shared with a small number of suppliers. This was generally regarded as an undesirable situation which was prime for disruption". Similarly, "He had previously noted that supply side or vendors did not regard government as serious about OSS."

6.4.3.1.7. Colleagues in LoB or End Users

Qualitative findings which suggested Colleagues (in LoB or End-users) as an important factor were; not directly supported on the supply-side and partially supported by the demand-side group, by reference to establishing, "'a level playing field' for OSS with proprietary software in line with the UK government's coalition agreement."

6.4.3.1.8. Colleagues in IT

The supply-side group made no direct reference to Colleagues in IT as an important factor. However, several observations were made to this in the demand-side group. A participant commented, "One IT manager had referred to OSS as a 'fad' and 'fashionable for government'". Another claimed, "[many IT managers] require extensive references and success stories to help support their decision-making which had resulted as a culture of 'doing what others do'. Not so much as a need for best practice but a herd mentality." Finally, "The question of IT manager's confidence as a function of experience was also raised."

6.4.3.1.9. Development and Freedom to Modify

There was some support for "Development and Freedom to Modify" capabilities as an important factor, and marginally inhibiting in terms of organisational adoption. From the supply-side group, a participant commented, "OSS developers tend to focus on Systems category which he regarded as 'done and dusted', and 'heading for apps space' citing examples of SaaS and Google Apps". So far as the demand-side group was concerned, "It was pointed out that IT resources were bifurcated into (1) large IT departments with extensive tenure who had a tendency to ossify their IT decision making and (2) Smaller IT departments which were more receptive to change but with perhaps less skills and needing time to develop them."

6.4.3.1.10. Skills & Training

There was also evidence to support Skills & Training as important factors. From the supply-side group a participant commented that, "customers had built up experience in Linux and Android as standardised building blocks". In addition, from the demand-side, a participant commented, "… public sector IT-spend had been affected by an outsourcing tradition, driven by systems integrators. This was now being challenged through the spending control procedures. These reviews would also take place in a number of phases depending on the size and scope of the project. The output could include approval, rejection or approval (with conditions). These conditions could include developing skills in certain areas (including OSS alternatives) if it were deemed appropriate."

6.4.3.1.11. Risk

There was no direct reference to Risk as a factor influencing OSS adoption from supply-side or demand-side participants.

6.4.3.1.12. Conceptual Model

Both groups were introduced to the conceptual model as a hybrid theory in combination of TPB as a variance theory and FFA as a process theory. Both groups agreed that the model was appropriate approach, with a participant from the supply-side group commenting that it appeared to be a good "starting point" for management intervention involving OSS implementations.

6.4.4. Summary of Qualitative Validation of Qualitative Findings

As discussed, this section has been structured in accordance to recent IS research recommendations on qualitative validity (Venkatesh et al., 2013).

In terms of design validity; the data are considered to be descriptively valid as they are recorded directly from the participant/respondent via BOS, the extent to which the results were considered credible has been corroborated, contradicted or neither via evidence from the aforementioned supply-side/demand-side key informant interviews. So far as this research is concerned, the transferability of results is explicitly denied, a part from any parallels the reader chooses to draw from their own experiences.

In terms of analytical validity; the theoretical validity is drawn from the results broadly matching the conceptual models proposed driving and inhibiting factors to OSS adoption with the addition of some data which was considered neither (i.e. neutral), the dependability of the results was considered good as they represent a snapshot of a sample at a given point in time, the consistency was considered good through following the content analysis method and the dependability and plausibility was evidenced by drawing on results from the two key informant interviews.

In terms of inferential validity; the interpretive validity has its limitations but was successful in complementing the existing quantitative data and the confirm-ability of the results is detailed in this chapter via comparison with key informant findings and available to the reader for corroboration if necessary. The interpretive validity could have been improved by (a) introducing additional coders to verify the researcher's coding and (b) introducing an inter-coder rating phase to quantify how well the coders correlated. That being said, the intention is to produce a research method which can be easily replicated in an operational setting. Such rigorous coding procedures were considered realistically unavailable in most operational scenarios.

6.5. Mixed-methods Validation of Mixed-methods Findings

Venkatesh et al. (2013) have produced a set of guidelines for validation of meta-inferences in mixed methods research. Firstly, separate 'technical validation', in which researchers, "follow and report validity types that are typically expected in a quantitative study. For the qualitative study, ensure that the authors provide either explicit or implicit (e.g., rich and detailed description of the data collection and analyses) discussion of validation" (Venkatesh et al., 2013, p21, Table 5). As with the previous sections, validity of methods associated with qualitative and quantitative data were discussed.

Secondly, adherence to naming conventions within both approaches, as well as a third set of mixed methods naming conventions, in which, "Inference quality in mixed methods research refers to the accuracy of inductively and deductively derived conclusions in a study or research inquiry", and consists of, "[a] design quality (i.e. whether a mixed methods study adheres to commonly accepted best practices), and [b] interpretive rigor (i.e. standards for the evaluation of accuracy or authenticity of the conclusion)" (Venkatesh et al., 2013, p15). This research has adopted this nomenclature in the appropriate sections.

Thirdly, separate discussion of mixed-methods inferences (or meta-inferences), in that, "assessed on the overall findings from mixed methods research, not from the individual studies", and, "The [inference] quality should be assessed in light of the theoretical contributions" (Venkatesh et al., 2013, p21, Table 5). This research has sought out scholarly precedent for the mixed-method design of this research (Jinwei et al., 2006). In addition, this research has highlighted findings that would otherwise have not have been possible using mono-method approaches and proposed an implementation plan incorporating a novel hybrid theory incorporating FFA.

Fourthly, mixed methods validation should be assessed from an overall design perspective in view of the studies original purpose, such that, "… the quality of meta-inferences from the standpoint of the overall mixed methods design chosen by IS researchers (e.g., concurrent or sequential)" is assessed (Venkatesh et al., 2013, p21, Table 5). The aim of this research was to establish the extent to which the organisational adoption and use of OSS can be shown to be a function of the salient beliefs of the managers involved. This section will show that the combined qualitative and quantitative data, and subsequent meta-inferences, successfully established additional factors of statistical significance to certain organisational OSS adoption behaviour.

Finally, threats to reliability of meta-inferences should be considered using, "the same standard that is typically used in rigorously conducted qualitative and quantitative studies" (Venkatesh et al., 2013, p21, Table 5). Therefore for the purposes of this research, meta-inferences were evaluated along the same criteria which were previously discussed.

6.5.1. Quantitative Validation of Mixed Methods Findings

As discussed in previous chapters, a range of driving and inhibiting factors were established for a variety of OSS organisational adoption behaviours. These factors were deductively established as statistically significant using the conceptual model developed for this research. Earlier in this chapter, those results were validated using binomial logistic regression to establish how well the models predicted the indicated organisational OSS adoption behaviour. Through mixed-methods, this research was also able to establish some additional factors which were found to be statistically significant and negatively associated with OSS organisational adoption. Therefore, these revised models were similarly tested for the ability to predict OSS organisational adoption behaviour using the aforementioned binomial logistic regression procedure.

6.5.1.1. OSS Adoption 2012: Utilities Application

Table 6.5 shows the results of three logistic regression analyses which were carried out using; (a) the Most OSS Projects Fail factor (established from quantitative data), (b) the Development or Freedom to Modify Capability factor (established from qualitative data) and (c) the aforementioned factors combined (i.e. established via mixed-methods or meta-inference) as predictor variables, and whether or not respondents reported OSS adoption in 2012 in the Utilities Application subcategory as the dependent variable:

(a) As previously discussed, a test of the model using the described factor against a constant only model was statistically reliable (i.e. $p<0.05$), $\{\chi^2 = (1, N=44) = 4.919, p=0.027\}$, indicating that the predictor variable reliably predicted whether or not the self-reported organisational OSS adoption in question was reported. The model correctly predicted 100% of those who did adopt OSS, and 0% of those who did not. This meant there was an overall percentage of 77.3% prediction.

(b) A test of the model using the described factor against a constant only model was statistically reliable (i.e. $p<0.05$), $\{\chi^2 = (1, N=44) = 6.264, p=0.012\}$, indicating that the predictor variable reliably predicted whether or not the self-reported organisational OSS adoption in question was reported. The model correctly predicted 100% of those who did adopt OSS, and 20% of those who did not. This meant there was an overall percentage of 81.8% prediction, which represents a 5.82% improvement on both (i) block zero and (ii) the quantitatively established model.

(c) A test of the model using the combined factors (i.e. (a) and (b)) against a constant only model was statistically reliable (i.e. greater than 0.05), $\{\chi^2 = (2, N=44) = 9.326, p=0.009\}$, indicating that the predictor variables reliably predict whether or not the self-reported organisational OSS adoption in question was reported. The model correctly predicted 100% of those who did adopt OSS, and 20% of those who did not. This meant there was an overall percentage of 81.8% prediction, which represents a 5.82% improvement on both (i) block zero and (ii) the quantitatively established model. However, this represented no improvement on the predictive capabilities of the qualitatively established model.

Table 6.5: Comparison of Logistic Regression Analysis for (a) Quantitative, (b) Qualitative and (c) Mixed Methods for OSS Adoption in the Utilities Subcategory

Source		(a) Utilities OSS Adoption (Quantitatively Established)	(b) Utilities OSS Adoption (Qualitively Established)	(c) Utilities OSS Adoption (Mixed-methods or Metainference)
	Attitude Factors			
21e	Most OSS projects fail	*0.03444		*0.03444
	Subjective Norm Factors			
N/A	No statistically significant factors obtained			
	Perceived Behavioural Control Factors			
QUAL	Development/Freedom to Modify Capability		*0.04757	*0.04757
	Binomial Logistic Regression Analysis	χ^2=(1, N=44)=4.919, p=0.027	χ^2=(1, N=44)=6.264, p=0.012	χ^2=(2, N=44)=9.326, p=0.009
	Block Zero: Beginning Block Prediction	77.30	77.30	77.30
	True Negative (eg No OSS Adoption or No Intention to Adopt OSS)	0.00	20.00	20.00
	True Positive (eg OSS Adoption or Intention to Adopt OSS)	100.00	100.00	100.00
	Overall Percentage	77.30	81.80	81.80
	Improvement on Block Zero	0.00	5.82	5.82

Key: *p<0.05

Figure 6.1 shows the same results in graphical format which shows that the mixed-methods approach improved marginally on the model derived from the quantitative data and failed to improve on the model derived from the qualitative data.

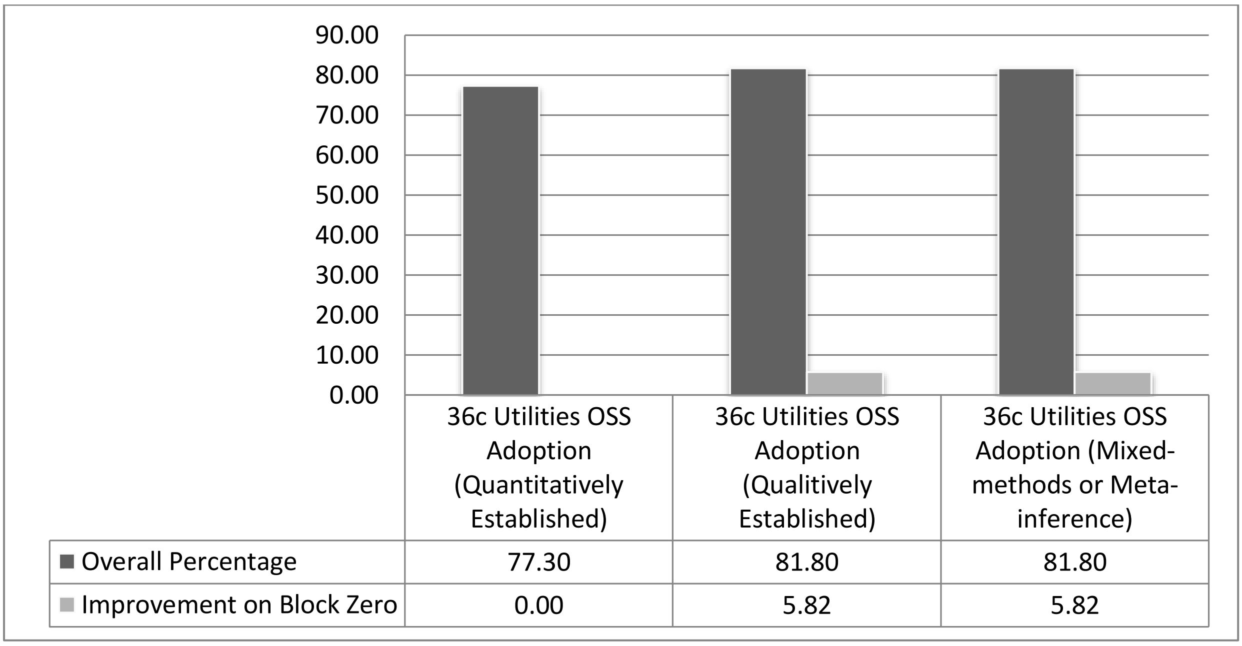


Figure 6.1: Bar Chart Comparing Predictive Capabilities of (a) Quantitative, (b) Qualitative and (c) Mixed Methods for OSS Adoption in the Utilities Subcategory

6.5.1.2. OSS Intention to Adopt in 2013: Cross-industry Application

Table 6.6 shows the results of three logistic regression analyses which were carried out using (a) the nine factors established from quantitative data, (b) the three factors established from qualitative data and (c) the aforementioned factors combined (established as mixed-methods or meta-inference) as predictor variables, and whether or not respondents reported intention to adopt OSS in 2013: Cross-industry Applications, as the dependent variable:

(a) As previously discussed, a test of the model using the described factors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (9, N=33) = 21.314, p=0.011}, indicating that the predictor variables reliably predict whether or not the self-reported organisational intention to adopt OSS in question was reported. The model correctly predicted 90.5% of those who did adopt OSS, and 91.7% of those who did not. This meant there was an overall percentage of 90.9% prediction, which represents an improvement on block zero of 42.92%

(b) A test of the model using the described factors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (3, N=42) = 8.083, p=0.044}, indicating that the predictor variables reliably predict whether or not the self-reported organisational OSS adoption in question was reported. The model correctly predicted 92.3% of those who did adopt OSS, and 37.5% of those who did not. This meant there was an overall percentage of 71.4% prediction, which represented; (i) a 15.35%% improvement on block zero and (ii) 21.54% below the accuracy of the quantitatively established model.

(c) A test of the model using the described factors against a constant only model was statistically reliable (i.e. greater than 0.05), {χ^2 = (12, N=33) = 28.069, p=0.005}, indicating that the predictor variables reliably predict whether or not the self-reported organisational intention to adopt OSS in question was reported. The model correctly predicted 90.5% of those who did adopt OSS, and 91.7% of those who did not. This meant there was an overall percentage of 90.9% prediction, which represents (i) a 42.92% improvement on block zero and (ii) a 30.66% improvement on the quantitatively established model. However, this represented no improvement on the predictive capabilities of the quantitatively established model.

Table 6.6: Comparison of Logistic Regression Analysis for (a) Quantitative, (b) Qualitative and (c) Mixed Methods for Intention to Adopt OSS in the Cross-industry Subcategory

Source		(a) Cross Industry Intention to Adopt (Quantitatively Established)	(b) Cross Industry Intention to Adopt (Qualitatively Established)	(c) Cross Industry Intention to Adopt (Mixed-methods or Metainference)
	Attitude Factors			
20a	Security (+ve)	*0.03274		*0.03274
20c	Quality (+ve)	*0.02261		*0.02261
20g	Job Performance i.e. Usefulness (+ve)	*0.04479		*0.04479
20h	Transparency (+ve)	*0.02514		*0.02514
20i	Perpetuity (+ve)	*0.04479		*0.04479
QUAL	Cost (-ve)		*0.04878	*0.04878
QUAL	Suitability (-ve)		*0.04869	*0.04869
	Subjective Norm Factors			
23c	OSS contributors (reported) (+ve)	*0.01288		*0.01288
25b	OSS contributores (influence) (+ve)	*0.02514		*0.02514
25d	Colleagues in IT (+ve)	*0.01234		*0.01234
	Perceived Behavioural Control Factors			
33	Organisation active OSS user (+ve)	**0.006463		**0.006463
QUAL	Ease of Implementation (-ve)		*0.02668	*0.02668
	Binomial Logistic Regression Analysis	χ^2=(9, N=33)=21.314, p=0.011	χ^2=(3, N=42)=8.083, p=0.044	χ^2=(12, N=33)=28.069, p=0.005
	Block Zero: Beginning Block Prediction	63.60	61.90	63.60
	True Negative (eg No OSS Adoption or No Intention to Adopt OSS)	91.70	37.50	91.70
	True Positive (eg OSS Adoption or Intention to Adopt OSS)	90.50	92.30	90.50
	Overall Percentage	90.90	71.40	90.90
	Improvement on Block Zero	42.92	15.35	42.92
Key:	***p<0.05**			
	****p<0.01**			

The figure below shows the same results in graphical format which shows that the mixed-methods approach improved substantially on the model derived from the qualitative data and failed to improve on the model derived from the quantitative data.

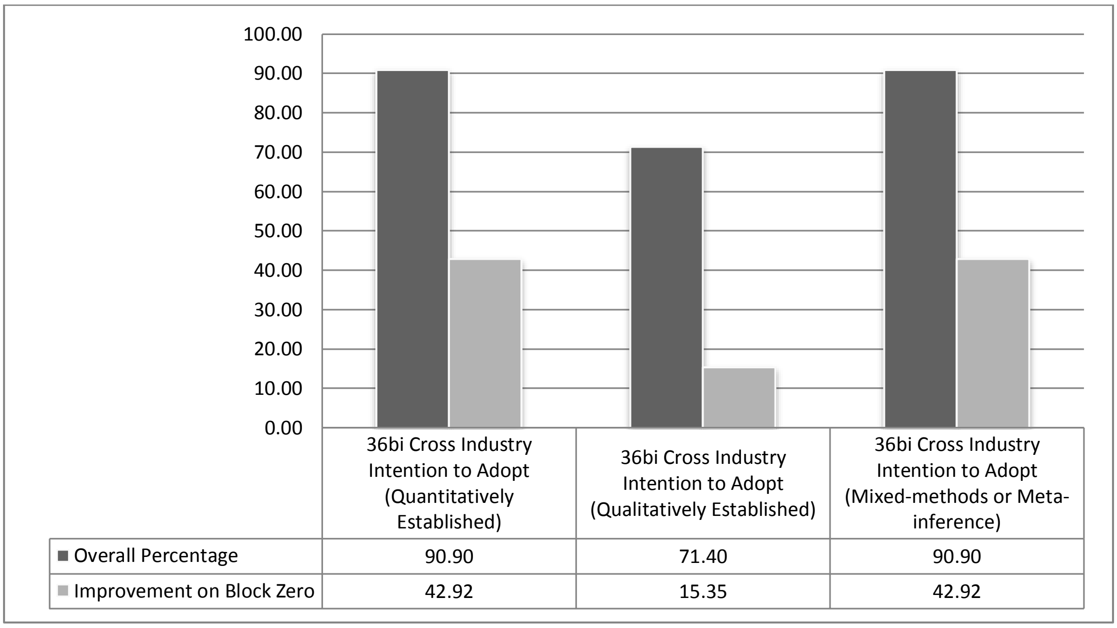


Figure 6.2: Bar Chart Comparing Predictive Capabilities of (a) Quantitative, (b) Qualitative and (c) Mixed Methods for Intention to Adopt OSS in the Cross-industry Subcategory

6.5.2. Qualitative Validation of Mixed-Methods Findings

6.5.2.1. OSS Adoption 2012: Utilities Application

There were two inhibiting factors, established through the aforementioned mixed-methods procedure, as associated with the above OSS organisational adoption behaviour, of which one had been successfully validated through the demand-side and supply-side key informant interviews. Specifically, the Development Freedom to Modify Capability factor was supported and described in previous sections. The remaining Most Projects Fail (to attract sufficient contributors) factor is discussed below.

6.5.2.1.1. Most Projects Fail (To Attract Sufficient Contributors)

The mixed-methods finding that "Most Projects Fail", as an inhibiting factor, was not explicitly supported in either of the key informant interviews. However, from the demand-side key informant interview it was noted, "… the resulting adoption of OSS technology was predominantly in the systems software [category], as opposed to the application software." Similarly, as previously pointed out, from the supply-side key informant interview it was noted, "… OSS developers tend to focus on the systems category, which he regarded as 'done and dusted'…" Therefore, as the Utilities sub-category resided within the Application category, it was possible that respondents/participants may have viewed this area as having less attention from the OSS community.

6.5.2.2. OSS Intention to Adopt in 2013: Cross-industry Application

There were 12 driving and inhibiting factors established through the aforementioned mixed-methods procedure, as associated with the above OSS organisational adoption behaviour, of which four had been successfully validated through the demand-side and supply-side key informant interviews. Specifically, these were Cost, Suitability, Colleagues (in IT) and Ease of Implementation and are discussed in other sections. The remaining nine factors are discussed below.

6.5.2.2.1. Security

The mixed methods findings of Security as a driving and inhibiting factor were supported from the demand-side key informant interview. For example, a participant from the demand-side key informant interview commented that, "... a government security agency had produced a 'myth-busting guide' for government IT managers thinking of using OSS. The same agency had asserted that OSS is no more, or less, secure than PS. In addition, "A persistent objection was noted as security concerns. The idea that OSS projects effectively created a 'sandbox' for security attacks. An IT expert from the security agency previously mentioned was quoted as saying (in jest). 'If anybody says that OSS is banned because of security concerns give me their name and I will have them killed'". On the other hand, the supply-side key informant interview made no explicit reference to security concerns.

6.5.2.2.2. Quality

The mixed methods findings of Quality as a driving factor were not supported from the supply-side key informant interview. A participant claimed that, "… a conflict between technologists and management [in which] concerns about reliability were occasionally levelled at OSS". On the other hand, concerns about quality were not explicitly raised in the demand-side focus-group.

6.5.2.2.3. Job Performance

The mixed methods findings of Job Performance as a driving factor was not supported from the demand-side key informant interview. For instance, one participant seemed to regard OSS as a distraction and commented that, "OSS was a 'fad' or 'fashionable for government'". On the other hand, from the supply-side key informant interview, a participant clearly signalled major benefit from OSS in that, "… customers had built up experience in Linux and Android [OSS projects] as standardised building blocks. This had led to an expectation of an 'instant on community' with no twelve month wait for infrastructure to be designed, procured, engineered, maintained…"

6.5.2.2.4. Transparency

The mixed methods findings of Transparency as a driving factor were supported from the supply-side key informant interview. A participant remarked, "…that Cloud-computing and BYO (bring your own) devices had accelerated the trend toward commodity and standardised building blocks for computing. He uses a car metaphor to describe how users expect a standardised experience in some ways and enhanced experiences through innovation in others." Similarly, from the demand-side key informant interview, a participant claimed, "One of the goals of the aforementioned review was to establish 'a level playing field' for OSS with proprietary software," and pointed out, "An OSS toolkit had also been specified and published on the internet."

6.5.2.2.5. Perpetuity

The mixed-methods finding of Perpetuity as a driving factor was not explicitly supported. However, some comments did imply a strategic shift toward OSS. From the supply-side key informant interview, a participant pointed out, "… OSS [was perceived as] part of a wider theme of customers who sought an alternative to mature proprietary incumbents (or traditional client-server variants). For example 'cloud computing'. He also noted the emergence of 'next generation' style of businesses such as Amazon, Google, Apple and Facebook as being less dependent on the incumbent models. He described a new wave of users as 'generation Y' who view OSS as a means of reducing barriers to entry for environments and markets. He also detected that customers were supporting a drive to commodity computing infrastructure, which OSS also helped facilitate." Similarly, from the demand-side key informant interview, a participant noted, "… a range of [government] technology code of practice documents, a rule-set for review/analysis. This included a policy that all things being equal OSS should be the preferred decision".

6.5.2.2.6. OSS Contributors (reported and influence)

The mixed method findings of OSS Contributors (reported and influence) was not explicitly supported by either of the key informant interviews. However, the demand-side group did point out a reliance on success stories in government circles, "Many government decision makers require extensive references and success stories to help support their decision making which had resulted as a culture of 'doing what others do'. Not so much as a need for best practice but a herd mentality". Therefore, if the OSS-favourable policies highlighted elsewhere in this section were successfully implemented, it is possible that some momentum from other OSS contributors would prove significant over time.

6.5.2.2.7. Organisation as an Active User of OSS

The mixed method finding of Organisation as an Active User of OSS as a driving factor was explicitly supported by both key informant interviews. From the demand-side, it was noted, "… public sector IT-spend had been affected by an outsourcing tradition, driven by systems integrators. This was now being challenged through the spending control procedures. These reviews would also take place in a number of phases depending on the size and scope of the project. The output could include approval, rejection or approval (with conditions). These conditions could include developing skills in certain areas (including OSS alternatives) if it were deemed appropriate." Furthermore, from the supply-side, a participant commented, "… users (were) expecting access to OSS development tools".

6.5.2.3. Summary of Qualitative Validation

6.5.2.3.1. OSS Adoption 2012: Utilities Application

The qualitative validation of the mixed-methods findings for the above organisational adoption behaviour is summarised in Table 6.7. This shows that the qualitative validation through the two key informant interviews partially supported both factors obtained via meta-inference. The implication for this research is that the mixed-methods findings are partially supported by the aforementioned qualitative validation.

Table 6.7: Summary of Qualitative Validation of Factors Associated with OSS Adoption in the Utilities Subcategory by Mixed Methods

Source		36c Utilities OSS Adoption (Mixed-methods or Meta-inference)
	Attitude Factors	
21e	Most OSS projects fail (-ve)	Partially Supported
	Subjective Norm Factors	
N/A	No statistically significant factors obtained	N/A
	Perceived Behavioural Control Factors	
QUAL	Development/Freedom to Modify Capability (-ve)	Partially Supported

6.5.2.3.2. OSS Intention to Adopt in 2013: Cross-industry Application

The qualitative validation of the mixed-methods findings for the above organisational adoption behaviour is summarised in Table 6.8. This shows that the qualitative validation using the two key informant interviews supported five factors, partially supported six factors and did not support one factor. The implication for this research is that the mixed-methods results are largely supported by the aforementioned validation.

Table 6.8: Summary of Qualitative Validation of Factors Associated with Intention to Adopt OSS in the Cross-industry Subcategory by Mixed Methods

Source		36bi Cross Industry Intention to Adopt (Mixed-methods or Meta-inference)
	Attitude Factors	
20a	Security (+ve)	Supported
20c	Quality (+ve)	Not Supported
20g	Job Performance i.e. Usefulness (+ve)	Partially Supported
20h	Transparency (+ve)	Supported
20i	Perpetuity (+ve)	Partially Supported
QUAL	Cost (-ve)	Supported
QUAL	Suitability (-ve)	Supported
	Subjective Norm Factors	
23c	OSS contributors (reported) (+ve)	Partially Supported
25b	OSS contributores (influence) (+ve)	Partially Supported
25d	Colleagues in IT (+ve)	Partially Supported
	Perceived Behavioural Control Factors	
33	Organisation active OSS user (+ve)	Supported
QUAL	Ease of Implementation (-ve)	Partially Supported

6.5.3. Summary of Mixed-methods Validation

As discussed, this section has been structured in accordance to recent IS research recommendations on mixed-methods validity (Venkatesh et al., 2013).

In terms of technical validation, the validity methods typically associated with quantitative and qualitative methods have been followed for the findings identified via mixed-methods.

In terms of inference quality, the design quality was identified as complimentary (i.e. qualitative methods augmenting quantitative methods) for which IS research precedent was established (Jinwei et al., 2006). It was also established that the interpretive rigour was satisfactory for the purposes of this research, however, could be improved upon by the inclusion of an inter-coder validation and correlation stage in the qualitative research method. Furthermore, the inference quality was rigorously assessed and found that neither of the mixed-methods models was able to improve on quantitative findings in terms of predictive capabilities of the model.

From an overall design perspective, and as will be shown in the next section, the qualitative data has been shown to add depth and breadth to the quantitative data. Additionally, this research has shown that the combined qualitative and quantitative data, and subsequent meta-inferences, successfully established additional factors of statistical significance to certain organisational OSS adoption behaviour. However, as shown in this section, this did not appreciably improve predictive capabilities of the models concerned.

Having evaluated the strengths and limitations of the quantitative, qualitative and mixed-methods research discussed in this chapter, the following section will compare the various findings with the existing IS research.

6.6. Discussion and Comparison with Other Research

6.6.1. OSS Adoption (2010 to 2012) or Intention to Adopt OSS (2013/2014)

Table 6.9 details the driving and inhibiting factors found to be associated with OSS adoption (from 2010 to 2012) and intention to adopt OSS (2013 and 2014) in the main study and discussed below.

Table 6.9: Driving and Inhibiting Factors Associated with OSS Adoption (by Year)

Question	Construct, Factor (+ve/-ve)	35e General OSS Adoption 2010	35d General OSS Adoption 2011	35c General OSS Adoption 2012	35b General OSS Intention 2013	35a General OSS Intention 2014
	Attitude Factors					
20a	Security (+ve)	*0.01134	*0.04863	*0.01824	*0.02234	*0.03857
20i	Perpetuity (+ve)				*0.04163	*0.04685
21a	Unsustainable business model (-ve)			*0.02967	*0.01414	*0.04407
21b	Second best perception (-ve)			*0.04621	**0.009007	*0.03137
21f	Questionable return (-ve)			*0.03732	*0.03207	
	Subjective Norm Factors					
23c	OSS contributors (reported) (+ve)		*0.01631	***0.001631		
25b	OSS contributors (influence) (+ve)			*0.03429		
25c	Colleagues (in line of business) (+ve)				*0.03207	
25d	Colleagues(in IT Dept) (+ve)				***0.003311	*0.02180
	Perceived Behavioural Control Factors					
27	Ease of implementation (+ve)		*0.04023	***0.003141	***0.002916	**0.009563
30g	Switching costs (-ve)			*0.04036		
32	Prior implementation (+ve)	*0.03018				
33	Organisation active OSS user (+ve)			**0.00953	**0.007525	*0.02887

Key: **p>=0.05 (No statistical significance)**
***p<0.05**
****p<0.01**
*****p<0.005**

6.6.1.1. ***Attitudes Identified as Associated with OSS Adoption or Intention to Adopt OSS***

6.6.1.1.1. Security

According to IS research security concerns are a major issue for IT managers and have been in the top ten IT topics since 2003 (Luftman and Ben-Zvi, 2010). IS research has highlighted contradictory conclusions whereby some consider OSS to be more secure and others prefer PS (Mosoval et al., 2006). Other scholars suggest OSS provides the opportunity to deliver greater security via an extension of Linus Torvald's 'Many eyes make all bugs shallow' philosophy (Fitzgerald, 2006b). In the context of this research, this factor was found to be statistically significant and positively associated across all years of adoption and intention to adopt OSS for which data was gathered (see Table 6.9). These quantitative findings were not supported or contradicted by the qualitative data. Therefore, the existing IS research is somewhat contradictory and this research supports those which find security is positively associated with OSS adoption.

6.6.1.1.2. Perpetuity

As with the pilot study, longevity of technology is important to organisations to avoid risk and unnecessary software switching exercises (Cavusoglu et al., 2010, Dedrick and West, 2003). A key related factor is also the perpetuity of the data and formats so as to enable continuity of access to archived and historical data (Casson and Ryan, 2006). So far as this main study was concerned this factor was found to be statistically significant and positively associated for intention to adopt OSS in 2013 and 2014 (see Table 6.9). These quantitative findings were not supported or contradicted by the qualitative data gathered. Therefore, this research partially supports the existing research which claims the Perpetuity factor is positively associated with OSS adoption.

6.6.1.1.3. OSS Unsustainable Business Model

As discussed in the pilot study, research has argued that there is a connection between OSS and the "tragedy of the commons" phenomenon in which, for a variety of reasons, the commons concept (including OSS) is practically, financially and operationally unsustainable (Benkler, 2002). So far as the main study is concerned, this factor was found to be statistically significant and negatively associated with OSS adoption in 2012 and intention to adopt OSS in 2013 and 2014 (see Table 6.9).

The quantitative finding described by the Unsustainable Business Model factor as an inhibiting factor appeared to be supported by a majority of the qualitative responses. Respondent reference number 10224550 stated, “The inherent danger is that the OSS project that has developed and is supporting the software either wanes or dies out completely”. Similarly, respondent 10225238 stated, "The fact that software is open source is not the issue it is the amount and strength of support that is easily available with a long term strategy, this tends to be weaker with many OSS." Furthermore, respondent 10225431 stated, "80% of OSS with a community basis are often too small to future-proof and support the products well enough. Often a few individuals are the community leading lights and the continuity of small initiatives is questionable. Profitable commercial organisations always have a better continuity story." Finally, respondent 10461272 stated,

> *Any adoption of OSS must be accompanied by excellent documentation, testing and support. Otherwise an organisation is doomed if key personnel leave or if these individuals inflate their worth because of their knowledge of the system. Third party software suppliers may become reticent and SLAs may fly out of the window if there is too much staff turnover. Traditional proprietary contracts carry with them a certain level of security in the knowledge that changes are made by the people who hold the support contract and documentation also remains their key priority.*

Conversely, only one qualitative respondent regarded OSS sustainability positively, respondent 10077520, who stated, "Better delivery than proprietary and more sustainable - all OSS projects I have done have worked this way".

Therefore, this research largely supports the existing research which claims that the Unsustainable Business Model factor is negatively associated with OSS adoption (Benkler, 2002).

6.6.1.1.4. Second Best Perception

IS research has argued that individuals may regard developing skills and expertise in OSS as undesirable (i.e. 'second best' compared to 'marquee' PS brands) and even regarded as 'de-skilling' in terms of their own employment prospects and marketability (Glynn et al., 2005). So far as this study is concerned, this factor was found to be statistically significant and negatively associated with OSS adoption in 2012 and intention to adopt in 2013 and 2014 (see Table 6.9). These quantitative findings were not supported or contradicted by the qualitative data gathered. Therefore, this research largely supports the existing research which claims that the Second Best Perception factor is negatively associated with OSS adoption (Glynn et al., 2005).

6.6.1.1.5. Questionable Return

Organisational software selectors may take into consideration a range of factors when considering changing technology including switching costs and total cost of ownership. IS research has argued that factors such as switching costs and total cost of ownership may combine to amount to a questionable return on investment for OSS (Haider, 2008, Ven et al., 2008). IS research has pointed out that there are a wide range of hidden costs, from patching upgrades to requirements analysis, which are unlikely to be funded from 'scarce IT budgets' and therefore better managed by vendors (Pare et al., 2009b). With respect to the main study, this factor was found to be statistically significant and negatively associated for OSS adoption in 2012 and intention to adopt in 2013 (see Table 6.9).

The quantitative finding described by the Questionable Returns as an inhibiting factor appeared to be somewhat supported by a majority of the qualitative responses: Respondent 10070892 stated, "I require access to relevant and affordable skillsets either in-house or via a 3rd party to develop and support OSS”. Respondent 10071152 stated, "Unable to manage risk and cost due to the management of change controls and expectation." Similarly, Respondent 10224146 stated,

> *[OSS] can't possibly be as good as the high cost alternative and so will be tolerated (whether or not it does the job required) until enough funds exist to replace it with an expensive, less flexible, probably less functional, but branded alternative.*

Additionally, Respondent 10226395 stated, "There is a false perception that OSS is free, which disregards the time involved in coming to learn about it and (often) creating your own support and training materials". Finally, Respondent 10480490 stated,

> *Where an organisation has chosen to buy in software packages from a third party or to outsource the support of their IT, opportunities to implement Open Source Software will remain low as barriers around the cost of support will be prohibitively expensive.*

There were a minority of qualitative findings which were considered more contradictory toward the Questionable Return factor as an inhibiting factor toward OSS adoption: For example, Respondent 10071006 stated, "... a means to save money on [Microsoft] Office Licences... Reduced costs [while] still allowing users to do their jobs with fit for purpose tools". Additionally, respondent 10076325 stated, "Investigating and will use if cost and service delivery is effective solution". Furthermore, 10224700 stated, "Attractive for licence cost reduction…"

Therefore, this research has largely supported the existing research which claims that the Questionable Return factor is negatively associated with OSS adoption (Haider, 2008, Ven et al., 2008, Pare et al., 2009b).

6.6.1.2. *Subjective Norm Identified as Associated with OSS Adoption or Intention to Adopt OSS*

6.6.1.2.1. OSS Contributors (Reported)

As discussed in the pilot study, IS research has argued that the success of an OSS project is not just a function of its overall diffusion and adoption, but also the number and extent of those who contribute code. Specifically, evidence of a sufficient number of code contributors suggests a successful and sustainable OSS project (Toral et al., 2009). So far as the main study was concerned, this factor was found to be statistically significant driving factor for OSS adoption in 2011 and 2012 (see Table 6.9). These quantitative findings were not supported or contradicted by the qualitative data gathered. Therefore, this research has largely supported the existing research which claims that the OSS Contributors Reported factor is positively associated with OSS adoption.

6.6.1.2.2. OSS Contributors' Influence

As discussed in the pilot study, IS research has argued that the OSS Contributor's Influence factor is significant in OSS adoption (Chengalur-Smith et al., 2010). In the context of the main study, this factor was found to be a statistically significant driving factor for OSS adoption in 2012 (see Table 6.9). These quantitative findings were not supported or contradicted by the qualitative data gathered. Therefore, this research largely supports the existing research which claims that the OSS Contributors' Influence is positively associated with OSS adoption (Chengalur-Smith et al., 2010).

6.6.1.2.3. Colleagues (in Line of Business)

IS research has argued that Colleagues (in Line of Business) can also influence IT adoption decisions. This 'absorptive capacity' refers to an organisations ability to deploy a particular technology and exploit it for business purposes (Chengalur-Smith et al., 2010). So far as the main study was concerned, this factor was found to be statistically significant for intention to adopt OSS in 2013 (see Table 6.9).

The quantitative finding described by the Colleagues (in Line of Business) as a driving factor was supported by two of the six of the qualitative responses coded as such. See Table 5.12, Page 222. Firstly Respondent 10071006 stated, "...allowing users to do their jobs with fit for purpose tools." Secondly, Respondent 10224430 stated, "The governance of our organization have expressed a desire for OSS." Conversely, respondent 10462926 stated, "If appropriate we would use OSS. [We] wanted to replace Blackboard [proprietary software] with Moodle [OSS] but [experienced] internal opposition from academics."

Therefore, this research has largely supported the existing research which claims that the Colleagues (in Line of Business) factor is positively associated with OSS adoption (Chengalur-Smith et al., 2010).

6.6.1.2.4. Colleagues (in IT Department)

IS research has suggested that an organisation's IT department is considered a key influencer in terms of IS adoption, not just in terms of capabilities and expertise, but also their preference in software selection (Chengalur-Smith et al., 2010). So far as this main study was concerned, this factor was of statistical significance and positively associated with intention to adopt OSS in 2013 and 2014 (see Table 6.9).

The quantitative finding described by the Colleagues (in IT dept) as a driving factor appeared to be somewhat contradicted by all of the qualitative findings largely in terms of a lack of skills: For instance, Respondent 10070892 stated, "I require access to relevant and affordable skillsets... to develop and support OSS." Similarly, Respondent 10071152 stated, "IT support personnel because there is additional risk and extra support considerations with open source software." Additionally, Respondent 10116015 stated,

> *We would like to adopt more OSS but it is hard in [our] market. We are not big enough to do our own thing so have to rely on a solution having gained enough momentum to be acceptable.*

Furthermore, Respondent 10226389 stated,

> *Open source is very attractive but it relies upon having in house resource to utilise the software. Currently our resource would not have the immediate skills to do this nor are we staffed up to meet demand.*

Finally, Respondent 10461272 stated, "Incorporating OSS is incumbent on any organisation having personnel who can exploit the resource"

Therefore, this research has supported the existing research which claims that the Colleagues (in IT Dept) factor is significant (Chengalur-Smith et al., 2010).

6.6.1.3. *Perceived Behavioural Control Identified as Associated with OSS Adoption or Intention to Adopt OSS*

6.6.1.3.1. Ease of Implementation

As with the pilot study, TPB research has argued that relative ease and difficulty in carrying out the target behaviour can be significant (Ajzen, 1991). Similarly, perceived ease of use (PEoU) is a key concern in IS research which is drawn from TAM-based models, which are more focused on end user acceptance rather than organisational implementation or adoption (Gwebu and Wang, 2011). In the context of the main study, this factor was found to be a statistically significant and positively associated with; adoption in 2011 and 2012, intention to adopt in 2013 and 2014 (see Table 6.9).

The quantitative finding described by Ease of Implementation as a driving factor was somewhat supported by the qualitative responses in the main study. For example, Respondent 10076325 stated, "Investigating and will use if cost and service delivery is effective solution... Confidence in making the change." Similarly, Respondent 10224700 stated, "Attractive for licence cost reduction however implementation and integration costs would be a barrier." Conversely, respondent 10071152 stated, "Unable to manage risk and cost due to the management of change controls..."

Therefore, this research has largely supported the existing research which claims that the Ease of Implementation factors is positively associated with OSS adoption (Gwebu and Wang, 2011).

6.6.1.3.2. Switching Costs

According to IS research cost concerns are a major issue for IT managers and have been in the top 10 IT topics since 2003 (Luftman and Ben-Zvi, 2010). IS research has claimed that the prospect of switching costs is an important factor in the adoption of OSS (Haider, 2008, Ven et al., 2008). IS research has also argued that a coherently planned proprietary infrastructure, and therefore the costs associated with switching, has significantly impeded OSS adoption in organisations (Glynn et al., 2005). Consistent with these findings, so far as this main study is concerned, this factor was found to be statistically significant and negatively associated with OSS adoption in 2012 (see Table 6.9).

The quantitative finding described by Switching Costs as an inhibiting factor was supported by the qualitative responses coded as such during the main study. Firstly, Respondent 10071152 stated, "Unable to manage risk and cost due to management of change controls and expectation". Secondly, Respondent 10226395 stated, "There is a false perception that OSS is free, which disregards the time involved in coming to learn about it and (often) your own training and materials". Finally, Respondent 10480490 stated,

> *Where an organisation has chosen to buy in software packages from a third party or to outsource the support or their IT, opportunities to implement OSS will remain low as barriers around cost of support will be prohibitively expensive.*

Conversely, some qualitative data appeared to contradict the costs factor as inhibiting. Respondent 10458184 stated, "Huge savings from collaboration with neighbouring Authorities and wider sharing development resource/training/knowledge/ideas, standardisation..."

Therefore, this research has largely supported existing research which claims that the Switching Costs factor can be negatively associated with OSS adoption (Haider, 2008, Ven et al., 2008).

6.6.1.3.3. Prior Implementation

TPB research has argued that previous behaviour, or in this case, prior implementation of OSS, is an important indicator of volitional control and therefore behaviour (Ajzen, 1991). So far as this research is concerned, this factor was shown to be statistically significant and positively associated with OSS adoption in 2010 (see Table 6.9).

The quantitative finding described by prior implementation as a driving factor was supported by one qualitative response. Respondent 10077520 stated, "[I have experienced] better delivery than proprietary [software] and more sustainable – all OSS projects I have done have worked in this way".

Therefore, this research has supported the existing research which claims that the Prior Implementation factor is positively associated with OSS adoption (Ajzen, 1991).

6.6.1.3.4. Organisation is an Active User of OSS

Similarly, at an organisational level, TPB research has argued that previous behaviour, or in this case, Organisation is an Active User of OSS, is an important indicator of volitional control and therefore planned behaviour (Ajzen, 1991). So far as this research was concerned, this factor was found to be statistically significant and positively associated with OSS adoption in 2012, and intention to adopt OSS in 2013 and 2014 (see Table 6.9). These quantitative findings were not supported or contradicted by the qualitative data gathered.

Therefore, this research has supported the existing research which claims that the Organisation as an Active User of OSS factor is important to OSS adoption (Ajzen, 1991).

6.6.2. OSS Adoption and Intention to Adopt OSS by Software Categories

Table 6.10 details the self-reported factors identified as associated with OSS adoption and intention to adopt OSS across the various sub-categories in the main study. This shows that a different, and greater number, of driving and inhibiting factors were found be statistical significant for different categories of software with various degrees of confidence levels. For example, the highest confidence levels (greater than 99.5%) were found for this main study for Freedom to Modify as a driving factor from the Attitude construct in the OSS Database Management System adoption in 2012 category. Other driving factors of the same 99.5% confidence levels include; OSS Contributors (reported) in the OSS Development Tools and Programming Languages adoption in 2012 category, and OSS Contributors (influence) and Colleagues (in IT dept) for the same category in terms of intention to adopt in 2013.

A number of factors have been discussed earlier in this dissertation; those that were not are discussed below.

Table 6.10: Driving and Inhibiting Factors Associated with OSS Adoption (by NAPCS Subcategory)

Question	Construct, Factor (+ve/-ve)	Adoption 2012								Intention 2013							
		Applications Software Sub Category				Systems Software Sub Category				Applications Software Sub Category				Systems Software Sub Category			
		36a General Business Productivity	36b Cross Industry	36c Utilities	36d Vertical Markets	37a Operating Systems	37b Network Systems	37c Database Management Systems	37d Development Tools and Prog Languages	36ai General Business Productivity	36bi Cross Industry	36ci Utilities	36di Vertical Markets	37ai Operating Systems	37 bi Network Systems	37ci Database Management Systems	37di Development Tools and Prog Languages
	Attitude Factors																
17	Productivity (+ve)					*0.02632		*0.01457						*0.02513			
20a	Security (+ve)	*0.01085					*0.03805			*0.04103	*0.03274				*0.02416	*0.03864	*0.02846
20c	Quality (+ve)									*0.0464	*0.02261						
20e	Disruptive Technology (+ve)														*0.03261		
20g	Job Performance i.e. Usefulness (+ve)						*0.04671				*0.04479			*0.01710	*0.03274	**0.007575	
20h	Transparency (+ve)										*0.02514						*0.01997
20i	Perpetuity (+ve)							*0.01182			*0.04479		*0.03322			*0.04075	
20j	Freedom to modify (+ve)	*0.04729						***0.002441								**0.006388	
20m	Creativity & innovation (+ve)									*0.04429							
20o	Observability (+ve)							*0.03329									
21a	Unsustainable business model (-ve)									*0.02735							
21b	Second best perception (-ve)													0.03817*	*0.04381	*0.01697	
21e	Most OSS projects fail (-ve)			*0.03444			*0.03427			*0.0258							
21f	Questionable return (-ve)												*0.04313				
	Subjective Norm Factors																
23b	Success stories (+ve)									*0.01849							
23c	OSS contributors (reported) (+ve)		*0.03739					*0.03801	***0.004635		*0.01288						*0.04308
24b	Network Effects (+ve)	*0.01683							*0.02731	*0.0258							*0.01873
24c	Internal politics (+ve)												*0.03161			*0.03636	
24e	Organisational Culture (+ve)	*0.03444								*0.02088							*0.03365
25a	Friends or acquintances (+ve)		*0.04551														
25b	OSS contributores (influence) (+ve)				*0.02135				*0.01481		*0.02514						***0.002521
25c	Colleagues (in line of business) (+ve)							*0.03732									*0.03047
25d	Colleageus (in IT) (+ve)								*0.02731		*0.01234		*0.03223			*0.01278	***0.003557
25i	Customers (-ve)		*0.04892														
25k	The media (broadcast, trade press etc) (+ve)						*0.03674								*0.03292		
	Perceived Behavioural Control Factors																
27	Ease of implementation (+ve)												*0.04313			*0.02742	
29b	Professionalism of IT dept (+ve)							*0.02035									
30a	Unacceptable license terms (-ve)					*0.04253	*0.03194										
30h	Standards (specifying proprietary) (-ve)					*0.03931							**0.006644				
32	Prior implementation (+ve)													*0.02313		*0.02246	*0.04828
33	Organisation active OSS user (+ve)	*0.02731			*0.0115						**0.006463	*0.04844				*0.01816	**0.006844

Key: **p>=0.05 (No statistical significance)**
***p<0.05**
****p<0.01**
*****p<0.005**

6.6.2.1. Attitude Identified as Associate with Various Software Categories and Adoption and Intention to Adopt

6.6.2.1.1. Freedom to Modify

As discussed in the pilot study, IS research has argued that that the ability to modify OSS technology by adopting-organisations and users is a key factor (Vitharana et al., 2010, Bueno and Gallego, 2010, Mosoval et al., 2006, Glynn et al., 2005, Ven et al., 2008) (i.e. freedom to modify code). So far as this main study is concerned, the Freedom to modify factor was found to be of statistical significance for OSS General Business Productivity adoption in 2012 (greater than 95% confidence level) and OSS Database Management System adoption in 2012 (greater than 99.5% confidence level) and intention to adopt for the same software category in 2013 (greater than 99% confidence level). See Table 6.10: Driving and Inhibiting Factors Associated with OSS Adoption (by NAPCS Subcategory).

The quantitative finding described by the Freedom to Modify factor was marginally supported by one qualitative response. Respondent 10225431 stated,

> *OSS religion is not a concern to me. OSS is just a different set of parameters when selecting software: cost, risk, rewards. The single biggest issue is sustainability of choices i.e. sustainability of community/supplier, access to skills. Following a Microsoft, Proprietary, Oracle, OSS or any other software religion is completely non-sensical. It becomes important when I have the in house skills to modify software but this isn't often.*

Therefore, this research has supported the existing research which claims that the Freedom to Modify factor is important to OSS adoption (Vitharana et al., 2010, Bueno and Gallego, 2010, Mosoval et al., 2006, Glynn et al., 2005, Ven et al., 2008).

6.6.2.1.2. Productivity

As discussed in the Literature Review Chapter, IS research has argued that productivity can be considered a driving factor in terms of OSS adoption, particularly for organisations who employ programmers and developers (Mehra et al., 2011). In addition, other IS research has criticised existing studies for failing to investigate the links between technology and organisational outcomes, such as productivity (Venkatesh et al., 2003). So far as the main study was concerned, the Productivity factor was found to be of statistical significant (i.e. greater than 95% confidence level) for OSS Operating System and Database Management System in 2012 and intention to adopt OSS Operating System in 2013.

The quantitative finding described by Productivity as a driving factor was supported by qualitative data. Participant 10077520 stated, “Always positive [toward OSS], but fit to organisations existing technologies is imperative. Better delivery than proprietary and more sustainable - all OSS projects I have done have worked this way.” In addition participant 10224550 stated, “The software solution needs to meet the organisational requirements - this is paramount. Factors following this, e.g. cost, supplier, platform, are also extremely important but irrelevant if the software does not do what the organisation needs it to do.”

Therefore, this research has supported the existing research which claims that productivity is important to OSS adoption (Mehra et al., 2011).

6.6.2.1.3. Quality

As discussed in the Literature Review Chapter, generic IS research has argued via meta-analysis that attitudes toward quality is a significant factor in the adoption of innovation in organisations (Jeyaraj et al., 2006). Similarly, in OSS research, it has been argued that, “High OSS quality will result in a high level of user satisfaction which will prompt users to spread positive information about the OSS” (Whitmore et al., 2009). Other OSS research has pointed out that OSS proponents have argued, “making source code available lets everyone peer review the code, resulting in higher quality software” (Ven et al., 2008). Additionally, OSS research in the field of software development, has cited higher quality as an important factor in adopting OSS (Vitharana et al., 2010). However, other OSS research has questioned OSS quality claims, “… based on analysis of the actual code, [research has] questioned the assumption that OSS products are automatically of high quality" (Glynn et al., 2005). So far as the main study was concerned, the Quality factor was found to be statistically significant (greater than 95% confidence level) for OSS General Business Productivity and Cross-industry application sub-categories intention to adopt in 2013. The quantitative finding described by Quality was not directly supported by the qualitative data.

Therefore, this research has largely supported the existing research which claims that the Quality factor is important to OSS adoption (Ven and Verelst, 2008, Jeyaraj et al., 2006, Whitmore et al., 2009, Vitharana et al., 2010).

6.6.2.1.4. Technological Disruption

As discussed in the Literature Review Chapter, OSS research has argued that, "Simply being a low-price alternative to an existing technology is typically insufficient to disrupt an existing market. Disruption requires that the new technology improve dramatically overtime along attributes valued by mainstream customers, while still maintaining its appeal to initial niche adopters" (Brydon and Vining, 2008). The same research questions whether the OSS development model satisfactorily fulfils this requirement (ibid). Other OSS research has argued that OSS development has successfully evolved into a 'mainstream and commercially viable form' incorporating corporations who contribute to its development (Fitzgerald, 2006a). So far as the main study was concerned, the Disruptive Technology factor was found to be statistically significant (greater than 95% confidence level) for OSS Network Systems software category intention to adopt in 2013.

The quantitative finding described by Disruptive Technology was not directly supported by the qualitative data.

Therefore, this research has supported the existing research which claims that the Technology Disruption factor is important to OSS adoption (Fitzgerald, 2006b).

6.6.2.1.5. Job Performance (i.e. Perceived Usefulness)

As previously discussed, IS research has claimed that perceived usefulness is an important factor in the adoption of innovation (Jeyaraj et al., 2006) and the acceptance of technology (Davis, 1989). Furthermore, OSS research has argued that perceived usefulness is important in the context of OSS adoption (Gwebu and Wang, 2011, Bueno and Gallego, 2010). Similarly OSS research has argued that organisational adoption research is flawed unless users themselves elect to use the software (Gwebu and Wang, 2011). So far as the main study is concerned, the Job Performance factor was found to be statistically significant (greater than 95% confidence level) for OSS Network Systems software adoption in 2012, and for intention to adopt OSS in 2013 for; Cross-industry application software, Operating and Network Systems software categories. In addition, the Job Performance factor was found to be statistically significant (greater than 99.5% confidence level) for OSS Database Management System software intention to adopt in 2013. In addition, the quantitative finding described by Job Performance was somewhat supported by qualitative data. Respondent 10077520 reported, "Always positive… Better delivery than proprietary and more sustainable - all OSS projects I have done have worked this way."

Therefore, this research has supported the existing research which claims that the Job Performance factor is important to OSS adoption (Gwebu and Wang, 2011, Bueno and Gallego, 2010).

6.6.2.1.6. Transparency

As discussed in the Literature Review Chapter, IS research has argued that transparency is an important factor in terms of policy reasons for the adoption of open standards and OSS (Casson and Ryan, 2006). OSS research has also suggested that transparency could be a key factor in OSS adoption, via a sense of ownership, specifically, "openness and transparency, [OSS] might offer manufacturers and consumers the potential for an equal say in the software being built" (Vitharana et al., 2010). The same research reported that participants in OSS-related projects reported that it was, "a lot easier to have visibility into what component teams are doing" (ibid). So far as the main study was concerned, the Transparency factor was found to be statistically significant (greater than 95% confidence level) for intention to adopt OSS in 2013 for; Cross-industry applications software category and Development Tools and Programming Languages systems category. However, the quantitative finding described by Transparency was not directly supported by the qualitative data.

Therefore, this research has supported the existing research which claims that transparency is important to OSS adoption (Vitharana et al., 2010, Casson and Ryan, 2006).

6.6.2.1.7. Creativity & Innovation

As previously discussed, OSS research has claimed that OSS offers a range of advantages, "OSS, when compared to closed source development, has manifested in lower development costs, higher quality, greater freedom for participants, enhanced knowledge creation, and greater creativity and innovation" (Vitharana et al., 2010, p278). So far as the main study was concerned, the Creativity & Innovation factor was found to be statistically significant (greater than 95% confidence level) for intention to adopt OSS in 2013 for General Business Productivity application software. However, the quantitative finding described by Creativity & Innovation was not directly supported by the qualitative data.

Therefore, this research has supported the existing research which claims that the Creativity & Innovation factor is important to OSS adoption (Vitharana et al., 2010, p278).

6.6.2.1.8. Observability

As discussed in the Literature Review Chapter, IS research has defined observability as, "The degree to which using an innovation generates results that are observable and can be communicated to others" (Jeyaraj et al., 2006, Variables Appendix) and original DoI research has indicated that it is a significant factor in the adoption of technology (Rogers, 2003). In addition, other IS research has indicated that observability should be investigated as an important factor in the adoption of innovation (Adams et al., 1992). So far as the main study was concerned, the Observability factor was found to be statistically significant (greater than

95% confidence level) for OSS Database Management System adoption in 2012. However, the quantitative finding described by Observability was not directly supported by the qualitative data.

Therefore, this research has supported the existing research which claims that observability is important to innovation adoption (Adams et al., 1992, Jeyaraj et al., 2006).

6.6.2.1.9. Most OSS Projects Fail

As discussed in the Literature Review Chapter, OSS research has claimed that many OSS projects fail, in so much as, "the majority of OSS projects struggle to attract contributors" (Hauge et al., 2010, p1135). Alternatively, more successful OSS projects may experience "forking" a process by which,

> *Because open source software is developed by independent developers or groups of developers, there is always a possibility that each person or group may create their own version of software. Starting with the same source code, if different groups do not coordinate their efforts, the new features and functionality they add may not be interoperable with each other or exhibit equivalent functionality" (Nagy et al., 2010, p150).*

Although this behaviour is not considered failure, it may complicate adoption decisions (ibid). So far as the main study was concerned, the Most OSS Project Fail factor was found to be statistically significant (greater than 95% confidence level) for OSS adoption in 2012 for; Utilities application software category and Network systems software category. In addition, to the same confidence level for General Business Productivity intention to adopt OSS in 2013.

The quantitative finding described by Most OSS Projects Fail was somewhat supported by the qualitative data. For example, Respondent/Participant 10225431 commented, *The OSS community is not one community but a massive variation. I believe that those commercial organisations open sourcing their products are often doing this for commercial advantage or PR. 80% of OSS with a community basis are often too small to future-proof and support the products well enough. Often a few individuals are the community leading lights and the continuity of small initiatives is questionable. Profitable commercial organisations always have a better continuity story.*

Therefore, this research has supported the existing research which claims that the Most OSS Projects Fail factor is important to OSS adoption (Hauge et al., 2010, p1135).

6.6.2.2. Subjective Norm Identified as Associated with OSS Adoption and Intention to Adopt (by Category)

6.6.2.2.1. Success Stories

As previously discussed, OSS research has made a distinction between infrastructure software and enterprise application software and has suggested that OSS success stories are far more prevalent in the former than the latter (Brydon and Vining, 2008). Furthermore, other OSS research has claimed that, within the more successful Systems Software category itself, OSS diffusion has taken place in waves, for example, from Operating System, middleware to database software (Chengalur-Smith et al., 2010). In addition, other OSS research has emphasised the role of factors external to organisations and has cited, “the existence of high-profile successful exemplars of OSS adoption” as key to organisational OSS adoption (Glynn et al., 2005, p226). Conversely, the same research has reported, “The lack of a successful exemplar of OSS adoption in the respondent industry sector also appeared to an important inhibitor” (Glynn et al., 2005, p231). So far as the main study was concerned, the Success Stories factor was found to be statistically significant (greater than 95% confidence level) for OSS General Business Productivity intention to adopt in 2013.

The quantitative finding described by Success Stories was somewhat supported by the qualitative data. For instance, Respondent/Participant 10458184 commented, “Huge savings from collaboration with neighbouring authorities and wider. Sharing development, resources, training, knowledge, ideas, standardisation, [and] economies of scale (e.g. hosting)”.

Therefore, this research has supported the existing research which claims that the Success Stories factor is important to OSS adoption (Glynn et al., 2005, Brydon and Vining, 2008, Chengalur-Smith et al., 2010).

6.6.2.2.2. Network Effects

As previously discussed, OSS research has defined network effects as, “the principle that an [innovation] is increased in value as the number of individuals by whom it is used increases”, and that, “[network effects] has been applied as a lens through which to view OSS success. IS research has characterized network effects as a critical factor in the diffusion of software in general and OSS in particular” (Whitmore et al., 2009, p92). Furthermore, other OSS research has argued that different software categories can experience low or high network effects (Sen, 2007). Low network effects typically apply to: “Desktop stand-alone single-user applications (e.g. PC diagnostic tools, single-player PC games, personal firewalls, CD writers, Web browsers such as Firefox and Explorer, e-mail clients such as Thunderbird and Outlook)", and, "Infrastructure software based on universally accepted standards and protocols (e.g. Web servers such as Apache and IIS, DNS servers such as BIND, and e-mail servers)" (Sen, 2007, p241, Table 3). Weak network effects typically apply to: Firstly, "Desktop office productivity software (e.g. MS Office)", secondly, "Database servers (e.g. Oracle, MySQL)", thirdly, "Network operating systems (e.g. Windows 2000, Red Hat Linux, Novell Netware)", and finally, "Desktop operating systems (e.g. Windows XP, SUSE Linux 9)" (Sen, 2007, p241, Table 3). So far as the main study was concerned, the Network Effects factor was found to be statistically significant (greater than 95% confidence level) for OSS General Business Productivity for adoption in 2012 and intention to adopt in 2013. In addition, the Development Tools and Programming Languages systems software category adoption in 2012 was found to be significant to the same confidence level. However, the quantitative finding described by Network Effects was not directly supported by the qualitative data.

Therefore, this research has supported the existing research which claims that the Network Effects factor is important to OSS adoption (Sen, 2007).

6.6.2.2.3. Internal Politics

OSS research has suggested that OSS adoption has the potential to avoid 'complex IT management politics' (Allen and Ieee, 2010). However, other OSS research has suggested that, "Investigation into political barriers and top management [support] for OSS" should be encouraged in order to successfully deploy OSS projects (Haider, 2008, p65). Furthermore, other OSS research has claimed that there are very few studies that take political factors into consideration and stated that, "internal pressure emanated from [senior] level decision makers who had projects with commercial software vendors and communicated that those projects would be at risk if the delivery organizations moved to OSS products" (Pare et al., 2009b, p3). So far as the main study was concerned, the Internal Politics factor was found to be statistically significant (greater than 95% confidence level) for intention to adopt OSS in 2013 for Vertical Markets application software and Database Management Systems software.

The quantitative finding described by Internal Politics was supported by qualitative data. For example, Respondent/participant 10224430 remarked, "Highly in favour. The governance of our organization have expressed a desire for OSS." Similarly, respondent/participant 10462926 commented,

> *If appropriate we would use OSS. Wanted to replace Blackboard with Moodle but internal opposition from academics… If the software does what we want, I would try to persuade all concerned it was the appropriate course of action.*

Therefore, this research has supported the existing research which claims that the Internal Politics factor is important to OSS adoption (Haider, 2008, Allen and Ieee, 2010, Pare et al., 2009b).

6.6.2.2.4. Organisational Culture

OSS research has argued, that despite best efforts to organise in a collaborative manner, certain organisations are unable to exploit the collaborative nature of OSS, and has stated, "a traditionally competitive culture negate some of the benefits of using open source licensed products" (Pare et al., 2009a, p4). Furthermore, other OSS research has indicated that driving factors can differ significantly across sub-cultures (i.e. technologists versus others) (van Rooij, 2011). In addition, other OSS research has reported that cultural affinity is an important factor in organisation OSS adoption (Ward and Tao, 2009). So far as the main study was concerned, the Organisational Culture factor was found to be statistically significant (greater than 95% confidence level) for OSS General Business Productivity adoption in 2012, and intention to adopt in 2013 for the same category. Additionally, the same factor was found to be significant to the same confidence level for Development Tools and Programming Tools intention to adopt in 2013.

The quantitative finding described by Organisational Culture was somewhat supported by qualitative data. As previously discussed, respondent/participant 10458184 stated, "Huge savings from collaboration with neighbouring Authorities and wider. Sharing development, resource, training, knowledge, ideas, standardisation, economies of scale (e.g. hosting)." In addition, respondent participant 10116015 stated, "…the best opportunity for OSS is as partnership project across a number of local service providers."

Therefore, this research has supported the existing research which claims that the Organisational Culture factor is important to OSS adoption (Ward and Tao, 2009, Pare et al., 2009b, van Rooij, 2011).

6.6.2.2.5. Friends and Acquaintances

As previously discussed, early TPB research proposed that friends and acquaintances were considered as a factor in planned behaviour (Ajzen and Madden, 1986). IS research has claimed that friends can also be an important factor for potential adopters of technology (Karahanna et al., 1999). However, the same research argued that friends were not a significant factor in terms of continued usage (i.e. adopters) (ibid). So far as the main study was concerned, the Friends and Acquaintances factor was found to be statistically significant (greater than 95% confidence level) for OSS Cross-industry adoption in 2012. The quantitative finding described by Friends & Acquaintances was not supported by qualitative data.

Therefore, this research has supported the existing research which claims that the Friends and Acquaintances factor is important to OSS adoption (Karahanna et al., 1999).

6.6.2.2.6. Customers

As previously discussed, IS research has found that customer support for adoption of innovation can be a significant factor (Jeyaraj et al., 2006). Other IS research has postulated for a special case of organisational adoption, known as inter-organisational IS adoption (IOIS) in which customer influence is key, and has stated, "there is a need for 'alignment' between the vision of one powerful customer and several 'obedient' suppliers that subsequently influences the structure and functionality of the IOIS" (Lyytinen and Damsgaard, 2011, p497). Furthermore, OSS research has identified that certain customers have adopted accreditation criteria which can effectively exclude OSS, and quoted a respondent who stated, "Vendors have to demonstrate that their solutions are capable of functioning on our existing network infrastructure ... so for open source software this gets to be a bit complicated" (Pare et al., 2009a, p5). So far as the main study was concerned, the Customers factor was found to be statistically significant (greater than 95% confidence level) for OSS Cross-industry application software category adoption in 2012. However, the quantitative finding described by Customers was not supported by qualitative data.

Therefore, this study has supported the existing research which claims that the Customers factor is important to OSS adoption (Lyytinen and Damsgaard, 2011, Pare et al., 2009b).

6.6.2.2.7. The Media (i.e. broadcast, trade or web)

IS research has claimed that OSS has attracted 'enormous media attention' (Fitzgerald and Agerfalk, 2005). Furthermore, OSS research has suggested that, "Information [provided via the media] can influence the normative beliefs of decision-makers associated with OSS use" (Macredie and Mijinyawa, 2011, p240). So far as the main study was concerned, the Media factor was found to be statistically significant (greater than 95% confidence level) for the OSS Network Systems software category for both adoption in 2012 and intention to adopt in 2013. The quantitative finding described by the Media factor was not supported by qualitative data.

Therefore, this research has supported the existing research which claims that The Media factor is important to OSS adoption (Fitzgerald and Agerfalk, 2005, Macredie and Mijinyawa, 2011).

6.6.2.3. Perceived Behavioural Control Factors Associated with Various Software Categories Adoption and Intention to Adopt OSS

6.6.2.3.1. Professionalism of the IT Department (Generic)

As previously discussed, IS research has identified professionalism of the IT department as a promising factor for predicting adoption of technology, has called for more research and defined it as, "Education, expertise, skills, and related knowledge of IS employees" (Jeyaraj et al., 2006, Variables Appendix). So far as the main study was concerned, the Professionalism of the IT Department factor was found to be statistically significant (greater than 95% confidence level) for the OSS Database Management System software category adoption of OSS in 2012.

The quantitative finding described by Professionalism of the IT Department was somewhat supported by the qualitative data. Respondent/participant 10070892 stated, "I require access to relevant and affordable skillsets (either in-house or via a 3rd party) to develop and support OSS." Respondent/participant 10225431 stated, "[OSS] becomes important when I have the in house skills to modify software but this isn't often".

Therefore, this research has supported existing research which claims that the Professionalism of the IT Department is an important factor for adoption of innovation (Jeyaraj et al., 2006).

6.6.2.3.2. Unacceptable License Terms

As previously discussed, OSS research has identified unacceptable license terms as an important factor in OSS adoption, and stated,

> *Many OSS applications are distributed under very restrictive license terms that limit users' ability to commercialize the software (i.e. copyleft provision) or to combine the software with other OSS applications distributed under less restrictive licenses (i.e. viral provision) (Gwebu and Wang, 2011, p222).*

Furthermore, other OSS research has pointed out a number of challenges in relation to license terms, which include,

> *Intellectual property (IP) and legal issues (i) Study of IP policy, resolution of IP, and ownership of IP with regards to OSS developed and procured by [the organisation], (ii) Identification of relevant IP knowledge and risks specific to [the organisation] (iii) Study of IP issues with OSS in government agencies" (Haider, 2008, p65).*

So far as the main study was concerned, the Unacceptable License Terms factor was found to be statistically significant (greater than 95% confidence level) for OSS Operating Systems and Network Systems software category adoption in 2012. The quantitative finding described by Unacceptable License Terms was not supported by qualitative data.

Therefore, this research has supported the existing research which claims that the Unacceptable License Terms factor is important for OSS adoption (Gwebu and Wang, 2011, Haider, 2008).

6.6.2.3.3. Set of Standards (which specify a proprietary alternative)

OSS research has argued that the presence of organisational standards may be an important factor in the adoption of OSS, and stated,

> *In certain sectors which are highly regulated and where interoperability may be paramount, policies may exist in relation to IT infrastructure. Thus, a particular proprietary software application may … appear to offer a de facto [or de jure] standard… certain standard architectures may exist which software packages in that industry must comply with (Glynn et al., 2005, p226).*

So far as the main study was concerned, the Standards Specifying PS factor was found to be statistically significant (greater than 95% confidence level) for OSS Operating Systems software category adoption in 2012. Similarly, the same factor was found to be statistically significant (greater than 99% confidence level) for OSS Vertical Markets intention to adopt in 2013.

The quantitative finding of described by Proprietary Standards was somewhat supported by qualitative data. Respondent/participant 10116015 commented,

> *OSS needs a critical mass within a local authority market sector to succeed. I previously referenced GIS [Geographic Information Systems] and this has now happened in that sector with OSS taking the lead in innovation but most of the other sectors of local government business are effectively controlled by just four large suppliers who have no interest in allowing OSS take over (Northgate, Capita, Civica and Idox).*

Therefore, this research has supported existing research which claims that the Proprietary Standards factor is important to OSS adoption (Glynn et al., 2005).

6.6.3. OSS Adoption (by ITG Stage)

Table 6.11 details the self-reported factors identified as associated with OSS adoption across self-reported stages of organisational adoption in the main study. This shows that a different, and greater number, of driving and inhibiting factors were found be of statistical significance for different stages of software adoption with various degrees of confidence levels. For example, the highest confidence levels (greater than 99.5%) were found for this main study for; Organisation is an Active OSS User as a driving factor from the perceived behavioural control construct in the Initiation Stage (and beyond) category. Other driving factors of the same 99.5% confidence level in the Development Stage (and beyond) category were found to be; Productivity and Security driving factors from the attitude construct, Success Stories and Organisational Culture from the subjective norm construct. Similarly; Category Killer (attitude construct), The Media (subjective norm) and Organisation is an Active OSS User (perceived behavioural control) were also found to be driving factors at the 99.5% confidence level in the Management Stage (and beyond) category. Finally, only The Media was found to be greater than 99.5% confidence level as a driving factor in the Approval Stage (and beyond) category. All of the factors described in Table 6.11 were discussed in the previous section with the exception of those which follow.

Table 6.11: Driving and Inhibiting Factors Associated with OSS Adoption (by ITG Stage)

Question	Construct, Factor (+ve/-ve)	IT Governance Stage			
		Initiation Stage (and beyond)	Development Stage (and Beyond)	Management Stage (and Beyond)	Approval Stage (and Beyond)
	Attitude Factors				
17	Productivity (+ve)	*0.03702	***0.002342		
18	Category Killer (+ve)			***0.003078	*0.004148
20a	Security (+ve)	**0.006885	***0.0004063	**0.006775	*0.01941
20b	Cost (+ve)		**0.006428		
20c	Quality (+ve)		*0.01046		
20d	Flexibility (+ve)		*0.04186		
20f	Relative Advantage (+ve)		*0.01649		
20g	Job Performance i.e. Usefulness (+ve)		*0.03689		
20h	Transparency (+ve)		*0.03689		
20j	Freedom to modify (+ve)		*0.01666		
20l	Knowledge Creation (+ve)		*0.02130	*0.04324	
20p	Ideological Compatibility (+ve)		*0.04598		*0.02989
21a	Unsustainable business model (-ve)		*0.03588	**0.007071	**0.006555
21b	Second Best Perception (-ve)	*0.03702			
21f	Questionable return (-ve)	*0.02105	*0.01838	*0.01884	*0.02508
	Subjective Norm Factors				
23a	Other OSS adopters (reported) (+ve)		*0.02213		
23b	Success stories (+ve)		***0.002455		
23c	OSS contributors (reported) (+ve)		*0.04502		
24b	Network Effects (+ve)			*0.03554	*0.02883
24e	Organisational Culture (+ve)	*0.01907	***0.0007612	*0.02017	**0.006744
25b	OSS contributors (influence) (+ve)	*0.03221	*0.01838		
25d	Colleageus (in IT) (+ve)	*0.03691	*0.005089		
25g	Third Party Partners (+ve)			*0.03598	*0.01978
25i	Customers (+ve)			*0.03598	*0.01978
25k	The media (broadcast, trade press etc) (+ve)		*0.01450	***0.003451	***0.001248
	Perceived Behavioural Control Factors				
27	Ease of implementation (+ve)		*0.04632	*0.03290	**0.007757
30d	Complexity (-ve)			*0.03877	
32	Prior implementation (+ve)		*0.0107	*0.002797	**0.006744
33	Organisation active OSS user (+ve)	***0.003007	***0.0003358	***0.001355	*0.01462

Key: **p>=0.05 (No statistical significance)**
***p<0.05**
****p<0.01**
*****p<0.005**

6.6.3.1. *Attitudes Identified as Associated with OSS Adoption of Various Stages*

6.6.3.1.1. Category Killer

As discussed in the pilot study, managers responsible for software selection in organisations face challenges in determining technologies which are mature and which are least likely to be ‘orphaned’ or abandoned by their manufacturers which can lead to a costly, unplanned switching exercise possibly at short-notice (e.g. OS/2) (Dedrick and West, 2003, Cavusoglu et al., 2010). The phrase “category killer” refers to a product status as being such a dominant innovation as to warrant being the only technology worth considering. IS research has claimed that OSS has achieved this status in certain horizontal domains such as operating systems (i.e. Linux), web servers (i.e. Apache) and mail servers (i.e. Sendmail) (Ven et al., 2008). So far as this main study was concerned, Category Killer as a driving factor was found to be significant (greater than 99.5% confidence level) for the Management Stage (and beyond) and also (greater than 95% confidence level) for the Approval Stage (and beyond). The quantitative finding factor described by Category Killer was not supported by the qualitative data.

Therefore, this research has supported the existing research which claims that the Category Killer factor is important to OSS adoption (Dedrick and West, 2003, Cavusoglu et al., 2010).

6.6.3.1.2. Cost

As discussed in the Literature Review Chapter, OSS research has cited reduced cost (primarily through the avoidance of PS licenses) as a driver in the adoption of OSS (Gwebu and Wang, 2011). For example, in the application software category in the Enterprise Resource Planning (ERP) area, reduced cost has been claimed as a driving factor in OSS adoption (Bueno and Gallego, 2010). Other research has argued that reduced cost (through lower development costs) is an important factor in the adoption of OSS (Vitharana et al., 2010). Other research has linked OSS, and its adherence to open standards, with the question of software affordability (Casson and Ryan, 2006). However, other OSS research has questioned whether OSS offers net cost savings, when other considerations are taken into account, such as data migration costs, switching costs, retraining and so forth (Ven et al., 2008). So far as the main study was concerned, Cost as a driving factor was found to be statistically significant (greater than 99% confidence level) for the Development Stage (and beyond).

The quantitative finding described by Cost was supported by the qualitative data. For instance, Respondent/Participant 10071006 stated, "Primarily cost driven and a means to save money on MS Office Licences… Reduced costs whilst still allowing users to do their jobs with fit for purpose tools". In addition, Respondent/Participant 10224700, "Attractive for licence cost reduction however implementation and integration costs would be a barrier". Furthermore, Respondent/Participant 10458184 stated, "Huge savings from collaboration with neighbouring [government] Authorities and wider." However, this finding was refuted by others. For example, Respondent/Participant 10226395, "There is a false perception that OSS is free, which disregards the time involved in coming to learn about it and (often) creating your own support and training materials". Additionally, Respondent/Participant 10480490 stated, "Open Source Software will remain low as barriers around the cost of support will be prohibitively expensive".

Therefore, this research has supported existing research which has claimed that the Cost factor is important to OSS adoption (Bueno and Gallego, 2010).

6.6.3.1.3. Flexibility

IS research has reported that flexibility is an important driving factor in the adoption of OSS (Bueno and Gallego, 2010, Gallego et al., 2008, Gwebu and Wang, 2011, Haider, 2008) and a core freedom associated with the principles of the FSF and the OSI (Lundell et al., 2010a). Other OSS research has found that the ability to customise OSS was also an important factor for some organisations (Ven et al., 2008). Furthermore, OSS research in field of software development, has cited flexibility has a key factor in the adoption of OSS (Vitharana et al., 2010). In terms of the main study, the Flexibility factor was found to be of statistical significance (greater than 95% confidence level) for Development Stage (and beyond) of OSS adoption.

The quantitative finding described by Flexibility as a driving factor in OSS adoption was somewhat supported by the qualitative data. For example, Respondent/Participant 10224550 stated, "…There is potential for an OSS implementation to spawn other similar OSS implementations as part of a wider strategy which embraces flexibility while reducing software cost." In addition, Respondent/Participant 10224146, "… [OSS] solution acceptance on the basis that it can't possibly be as good as the high cost alternative and so will be tolerated … until enough funds exist to replace it with an expensive, less flexible, probably less functional, but branded alternative."

Therefore, this research has supported the existing research which claims that the Flexibility factor is important to OSS adoption (Bueno and Gallego, 2010, Gallego et al., 2008, Gwebu and Wang, 2011, Haider, 2008).

6.6.3.1.4. Relative Advantage

As previously discussed, OSS research has described DoI as being foundational to much adoption and usage research, and has described technology characteristics; such as, "relative advantage…", as key influencers in adoption decisions (Dedrick and West, 2003). See Diffusion of Innovation Section 2.3.5.1, Page 78. IS research has defined relative advantage as, "The degree to which an innovation is perceived as being better than its precursor", and has argued that it is an important predictor in an individual's intention to adoption an innovation (Jeyaraj et al., 2006, Variables Appendix). The concept was originally derived from DoI theoretical constructs (Rogers, 2003). So far as the main study was concerned, the Relative Advantage factor was found to be statistically significant (greater than 95% confidence level) for OSS adoption at the Development Stage (and Beyond). The quantitative finding described by Relative Advantage as a driving factor was somewhat supported by the qualitative data. See Respondent/Participant 10224146 comment in the section above.

Therefore, this research has supported the existing research which claims that the Relative Advantage factor is important to OSS adoption (Dedrick and West, 2003).

6.6.3.1.5. Knowledge Creation

As discussed in the Literature Review Chapter, IS research has claimed that OSS offers other advantages, "OSS, when compared to closed source development, has manifested in lower development costs, higher quality, greater freedom for participants, enhanced knowledge creation, and greater creativity and innovation" (Vitharana et al., 2010). In terms of the main study, the Knowledge Creation factor was found to be statistically significant (greater than 95% confidence level) for both the Development Stage (and beyond) and the Management

Stage (and beyond). The quantitative finding described by Knowledge Creation was not explicitly supported by the qualitative data.

Therefore, this research has supported the existing research which claims that the Knowledge Creation factor is important to OSS adoption (Vitharana et al., 2010).

6.6.3.1.6. Ideological Compatibility

OSS research has suggested that ideology can be an important factor in OSS adoption and has stated that (Ven and Verelst, 2008). Similarly, it has been claimed that, "Personal support for OSS ideology was also found to be an equally important variable" (Glynn et al., 2005, p231). However, other OSS research has found that, "adherence to some ideological components was beneficial to the effectiveness of the team in terms of attracting and retaining input, but detrimental to the output of the team" (Stewart and Gosain, 2006, p291). So far as the main study is concerned, the Ideological Compatibility factor was found to be statistically significant (greater than 95% confidence level) for the Development Stage (and Beyond) and the Approval Stage (and Beyond) in terms of OSS adoption.

The quantitative finding described by Ideological Compatibility was somewhat rejected by the qualitative data. For example, Respondent/Participant 10225431 stated, "OSS religion is not a concern to me. OSS is just a different set of parameters when selecting software: cost, risk, rewards."

Therefore, this research has largely supported the existing research which claims that the Ideology Compatibility factor is important to OSS adoption (Glynn et al., 2005, Stewart et al., 2006).

6.6.3.2. ***Subjective Norm Identified as Associated with OSS Adoption of Various Stages***

6.6.3.2.1. Others' Reported Adoption of OSS

As previously discussed in the Literature Review Chapter, IS research has concluded that the success of OSS communities is partially a function of a driving force known as network cohesion, described as, "attracting and retaining a critical mass of users" (Toral et al., 2009, p382). Other IS research has reported that peer group behaviour is an important factor in OSS adoption, and stated, "One firm argued that they had not adopted because other nearby firms had rejected open source software. This suggests that, for at least some managers, peer information networks are significant" (Goode, 2005, p675). So far as the main study was concerned, the Others' Reported Adoption factor was found to be statistically significant (greater than 95% confidence level) for OSS adoption at the Development Stage (and beyond).

The quantitative finding described by Others Reported Adoption of OSS was somewhat supported by the qualitative data. For example, Respondent/Participant 10116015 stated,

> *Currently within the local government software market there are limited opportunities to invest in OSS. GIS [Geographical Information Systems] is one area that we are currently changing to OSS. We would like to adopt more OSS but it is hard in the local government market. We are not big enough to do our own thing so have to rely on a solution having gained enough momentum to be acceptable. We do not work in isolation so the best opportunity for OSS is as partnership project across a number of local service providers.*

Therefore, this research has supported existing research which claims that the Others' Reported Adoption of OSS factor is important to OSS adoption (Toral et al., 2009, Goode, 2005).

6.6.3.2.2. Third Party Partners

As previously discussed in the Literature Review Chapter, IS research has established, via meta-analysis, that external pressure (e.g. 'imposition by partners') is one of the best predictors of IT adoption (Jeyaraj et al., 2006). Furthermore, OSS research has found that the cohesion and structure of networks is important to the success of OSS communities (Toral et al., 2009). In addition, OSS research has argued that an organisation's ability to, "access a value network of 'complementors' is crucial for effective value creation and capture [of OSS]" (Morgan et al., 2012). So far as the main study was concerned, the Third Party Partners factor was found to be of statistical significance (greater than 95% confidence level) for OSS adoption at the Management Stage (and beyond).

The quantitative finding described by Third Party Partners was somewhat supported by the qualitative data. For example, Respondent/Participant 10112936 stated, "Lack of support by business system vendors (eg. Capita, Northgate, Civica) is preventing wider adoption of OSS within my organisation." In addition, Respondent/Participant 10116015 stated, "... most of the other sectors of local government business are effectively controlled by just four large suppliers who have no interest in allowing OSS take over (Northgate, Capita, Civica and Idox)". Finally, Respondent/Participant 10225715 stated, "Won't happen... all our systems are QAd [quality assured] against Microsoft".

Therefore, this research has supported the existing research which claims that the Third Party Partners factor is important to OSS adoption (Toral et al., 2009, Morgan et al., 2012).

6.6.3.3. *Perceived Behavioural Control Identified as Associated with OSS Adoption of Various Stages*

6.6.3.3.1. Complexity

DoI research has argued that complexity can be an important factor in adoption of technology (Rogers, 2003). IS research has defined complexity as, "The degree to which an innovation is perceived as relatively difficult to understand and use" (Jeyaraj et al., 2006). IS research has argued that complexity is a relevant factor in OSS adoption and argued that,

> *…complexity factors will have a negative influence … towards the use of an OSS. The 'complexity' construct may be used in an exploratory way and is suitable for exploring innovation-related risks and challenges in using an OSS (Macredie and Mijinyawa, 2011).*

So far as the main study was concerned, the Complexity factor was found to be statistically significant (greater than 95% confidence level) for the Management Stage (and Beyond) for OSS adoption. The quantitative finding described by Complexity was not supported or rejected by the qualitative data.

Therefore, this research has supported the existing research which claims that the Complexity factor is important to OSS adoption (Macredie and Mijinyawa, 2011).

6.7. Summary

This chapter has evaluated the research findings against certain criteria published in the existing IS research which is of particular relevance to mixed-methods research such as this. The research findings were then discussed in the context of the existing IS/OSS research.

As discussed, IS research has defined complementary mixed-methods research as, "Mixed methods are used in order to gain complementary views about the same phenomena or relationships" (Venkatesh et al., 2013), and has defined scholarly precedent in which closed questions (yielding quantitative data) and open questions (yielding qualitative data) were used in a survey instrument, (Jinwei et al., 2006) cited in (Venkatesh et al., 2013). This chapter has evaluated the findings and rigorously tested the results showing some of the strengths and limitations in both approaches.

In terms of strengths, it was found via binomial logistic regression analysis, that a reasonably high level of internal validity or predictive capability was achieved across the various models tested. These models successfully identified a relatively parsimonious series of statistically significant driving and inhibiting factors which predicted various organisational OSS adoption behaviour in the manner described. Specifically, this was considered valuable to management intervention in operational settings, where it would be important to eliminate variables of little or no impact. Furthermore, via the three confidence levels (i.e. 95%, 99% and 99.5%) of the various factors established as significant, this was considered to be of additional practical value.

In terms of limitations, it was found that although the qualitative data contributed significantly in terms of richness and depth of findings, there was shown to be limited predictive capability by augmenting quantitatively established models with qualitatively established factors. However, in an operational setting it was considered that richer qualitative data would prove important to managers in need of more insightful descriptions of the driving and inhibiting forces at play, as well as that which was shown to be statistically significant.

Having evaluated the various findings the next chapter will reflect on the overall research project from a variety of practical and philosophical perspectives relevant to this research.

Chapter 7: Reflections and Reflexivity

7.1. Introduction

As the researcher conducting this research is seeking a DBA, part of the requirements involve providing a reflection of the work in terms of practice. In this chapter, this is provided along with some theoretical preferences being used to support the views. De Vaujany et al. (2011) have described a paucity of reflexivity in the IS field, and have specifically drawn reference to a post-modern perspective:

> *The exercise of reflexivity through the process of writing is rare… [However, post-modernism] values the reflexive-self and the co-production of social science… [and regards research studies as] speech acts oriented to reproduce wider social conventions in language usage… displays, theatre, stories, fictional ethnography… (de Vaujany et al., 2011).*

This chapter is intended to be a contribution to the author's reflexive learning as part of this research. It describes some relevant aspects of the author's education, work and research experience. In order to be reflexive (or be able to reflect) it is necessary to have something to reflect upon. With this in mind the author has written some reflective accounts, within this chapter, intended to provide such a suitable reflexive framework. To further aid the reader the author has expressed these as opinions and experiences in the first person and in italics, as though excerpts from a journal or diary:

> *Hello world. (I am the author reflecting in the first person and italics).*

This is distinguished from the text written in a more traditional scholarly way, which happens to be the way in which the rest of the dissertation has been written. That is, in the main text, the author has chosen to write in a more discursive style, in the third person in normal font.

Reflexivity has been described as a multi-voicing practice in which there is a focus on, "... the authorial identity of the field worker and their relation to the 'Other', i.e. the research subject..." (Alvesson et al., 2008). There are three practices associated with it. Firstly, "the researcher is recognized as part of the research project, a subject just like any other that is constructed in and through the research". Secondly, "...it is incumbent on the researcher to declare the authorial personality – to present the details of their particular experiences and interests". Finally, "By being more creative and experimental in writing, researchers can bridge the gulf between self and other..." (Alvesson et al., 2008).

In the first instance, this chapter has been constructed with the aforementioned reflective writing structure to illustrate something of the author's motivation for this research. Secondly, the reflective writing will be selected to show the authors preferences based on prior experiences. Finally, through the structure of this chapter the author will show both short-comings and new research possibilities.

However, it is also important to strike a balance between highlighting the relevant background of the writer's perspective and the risk of producing distractingly personal narrative. Such self-indulgent and auto-biographical writing can distract from the "subjective other" and the research itself (Rhodes and Brown, 2005, Johnson and Duberley, 2000). As an example, the following excerpt is provided.

> *My Dad, a dispatch foreman, worked for the same engineering firm for 35 years. Determined that I should get every advantage in life he encouraged me in education. Mum & Dad provided my brother and I with enough praise and reward to get through 'O' levels, 'A' levels at further-education college and university. I studied Mathematics at college and Physics at university. I was one of only two in my year at secondary school who went to university. The 35 year career is now rare and in my profession (sales) it is practically unheard of. Some years ago a colleague remarked to me, "Take all the training that they [management] throw at you. It's one*

thing they can never take away!" He went on to do an MBA, as did I (part-time). Some years later, having missed part-time study, I also enrolled on the current research course (DBA).

Whether or not this piece is over-indulgent is for the reader to decide. By way of explanation, as a short *self-reflective* text it serves a purpose: the author has now been introduced in a more substantial way than he would otherwise and the reader knows something of his inspiration, motivation and history in business and education. However, there are fundamental differences between *reflection* and *reflexivity*. That is, the former subscribes to the modernist view that an original exists and it is the observer's primary concern to simplify experiences with a view to, "uncover patterns, logic and order" (Cunliffe, 2002). It is argued that *reflexivity* deliberately 'problematizes' an experience. This is achieved by, "exposing contradictions, doubts, dilemmas and [importantly] alternative possibilities" (Cunliffe, 2002). The *reflection-reflexivity* distinction is an important one, as will be shown, the origins of which relate to epistemological factors (i.e. the nature of knowledge).

The author, and researcher, was apparently unaware of the epistemological tradition in which his education had been provided. As will be described later in this chapter, the alternatives struck him as a revelation in doctoral study. A physics degree is commonly associated with the positivist and empirical traditions. It has also been suggested that quantification (commonly associated with positivist traditions) is somewhat flawed in the social sciences (Alvesson, 1996). In other words, the author had a preference for quantification as a result of his science and technology background, and was largely unaware of any intellectual alternatives. This chapter will show how the author was motivated and sought to address these short-comings in this research.

The author was generally encouraged in education and when it was possible to be sponsored for a part-time Masters of Business Administration (MBA) the offer was taken. Increased demand for MBAs has led to increased class sizes and graduation numbers (Currie and

Knights, 2003). As part of the MBA pedagogy students have been trained to, "challenge and open frameworks to critical scrutiny" referred to as *critical management learning* (Currie and Knights, 2003). However, in the author's experience, a combination of lack of time and the volume of material presented meant that there was relatively little opportunity for questioning the frameworks delivered and inevitably no time (or perhaps necessity) for exploring the foundations on which they were built. In reflexivity, writers should endeavour to consider different perspectives and "explore the different ways in which a phenomenon can be understood" (Alvesson et al., 2008). There are also similar time constraints on the DBA, however as will be shown, the course appears to be designed specifically to question such aspects of research and practice.

As will be discussed, the author identifies reflexivity as one of the core approaches incorporated into the DBA course. As an MBA graduate, the author has noted some similarities with this approach and Argyris' *double-loop learning* (Argyris, 1977). In both, organisations or individuals are required to question the assumptions on which a particular course of action was based. However, the author will show that reflection and reflexivity has developed into a multi-faceted approach. In this context, straight forward reflection or questioning assumptions does not grasp the level of practical and philosophical complexity in research terms (e.g. methodological or epistemological perspectives).

Weber (2003) has argued that reflexive approaches should incorporate (a) Meta-theoretical Reflexivity, which is regarded as, "Broad, general ideas that we hold about the world" (2003, pvi), (b) Theoretical Reflexivity, which is regarded as, "A particular kind of representation of some phenomenon in the world" (2003, pvii) (c) Research Method Reflexivity, which is regarded as the lens with properties, which may prove most meaningful to the phenomena under research (2003, pix) and (d) Interpretation Reflexivity, which is regarded as, "… [awareness] of the assumptions and biases that underlie data, text and analysis… [which] will juxtapose interpretations to achieve new insight" (Weber, 2003, px).

With this in mind, the author has selected some summary accounts derived from the DBA programme, and before, for the reader's consideration. These include (a) the Author's Curriculum Vitae (b) An extract from the Registration stage of this research (c) Description of Conceptual Model from the second progression stage of this research (d) Summary of Research Decisions from the Introduction chapter of this research and (e) Mixed-methods Research Findings from the Main Study findings chapter of this research. These accounts were selected since they illustrate the reflexive subject matter in hand and the key stages throughout the research project. The paper will show that even approaches associated with wholly empirical techniques can be considered reflexively to improve insight and understanding; and not just on a technical level.

In this chapter the author has sought to review key points of this research project, not simply to expose oversights or limitations, but to illuminate new research possibilities. This is achieved by considering a combination of epistemological, ontological and reflexive concepts as encountered in his education, work and research experience to date.

7.2. Meta-theoretical Reflexivity

As previously discussed, Weber (2003) has defined Meta-theoretical Reflexivity as exploring, "Broad, general ideas that we hold about the world" (Weber, 2003). Similarly, it has been argued that, "we cannot eradicate our subjective meta-theoretical commitments - we must open them to inspection through our capacity for reflexivity" (Johnson and Duberley, 2003). The following section aims to further introduce the author, in his capacity as the researcher. This way the reader can judge and assess his perspectives and preferences in the aforementioned manner. The author's CV has been summarised as follows with the emphasis on certain meta-theoretical preferences.

7.2.1. The Author's Curriculum Vitae

My CV shows 24 years' experience in the IT industry and that most of the positions I have held have been sales or business development with the exception of several years running my own business (which predominantly involved selling). My CV illustrates some of the enthusiasm for education my Mum & Dad instilled in me. Of the aforementioned 24 years, 9 years have been spent enrolled in part-time higher education. The CV also shows common threads: from secondary school and technical college emphasis on technology and numerate subjects, a Physics first degree (following the theme of the numerate subjects), MBA second degree (following two business ventures) and the current DBA programme. In my MBA, a significant experience, I expected to be provided with management tools to improve my performance. The most important that I can recall was learning to develop a discounted cash flow (DCF) analysis: the financial manager's language or appraisal tool for projects. I recall, as a salesman, I thought I had been given the key for winning business. I could apply what my company's products and services would mean in financial terms and bingo, the project would either fly or not. However, there are also times when this does not produce the desired result. Perhaps there are conflicting priorities, hidden agendas, missing data or anything for that matter of significance that does not rationalise so well to a series of annualised cash flows. The tools of financial management are important but they are not the whole story. Nonetheless, this was an exciting tool for a salesman and here's why. I am unencumbered with the burdens of accuracy and objectivity of a professional financial or project manager. I have license to claim my own naïve, unsophisticated and biased business case. I have nothing more than the intention to disrupt or "prick the conscience" of those responsible, and negotiate what this means to the various stakeholders. From the relative safety of my "relativist" stance I am simply seeking agreement for initiating a project, and perhaps making a sale.

It has been argued that researchers should avoid over-indulgent reflexive accounts which may detract from the subject matter (Johnson and Duberley, 2003). Whether or not this text is to be viewed as such is again for the reader to decide. The author's business and educational background has now been further placed, and by the end of this section, the reader will be more familiar with the author's 'meta-theoretical preferences' (Weber, 2003, Johnson and Duberley, 2003).

It has been claimed that there has been an over-reliance on 'quantification' in the social sciences, in so much as, "The rich variety and diversity of the social world is suppressed for the sake of fitting procedures that give the impression of objectivity" (Alvesson, 1996, p461). The above text is evidence of the author's conceptual understanding of the persuasiveness of facts and figures (i.e. introducing a sense of objectivity), but equal emphasis on the need to enrol stakeholders in a proposed course of action (i.e. an appreciation of subjectivity). In this sense, as will now be shown, the text above has met this level of meta-theoretical reflexivity.

As the author has chosen to highlight his MBA experience and problematize some quantitative assessments therein, it is appropriate to draw on management learning pedagogy. Management learning has been described in three distinct levels or practices. Firstly, 'disciplinary' management learning, defined by, "... acquisition of a body of knowledge 'about' management education, rather than 'for' management" (Watson, 1993 cited in Currie and Knights, 2003, p30). Secondly, 'Staff Development' management learning which provides a, "… balance between the educational and the practical... rather than just the acquisition of the 'facts', learning incorporates the social processes and even interpersonal emotional aspects" (Grey et al., 1996, cited in Currie and Knights, 2003, p31). Finally, 'critical' management learning, defined by, "...the work and non-work experiences... to problematize rather than simply validate [theory]... a concern to reflect critically on such knowledge in order to understand... social, political, economic and moral practice" (Grey et al., 1996, cited in Currie and Knights, 2003, p31).

In the first disciplinary sense, the author has described how he acquired knowledge and skill in developing a DCF analysis for the purposes of project appraisal, which would suggest a preference for quantitative analysis. In the second developmental sense, he has described how such analysis can be useful in persuading and enrolling others in a particular course of action. Finally, in the critical sense, the author has (a) "problematized" his own quantitative meta-theoretical preference and described how, through any number of reasons, the results may be unexpected and (b) presented his own "relativist stance" or subjectivity as a virtue in order to disrupt the status quo and achieve a purpose (i.e. the possibility of a sale). So far as this research is concerned, with respect to meta-theoretical reflexivity, the reader is more aware of the author's worldview and his awareness of strengths and limitations of quantitative analyses.

7.2.2. Open Source Software – Research Registration

> *One of the first milestones in doctoral study is registration, I read a lot of research papers and then I wrote, "Open Source Software (OSS) is a form of distributed innovation (Kogut and Metiu, 2001) primarily in the field of information systems (IS). As a result of this innovation potentially millions of developers can contribute to the design, coding and refinement of computer software using existing intellectual property laws to assert the right to do so. OSS development principles have also been described as being in the tradition of academic discourse (Dedrick and West, 2003). The number of academic journal articles written about Open Source from various disciplines has grown consistently from mid-1990s to around 1200 per year by 2008 (ISI Web of Knowledge 2009). As OSS awareness has grown, organisations are also considering OSS as an important innovation to adopt. In industry, managers' report a 54% intention to adopt OSS technologies (Sen, 2007). Despite this, the actual organisational adoption of OSS applications remains surprisingly low (Goode, 2005). OSS has been credited with the potential to harness the creative intelligence of*

millions, neutralising allegedly overbearing intellectual property laws and even the promise of offering economic parity with developing countries (Kogut and Metiu, 2001). In view of such forecasts from industry, and outstanding academic acclaim, what is responsible for this lack of organisational OSS adoption? The aim of this research is to investigate the drivers and inhibitors to adoption of OSS, from the perspective of managers, by utilising predominant adoption and usage theories (Venkatesh et al., 2003)". I was pleased to arrive at a research problem, which was considered to have some academic merit and looked forward to the journey ahead.

The author has introduced a summary of his research project, which formed part of his registration for this course, with a view to applying some of the principles discussed in this chapter. This will illustrate some elements of *reflection* and *reflexivity* in the context of this particular description of the early stages of this research.

It has been argued that there are important differences between 'reflection' and 'reflexivity', "Reflection is traditionally defined as mirror image… a systematic thought process concerned with simplifying experience by searching for patterns, logic and order, [whereas] reflexivity means 'complexifying' thinking or experience by exposing contradictions, doubt, dilemmas and possibilities" (Chia, 1996b, cited in Cunliffe, 2002, p38). So far as this research is concerned, in the text the author has accurately represented: a phenomenon (i.e. OSS), the increasing interest and acclaim, a research problem (i.e. despite the acclaim, why haven't organisations used it?) and some theories that ostensibly have the potential to help investigate this problem (i.e. Ajzen's TPB). Therefore, by this definition, the text serves as a 'reflection' or reflective account of the author's intentions or plans at a particular moment in time which happens to be relatively early in this research project.

In reflexive terms, the above text is an *a priori* narrative, and completely lacks any apparent reference to the experience of the researcher, which has therefore denied any expression of 'reflexive doubt' (Cunliffe, 2002). For instance, this account could have referred to the author's aforementioned practical experience in sales and the motivation to investigate this allegedly free (or near-free) resource juxtaposed with its apparent lack of organisational adoption. Therefore, by the above definition the above text meets the description of a reflective account and illustrates some meta-theoretical preferences. On the other hand, as a reflexive exercise the text in its current form, falls short by the above reflexive definition. However owing to the structure of this chapter, as will now be shown, reflexivity is at hand.

Deconstructive or Hyper-reflexivity can be described as, "Relativism, for example Post Modernism…", the purpose of which is to, "…display and overturn constructive processes so as to invoke temporary alternative voices" (Johnson and Duberley, 2003, p1293, Table 1). It perhaps goes without saying, that in the previous paragraph (a commentary in the third person, in the main body and above) about the text in hand (a narrative in the first person, in italics and the preceding paragraph), is in itself (by the definition therein) a reflexive account. The paragraph now being read (by the aforementioned hyper-reflexive definition) is therefore hyper-reflexive. That is to say, by virtue of reflexive structure of these three paragraphs, the author (in the first and third person combined), has collaborated to provide new meta-theoretical background for the benefit of the reader.

Specifically, in terms of the author's professional interest in this research area and the now explicit meta-theoretical commitments which he has brought with him. Put another way, the author has been in sales nearly all his professional career and he is intrigued as to why, when presented with a free (or near-free) alternative to high-value PS (i.e. OSS) - organisations do not use it. As far as the hyper-reflexive nature of these paragraphs is concerned, organisational research has cautioned researchers about post-modernism and its capacity to alienate and confuse. "Pomo [Post-modernism] - and its ambiguities and slipperiness – may finish off any author, and any reader, at least me" (Alvesson, 1995, p1071). Therefore, throughout the rest of this chapter and in deference to the reader, 'pomo' and such hyper-reflexivity, will be kept to a suitable minimum.

It has been claimed that there are two other, more accessible and perhaps less 'slippery', reflexivity types: (a) 'Methodological Reflexivity', defined as, "Foundationalism, for example positivism/neo-empiricism" which aims to "nurture and sustain objectivity", and (b) 'Epistemic Reflexivity', "Kantianism, for example Critical Theory" which aims to, "emancipate, by reclaiming control over social, ethical and meta-theoretical subtexts or discourses" (Johnson and Duberley, 2003, p1293, Table I and p1282, Figure 1). For example, in the previous reflective text the author has described how he has selected and intends to use predominant adoption and usage theories. This would suggest, at the time of writing the excerpt, a level of methodological reflexive practice had taken place which is in line with the author's previously highlighted; numerical, scientific and quantitative meta-theoretical preferences. The text also cites scholarly references as to the potential impact of the OSS phenomenon; "…harnessing the creativity of millions", "neutralising [allegedly overbearing] intellectual property laws" and the somewhat radical claim of, "achieving economic parity for developing countries". This would suggest, at the time of writing the excerpt and by the aforementioned definition, a level of epistemic reflexive practice has also taken place.

However, Critical Theory was subsequently excluded from the implementation of the research plan. The Research Methodology Chapter highlighted that Cornford and Smithson (2006) argued against students taking on critical theory approaches unless the researcher possessed a 'strong philosophical background' (Cornford and Smithson, 2006, p60). The decision to follow this guidance perhaps shows that when faced with important research decisions, the author has opted for what he perceives to know best, i.e. his numerical/quantitative meta-theoretical commitments as previously described. It would seem therefore that epistemic reflexivity is not as practically easy to access as it first seems. Put another way, "…theory of knowledge presupposes knowledge of the conditions in which knowledge takes place. This circularity means that we cannot detach ourselves from our meta-theoretical commitments so as to reflexively assess those commitments - indeed we would depend upon them in order to undertake that task." (Johnson and Duberley, 2003, p1281)

It has also been argued that reflexivity demands a constant awareness of the researcher-practitioner's own meta-theoretical commitments and interpretations. "Reflexivity means that the researcher consistently aims at being self-aware of how his or her moves open as well as close interpretative possibilities. Reflection over one's own assumption is crucial. It implies an interpretive, historical, language-sensitive, local, open and non-authoritative understanding of the subject matter" (Alvesson, 1996, p481) However, in the last text the author appears to have used quite an 'authoritarian' voice, that is; quoting facts, citing scholarly argument (on the potential of OSS) and producing literature-grounded theories (i.e. on adoption and usage). This is perhaps in sharp contrast to the former text (regarding the author's MBA experience) in which there is some explicit sensitivity to the interpretive social dynamics of the analysis, which notably strikes more of a balance between authoritarian and relativist perspectives. In reflexive meta-theoretical terms, again when faced with certain important research decisions, at least in planning the early stages of this research, the author has gravitated to objectivity and somewhat eschewed subjectivity.

However, it has been argued that in reflexive practice, the researcher must not ignore their own capacity to interpret. Such 'self-reflexivity' has been described as;

> *... [originating in] both phenomenology and social constructionism... recognising that we shape and are shaped by our social experience, and involves dialogue-with-self about our fundamental assumptions, values and ways of interacting: a questioning of our core beliefs, our understanding of particular events, and how these shape our own and others' responses... we may become responsive to others and open to possibilities for new ways of being and acting (Cunliffe, 2009, p98).*

Additionally, as discussed previously, Weber (2003) has described meta-theoretical reflexivity as, "… broad, general ideas we hold about the world", and more specifically the reflexive researcher will,

> *... formulate and use theory in a way that is sensitive to the phenomena that are their focus, acting aggressively when the phenomena exhibit clear nomothetic properties, and using theory with restraint when the phenomena exhibit clear idiographic properties. They will be pluralistic users of research methods, choosing methods that are well suited to the characteristics of the phenomena they are investigating (Weber, 2003, vii).*

These descriptions of reflexive practice place the emphasis unequivocally on the researcher. As far as this research is concerned, the first text shows evidence that the author has learnt from his experience and has reflexively reflected on that experience to improve understanding. However, the second text is perhaps necessarily more of a plan, produced a priori and in anticipation, which essentially presents a somewhat idealistic road map of how the author would like his research to progress. As such, so far as the early stages of this research are concerned, there was little evidence of meta-theoretical reflexive practice.

7.3. Theoretical Reflexivity

IS Research has described theory as, "A particular kind of representation of some phenomena in the world… which both liberates and constrains research…" (Weber, 2003, vii). The reflexive researcher is someone who, "…use theories in creative, adaptive ways…", "…understands that any one theory provides only a limited view of the world…", and "… are knowledgeable, facile, flexible users of theories" (ibid). In this research, this section will show the extent to which the author has been able to demonstrate this level of reflexive practice, at around the mid-stage of this research (i.e. the second progression).

7.3.1. The Conceptual Framework – Second Progression

> *I was advised by my first progression examiner to augment my contribution to theory in preparation for my second progression. I recall being somewhat disappointed at the time, as I thought I had done enough. My examiner assured me that to follow this*

guidance would be good preparation make the second progression less of a challenge. Therefore, as part of my second progression I wrote, "Existing IS research has developed a wide variety of theories aimed at characterising the salient factors involved in the adoption and usage of a range of technologies. These include The Theory of Planned Behaviour (TPB) (Ajzen, 1991, Ajzen and Madden, 1986) and The Technology Adoption Model (TAM) (Davis, 1989). Benbasat and Barki (2007) have criticised TAM in particular, and its derivatives, for producing little of value by eliciting the salient beliefs for adopting various technologies in an increasing set of scenarios, and have encouraged researchers to explore other aspects of technology adoption, including the development of multi-staged models (Benbasat and Barki, 2007). Adoption and usage theories are largely silent in respect of the direction of the salient beliefs; in terms of drivers toward change (i.e. adoption) and inhibitors to change (i.e. non-adoption). In addition, the existing research offers little guidance with respect to the complex contextual factors of governance associate with IT adoption in organisations. These elements may be considered as shortfalls in IS research which this study aims to address by using a combination of the Theory of Planned Behaviour (TPB) (Ajzen, 1991), Force Field Analysis (FFA) (Cronshaw and McCulloch, 2008) and IT Governance (ITG) (Sambamurthy and Zmud, 1999, Xue et al., 2008) types of approaches. This is important in order to develop a richer understanding of the overriding factors involved in innovation adoption in an organisational context… A conceptual model should communicate and capture the essence of a problem space such that it can be effectively mapped elsewhere and form part of a proposed solution (Avison and Fitzgerald, 2008). In this research, the model has postulated that the organisational adoption of the technology in question (i.e. OSS) will not occur unless and until the factors inhibiting the adoption are overcome by the forces driving adoption (either on aggregate or by the removal or introduction of a single factor). It is important that the model is drawn from the *appropriate theories, techniques and literature so that any resulting artefact can better inform any proposed management intervention, for example, to minimise inhibitors and maximise drivers, or vice versa, as necessary". The figure below illustrates the proposed conceptual model which I presented at this stage of the research.*

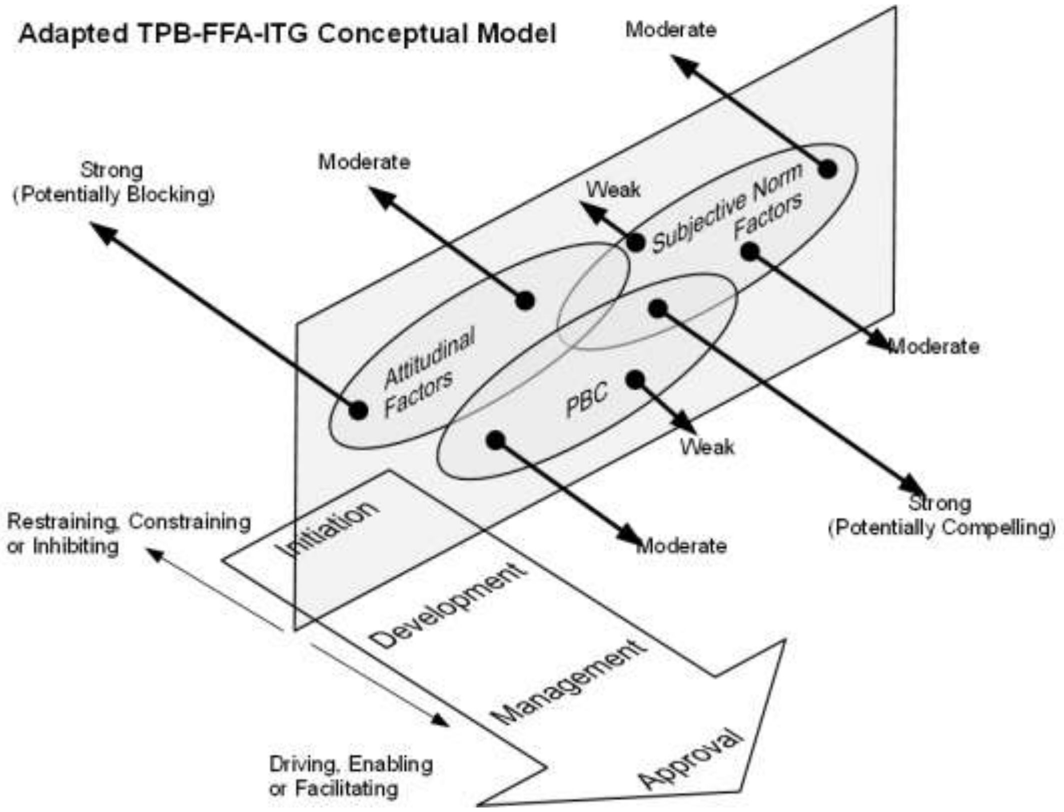


Figure 7.1: Conceptual Model Presented at Second Progression

The author has presented this third text as a direct result of the feedback that he received at his first progression which, according to the previous definition, has made the remainder of this section 'deconstructive' or 'hyper-reflexive'. The purpose of which is to, "… display and overturn constructive processes so as to invoke temporary alternative voices" (Johnson and Duberley, 2003). However as promised, owing to the aforementioned confusion and circularity (Alvesson, 1995), this particular reflexive viewpoint will be kept to a minimum.

A more accessible ‘critical’ or ‘intellectual’ reflexive practice has been described as, “... standing back and questioning ideologies and techniques of domination, hierarchy and control" (Cunliffe, 2002, p46). Furthermore, a ‘practical’ or ‘dialogical’ reflexive practice involves, “…at least three issues: [a] recognising that educators and learners are practical authors in the learning process; [b] constructing and recognising dialogical opportunities for learning; and [c] incorporating practical reflexivity in learning conversations” (Cunliffe, 2002, p47).

In the first instance, in the most recent text, the author has presented some well-known theories in the IS field (i.e. TPB and TAM) and alluded to another scholar’s criticism of one of them (i.e. Benbasat and Barki on TAM), as well as adding some of his own criticism (i.e. the absence of vector or directional nature of driving and inhibiting forces in TPB).

The author has also sought to address his examiner’s concerns by an augmentation of these theories with others in line with the research question (i.e. FFA and ITG stages and their potential role in surfacing the driving and inhibiting factors in organisational OSS adoption). As discussed in the text, the purpose of doing so is to address these shortcomings with a combined or hybrid conceptual model of the problem space. In this sense, there is evidence that the aforementioned critical (or intellectual) reflexivity definition has been met at this mid-stage of this research. In the second case (i.e. that of dialogical reflexive practice) there are at least two perspectives from which this could be considered. From the examiner’s perspective, the author has engaged with the feedback and addressed his concerns with a seemingly novel combination of theories. On the other hand, the author has also augmented his conceptual model with a tool which is well known for its practical intervention capabilities in organisational diagnostics (i.e. FFA). However this augmentation, as practically aware as it may be claimed to be, is only theoretical itself in nature. In this sense, so far as theoretical reflexivity is concerned at this mid-stage of the research, there is evidence that the aforementioned practical or dialogical reflexivity is only partially met. In respect of the former, critical (or intellectual) reflexivity and acting on the guidance provided at the earlier progression, there is evidence that the definition of reflexive practice has been met.

Therefore, in terms of 'Theoretical Reflexivity' (Weber, 2003), the author has shown that intellectually and practically he has been prepared to acknowledge the constraints of his originally selected theoretical lens, and to augment these appropriately to devise a more sophisticated conceptual model with which to investigate the research area or problem space.

7.4. Research Methods Reflexivity

Research methods have been described as possessing as certain properties, which may prove most meaningful to the phenomena under research, as opposed to an individual's experience or expertise, and that reflexive researchers, "…strive to disengage research method and theoretical genre, consider the appropriateness of each within the research context, and re-engage the two in more-powerful ways" (Weber, 2003, pix). This section will consider some of the major research methods decisions that were made during the course of this study and examine the nature of the research methods reflexivity.

> *One of the concerns that I experienced as a doctoral candidate, which I noticed that I shared with some of my co-students, was a somewhat irrational fear that another author would produce and publish a work virtually the same as the research that I had planned, before me. It is only when considering the number of research decisions which have been made in this project, and the permutations involved, that it would be highly improbable that another author would produce even a remotely similar work.*

Table 7.1: Reflections of Research Decisions

Research Domain	Example Options	Decision-making Criteria/Rationale/Comment
Design	PhD and DBA	Doctoral practice (Phillips and Pugh, 2007) and UoH Doctoral College Handbook.
Philosophical Assumptions	Positivism	Potentially over-used in IS research (Williams et al., 2009) but provides cultural credibility possibly essential to successful implementation of findings in practice (Cornford and Smithson, 2006)
	Beyond Positivism	Under-utilised in IS research with large scope for unique research contributions (Williams et al., 2009).
	Pragmatism	Freedom to draw on positivist techniques and use "practical adequacy" as the most important test (Johnson and Duberley, 2000). Most appropriate for mixed-methods research (Johnson and Onwuegbuzie, 2004).
Approach	Inductive/Deductive	Commonly associated with analysing qualitative and quantitative data respectively (Cornford and Smithson, 2006)
	Abduction	Associated with mixed methods and involves alternating between the above as necessary (Venkatesh et al., 2013)
Method & Strategy	Experiment	Rejected owing to resource constraints and preference for "real-life" data.
	Survey	Selected due to ease-of-use both for research and proposed implementation purposes and ability to collect qualitative and quantitative data.
	Case Study	Rejected as no suitable case(s) were available
	Others	Other approaches were considered and rejected (see narrative) with the exception of content analysis which was easily implemented as part of the survey and enabled mixed-methods.
	Multi/mixed-methods	Considered advantageous to use complementary toolkits of quantitative and qualitative approaches (Cornford and Smithson, 2006)
Data Collection Sampling	Probability	Not possible to obtain statistically representative sample which is common in IS research (Seddon and Scheepers, 2012)
	Non-probability	Used a variety of sampling techniques available in non-probability sample situations (Saunders et al., 2009)
Empirical Data Collection	Secondary Data	No secondary data available for addressing the research question.
	Observation	No opportunity to deploy observational techniques
	Semi-structure/In-depth	Due to time constraints used only minimally in validation.
	Questionnaire	Selected as the most efficient means of obtaining "real-life" qualitative and quantitative data.
Data Analysis	Quantitative	Fisher's Exact Test as the most appropriate means of analysing quantitative data set and mixed methods
	Qualitative	Content Analysis as the most efficient means of analysing qualitative data set.
	Multi-methods	'Meta-inferences' established as a result of combining quantitative and qualitative methods and data (Johnson and Onwuegbuzie, 2004, Venkatesh et al., 2013).
Evaluation	Validation of Quantitative	Using widely used methods associated with quantitative research (Venkatesh et al., 2013) i.e. Binomial Logistic Regression.
	Validation of Qualitative	Using widely used methods associated with qualitative research (ibid) i.e. Supply-side and Demand-side key informant interviews.
	Validation of Meta-inferences	Using combination of methods specifically devised for mixed methods IS research (ibid) as for quantitative and qualitative approaches (as above).

7.4.1. The Table

The table as a whole functions as a kind of methodological blue print for this study. It showcases some of the strengths, but also exposes the very nature of the study to criticism. It can appear both strong and vulnerable depending on the perspective of the reader. As such, as the author, I find it both concerning and reassuring. If I wanted to critique a research project, I would start here.

Reflexivity as 'disruptive' or 'destabilising' practice is described as,

> *…to point out a lack of reflexivity, usually [but not always] on the part of others... an insurgent, the reflexive researcher challenges research by taking up a place 'outside' the target project, which is usually undertaken by other researchers, and then infiltrates it in order to undermine its very foundations" (Alvesson et al., 2008, p489).*

In possession of this table and in the context of this chapter, it is this metaphorical reflexive high ground that the reader now occupies, which (owing to the potential for disruption) is not an entirely comfortable experience.

7.4.2. Design

As a doctoral student it is necessary to adhere to the university regulations and general literature for guidance on designing a research project. Although there is no lack of high level structural guidance, there are a huge number of decisions which need to be made, the pace of which will determine the progress of the research. The existing literature, course director, facilitators, guest speakers, supervisors, progression examiners and co-students are a rich source of ideas during the initial design phase. However, it ultimately falls to the student to justify the research decisions which are taken, and for the University and the supervisor to decide whether those decisions will ultimately meet the requisite standard. As a scholarly *work it is primarily from the existing literature that I must draw my ideas and to others for support.*

Reflexivity as 'perspectives' is explained as,

...a set of practices involving the juxtaposition of perspectives to draw attention to the limitations in using a single frame of reference and, in so doing, provide new insights. It is the accumulation of these perspectives that amounts to reflexivity: the use of different perspectives is enlightening in that it helps to complement otherwise 'incomplete' research (Alvesson et al., 2008, p483).

The table, and other text presented so far, are a primarily 'reflective' (Cunliffe, 2002) accounts of some of the early concerns, fears and design decisions made by the author. The text also acknowledges that this study is a means to an end, to obtain a university degree, and that the existing literature is the primary source for the research decisions for which the author has sought the support of others. It is through the introduction of the third party perspectives it becomes explicit that the author is not alone in this endeavour, and that there are others who have significant influence over this research project. Therefore, in terms of this study's research methods design, the definition of reflexivity as perspective has been met.

Reflexivity as 'positioning' is described as, "…the way that the author's research takes place within a broader network or field. These broader social processes shape knowledge, meaning that the researcher can construct 'knowledge' only in the context of a particular research community and society" (Callon, 1986, cited in Alvesson et al., 2008, p484). In this research text the author draws reference to the existing IS research literature and his direct research community (i.e. his cohort and various university staff) as significant influencers of this research. Therefore, in terms of this study's research methods design, the definition of reflexivity as positioning has also been met.

7.4.3. Philosophical Assumptions

I found that there was a huge draw to a positivist world view from other research. These almost absolute cultural pressures are not unique to IS research and are can ultimately impact how seriously a project is taken. Beyond positivism I could see there were a variety of philosophies which could be used, and eventually settled on pragmatism. I believed that, particularly for a professional doctorate, the test of practical adequacy (i.e. what is most likely to work in practice) was most appropriate. A pragmatic researcher is also encouraged to make use of whatever research approaches (including positivism) that address the research question and is considered by IS research as ideal for those considering mixed-methods (see Table: Philosophical Assumptions). In this case, I seek to utilise positivist quantitative approaches to lend credibility to my approach and findings, neo-positivism to aid qualitative and mixed-methods, and to pragmatism to enable the findings to be implemented.

Barry et al. (1999) has described reflexivity in two parts, firstly an acknowledgement that, "…research is part of the setting, context, and social phenomenon being studied", and secondly, "… a process of self-reflection of one's biases, theoretical dispositions, preferences and so forth" (Barry et al, 1999, cited in Truex et al., 2006, p799, see footnote). The author has shown awareness of his research community, the operational setting in which the research findings must be heard in practice and made a conscious effort to leverage the strengths and minimise the weaknesses. Therefore, so far as the research methods reflexive philosophical assumptions are concerned, the author has at least partially met this level of reflexivity. However, the IS research definition above, specifically draws reference to, "the social phenomenon being studied," in this case OSS and its driving and inhibiting factors in organisational adoption. Von Krogh and Spaeth (2007) have defined the 'communal reflexivity' exhibited in the OSS phenomenon as,

…evident in the many online discussions about the roles and functions of OSS and its impact on the economy and society... OSS involves a very large number of contributors, it uses simple technologies for coordinating work, it draws upon direct feedback and improvement by users, it produces a public good with considerable market and economic impact… (von Krogh and Spaeth, 2007).

Therefore, in the latest text and elsewhere in this dissertation, in order to meet the definition above, perhaps more could have been made of the philosophical and reflexive nature of OSS as a 'social phenomenon' itself rather simply drawing on the author's current 'theory dispositions' to explain and explore driving and inhibiting factors in organisational settings.

7.4.4. Approach

Taking a deductive approach, having devised a conceptual model which was drawn from the existing literature, there is initially a great deal of reassurance to be taken from the resultant 'fledgling' theory. Of course, there are risks. It remains just a theory, no matter where it has been drawn from. What if it doesn't seem to fit my data? What if I've missed something? What it I have to start all over again or take an entirely different direction? On the other hand, taking an inductive approach, the reassurances are reversed. Initially the data looked messy, confusing and appeared to hide more than it revealed. Slowly and over time patterns begin to solidify. So far as both approaches are concerned, and after much analysis, finally the results emerge. It made sense to me, but of course I am by then emotionally invested, biased and even prejudiced. What will others have to say? It is only when I listen to my fellow students' accounts of their own research I see similar concerns are in evidence.

Archer (2007) has described reflexivity as,

> *…the regular exercise of the mental ability, shared by all normal people, to consider themselves in relation to their (social) contexts and vice versa. Such deliberations are important since they form the basis upon which people determine their future courses of action—always fallibly and always under their own descriptions (Archer, 2007, cited in Dobson et al., 2013, p973).*

In this text the author alludes to some of the 'reflexive doubt' (Cunliffe, 2002) discussed earlier as well as an inevitable fallibility. Some scholars have considered such reflections as, "… a 'palsy' [that] they should avoid at all costs, or perhaps more positively, a luxury they cannot afford" (Weber, 2003, v). Nonetheless, this account of the emergence and subsidence of doubt has shown evidence that the author has engaged at this level of reflexivity so far as the research methods approach of this study is concerned.

7.4.5. Methods and Strategy

> *A colleague once said to me, "If all you have is a hammer, pretty much all your problems will look like a nail". These words were foremost in my mind when making decisions with respect to research methods and strategy. I found the 'tools of the trade' (i.e. research methods) were laid out fairly neatly by way of introduction, the results were demonstrated by publication or presentation, and in turn were often greeted by a sense of bewilderment or enlightenment (as is common in the novice researcher). As a part-time research student time, effort and resources were particularly constrained. Access is the perennial problem of any researcher and I was concerned to make maximum use of the resources within my grasp. Methods such as experiment and case study were considered and discounted for the reasons set out in the table. Other methods were also considered and selected to make maximum use of my resources. I opted for a survey instrument to access real-life quantitative and qualitative data in order to enable a mixed-methods strategy. My*

intention was to enable a degree of breadth from the 'thin' quantitative data, complimented by the depth of the 'thick' qualitative data and (when combined) access some results which would have been otherwise unobtainable from a mono-method strategy alone. This would, I hoped, enable a better understanding of the drivers of organisations OSS adoption behaviour.

As previously discussed, IS research has described research methods as, "… [possessing] certain properties, which may prove most meaningful to the phenomena under research, as opposed to an individual's experience or expertise," and reflexive researchers, "…strive to disengage research method and theoretical genre, consider the appropriateness of each within the research context, and reengage the two in more-powerful ways" (Weber, 2003, ix). So far as this research is concerned, the author has suggested that a combined analysis (of both quantitative and qualitative data) will reveal greater results than could otherwise be expected via mono-methods alone. This is despite the author's meta-theoretical commitments described in previous sections which may have otherwise led to more exclusively quantitative approaches. Therefore, in terms of the research methods reflexivity, this latest text is evidence that the author has met this description of reflexive practice and made decisions based on the research objectives rather than his experience alone.

7.4.6. Data Collection and Sampling

I recall my early attempts at data collection. It was extremely disappointing. Having spent a great deal of time and effort developing a conceptual model and a survey instrument designed to test it, I found that I could only obtain a few of responses. This was my first major set-back. My hope was to obtain a statistically representative sample of the FTSE500, however given the responses, this was highly unlikely. I attended the cohort weekend session and presented my dilemma to my fellow students. However, my update was painfully simple. No data, no analysis. No analysis, no research project. Another student offered an email and contact database *which he had recently compiled by hand, and suggested that the local government IT managers that it contained could make a more responsive target population. I emailed the contacts with an invitation to log in to BOS, and combined with my existing responses, I received enough data for the pilot study analysis using non-parametric techniques. This gave me the confidence to pay an email marketing company to distribute invitations to a similarly profiled population for the main study.*

As previously discussed, there is an important distinction in dialogical reflexive practice, in which, "…the focus shifts from a theoretical [or intellectually] talking about practice, to a dialogical, responsive [or experiential] talking in practice" (Cunliffe, 2002, p46). So far as this research is concerned, the author has reflected on his problem (i.e. lack of responses in the pilot study), and working with his cohort (and a fellow student in particular) has questioned his initial approach (i.e. larger, statistically representative sample size, and probability sampling), devised an alternative approach (i.e. smaller sample size, and non-probability sampling) and successfully put it to the test. In this sense, so far as the research method in data collection and sampling is concerned, the experience highlighted in the text has met this description of dialogical reflexive practice.

7.4.7. Empirical Data Collection

I became well-versed in using the BOS web application as a means of accurately collecting data. I found this to be the most efficient means of gathering real-life quantitative and qualitative data so as to prepare for mixed-methods analysis. The university had already purchased a license for the system which was designed by researchers who had thought of the vast majority of the student researcher's on-line data collection requirements. Most respondents were able to complete the survey successfully. In addition, the instrument itself was somewhat simplified between pre-test/pilot study, and pilot/main study so as to further improve completion rates.

As previously discussed, the objective of methodological reflexivity has been described as, "… to nurture and sustain objectivity", (Johnson and Duberley, 2003, p1293, Table 1). The author has developed a reliable means of accurately gathering data which is designed to be error-free (i.e. the data are entered by the respondents themselves). Therefore, so far as the method of empirical data collection is concerned, the text is evidence that this level of methodological reflexive practice has been met.

7.4.8. Data Analysis

Despite improvements to the data collection and sampling, the response rates were still quite low and the sample sizes were still relatively small. I had resolved, and not for the first time, to attempt to further increase data collection, however, during one of the university SPSS practice sessions the Fisher Exact Test statistical procedure was introduced as an alternative form of analysis in small sample-sized studies. Using this form of non-parametric statistical procedure I was able to carry out the analysis and test the conceptual model. In addition, the smaller sample size meant the qualitative analysis phase was more manageable. Furthermore, I felt the scenario for implementation was more realistic in so much as most organisations' IT departments (the target audience for this research) are measured in dozens rather than hundreds of staff members. That being said the Fisher Exact Test procedure itself can theoretically scale to unlimited number of responses, only being practically limited by the available computational power. Following the collection of empirical data it was possible to export the data to SPSS or MS Excel for quantitative data analysis or WeftQDA for qualitative data analysis. A student from our cohort recommended WeftQDA, a CAQDAS, and provided a demonstration to our group. In order to achieve mixed-methods results the quantitative and qualitative data were subsequently combined and re-analysed.

As previously discussed, in addition to preserving objectivity, methodological reflexivity has been described as, "…analysis of researcher behaviour to erase methodological lapses", an outcome of which can be regarded as, "… 'technicism' [or 'scientism'] which preserves privileged knowledge" in which the role of the researcher is a, "Disinterested and sceptical expert" (Johnson and Duberley, 2003, p1293, Table I). So far as the quantitative data phase is concerned, the author had established a set of procedures which can be carried out and then tested for errors (i.e. repeated) using the same dataset, the output of which is independent of the researcher (barring errors). In this sense the text has met this description of methodological reflexivity. However, as far as the qualitative data (and therefore mixed-methods data) phases are concerned, the results are more open to interpretation by the researcher. That is to say, elements of the content analysis are subjective interpretations of the individual coder or researcher. Therefore, under this description of methodological reflexivity of data analysis, more steps could have been taken to preserve objectivity (e.g. inter-coder rating procedures). Therefore, so far as research methods reflexivity of data analysis is concerned, this definition of methodological reflexivity has been met for quantitative analysis, but only partially met for qualitative and mixed-methods analysis.

7.4.9. Evaluation

Having devised and tested the conceptual model I now faced the question of how well the models predicted OSS organisational behaviour in the sample. I found that there was a wide range of methods for evaluating quantitative and qualitative findings, which struck me as entire research projects in themselves. Guided by the existing IS research I was able to find a number of techniques which were accessible and achievable, the first was binomial logistic regression (for quantitative methods results) via SPSS, the second was key informant interview from supply-side and demand-side experts (for qualitative methods results) and finally both (for mixed-methods results).

Under the previous description of methodological reflexivity, the same rationale applies. The outcome of the evaluation using logistic regression analysis is again independent of the researcher (and therefore preserves objectivity) whereas the other forms of analysis are subjective (and are more reliant on the researcher's own interpretation or that of the individual experts). However, as also previously discussed, the author has chosen a pragmatic philosophical world view for this research, and as such, can eclectically draw on positivist or neo-positivist methodology in order to advance the goal of practical adequacy. Therefore, as in the previous section, so far as research methods reflexivity of evaluation is concerned, this definition of methodological reflexivity has been met for quantitative analysis, but only partially for qualitative and mixed-methods analysis.

7.4.10. Summary of Research Methods Reflexivity

Through the experimental structure of this chapter the author has provided a reasonably persuasive account as to the various methodological decisions that were made during the course of this research. The subsequent reflexive assessment has successfully surfaced strengths and weaknesses in the research method reflexivity as described by IS research (Weber, 2003). As discussed, depending on the level of reflexivity, this can illustrate methodological improvements (e.g. better procedural compliance) or hint at the potential for entirely different research possibilities operating under entirely different paradigms (e.g. Critical Theory, Post-modernism, Social Constructionism/Conventionalism and so forth).

7.5. Interpretation Reflexivity

Weber (2003) has described interpretation reflexivity as acknowledging the need for researchers to, "… introspect carefully about the assumptions and biases that underlie interpretations they undertake of data or texts or statistical analyses" (Weber, 2003, x). The same research cautions researchers to question, "...does the data really reflect the participants' perception? ...do the regularities manifested in the statistical analyses undertaken reflect demand effect [generated by the survey instrument itself] rather than the participants' realities?" (ibid). In this section further reflexive consideration will be given using an example of a mixed-methods research finding derived from this study.

7.5.1. Mixed-methods Findings

As the researcher in question, I was far from a "disinterested and sceptical expert", by the time I had arrived at these findings. Although you could be forgiven for thinking otherwise when I wrote, "[Figure 7.2] shows the relationship summarised in diagrammatic form, categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show the nine previously identified statistically significant factors for intention to adopt OSS of this category of software in 2013. However, in this mixed-methods version, the diagram includes the two inhibiting factors (in the attitude construct) associated with OSS adoption behaviour (i.e. Cost and Suitability) established via the aforementioned meta-inference. Similarly, in the perceived behavioural control construct, the Ease of Implementation inhibiting factor is also included." In reality, I was relieved that the mixed-methods approach had yielded further driving and inhibiting factors, disappointed that there was only two OSS organisational adoption behaviour (this and another) where this was found to be statistically significant. In addition, when evaluated the mixed-methods results only marginally improved predictive capability in one of the cases (i.e. via binomial logistic regression). I was generally pleased that the quantitatively established driving and inhibiting factors (or thin descriptions) were augmented by the qualitative established factors (or thick descriptions) which had also shown statistical significance. According to the key informant interviews this type of information would be useful and would inform practical interventions. My priority has been to draw on positivist principles to lend credibility and justify my findings to a practitioner. I have then drawn on more subjective approaches to lend depth to the results, which should also appeal in an operational setting. Finally, I have suggested *these results are wholly compatible with an intervention method commonly used by managers (i.e. FFA).*

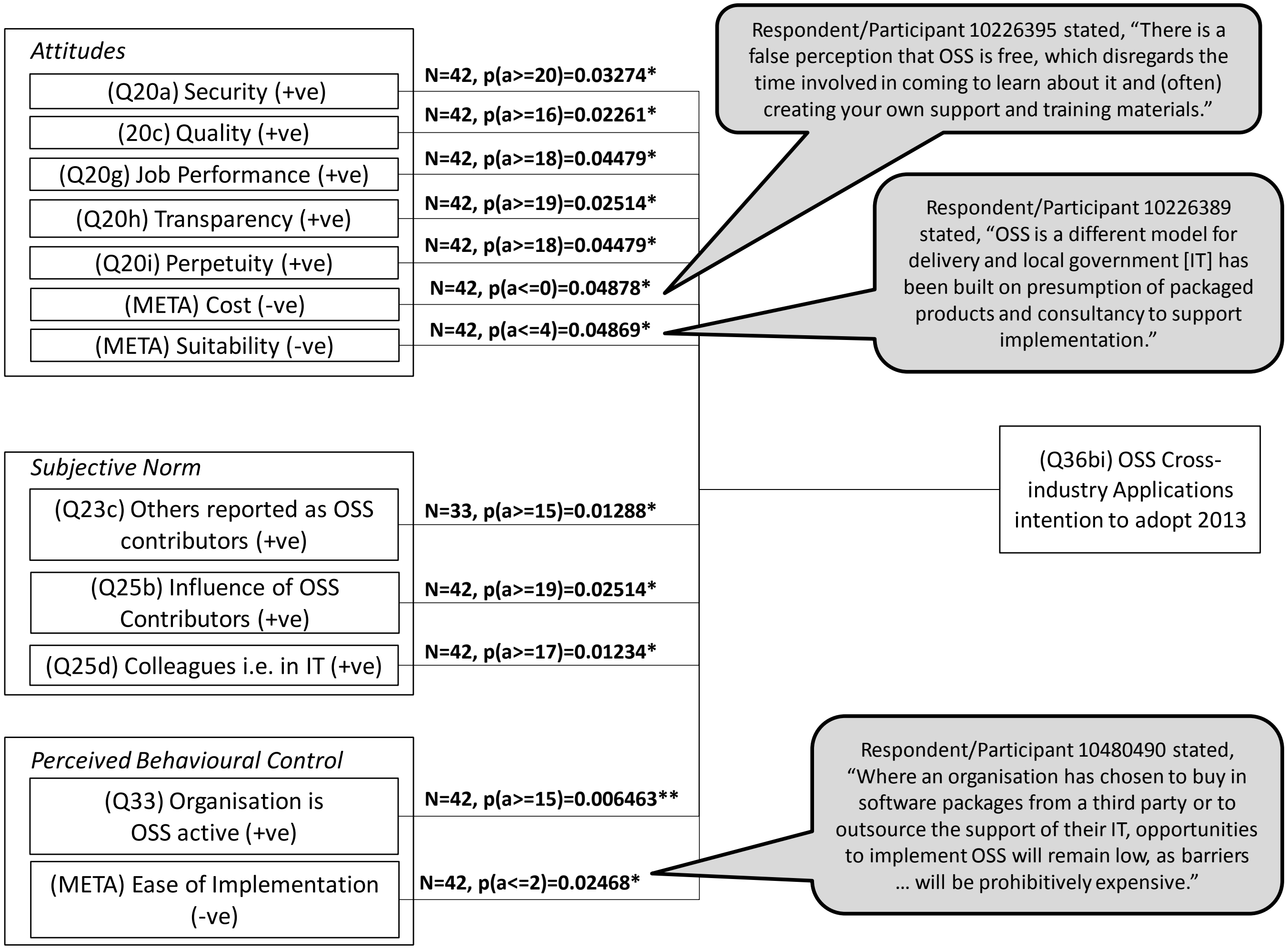


Figure 7.2: Review of Mixed Methods Research Finding for Intention to Adopt OSS in the Cross-industry Subcategory

Reflexivity has been further described in terms of five levels (Holland, 1999) as below:

‘Reflexivity one’ has been described as, “… the local kind of reflexivity which is too weak to break through the boundary of discipline or its containing paradigm”, in which, “Neither discipline puts itself into question by using resources from another one, or by reflecting on its inadequacies or ideological functions” (Holland, 1999, p475). In this latest text, the author has shown that he has been able to draw on positivist, neo-positivist and pragmatist philosophical assumptions and has also indicated some of the actual results stemming from mixed-methods. Those results show factors positively and negatively associated with the organisational OSS adoption behaviour specified, and so far as the mixed methods results are concerned, are augmented with the respondent’s quotes which support the findings with greater depth. Therefore, so far as reflexive interpretation is concerned, the text has met the practice known as ‘reflexivity one’ (Holland, 1999, p475).

‘Reflexivity two (a)’ has been described as, “… the paradigms are used against each other to highlight contradictions and conflicts”, and, “… prompts [movement] between focal and contextual meanings” (ibid). From the text and diagram, mixed-methods results have supported each other in both a meaningful and statistically quantifiable way. Elsewhere in this dissertation the author has shown how findings have both supported and contradicted one another. Furthermore, the text has described moving from focal or statistical findings (using Fisher’s Exact Test and Content Analysis) to contextual or operational implementation in practice (via the proposed use of FFA in practice). Therefore, so far as reflexive interpretation is concerned, the text is evidence that the practice known as ‘reflexivity two (a)’ has been met (Holland, 1999).

‘Reflexivity two (b)’ has been described as, “… a view of paradigms as clusters of disciplinary alternatives to be drawn on eclectically”, and,”… certain techniques are common to more than one paradigm, otherwise a strong mediating argument is needed to justify multi-paradigm work to ensure coherence" (Holland, 1999, p475). In this latest text, the author has shown how he has drawn on objective or positivist methods as well as more subjective interpretive methods, using the goal of practical adequacy. Elsewhere in this dissertation, the author has also shown how techniques such as content analysis are compatible, and can be combined with, quantitative data to produce mixed-methods results via the Fisher Exact Test. Therefore, so far as reflexive interpretation is concerned, the text is evidence that the description of practice known as 'reflexivity two (b)' has been met (Holland, 1999).

'Reflexivity three' has been described as, "… contextualise individual processes within societal conditions… movement involves cognitive, personal or group revolution calling out psychological and social dynamics. A journey from the individual level to the social level…" (Holland, 1999, p476). In previous sections of this chapter, the author has shown how a theory used to predict individual behaviour (i.e. Theory of Planned Behaviour) has been combined with organisational multi-stage based behaviours (i.e. IT Governance stages), successfully tested in practice for certain organisational OSS adoption behaviour (i.e. Fisher Exact Test, Content Analysis and mixed methods), subsequently evaluated (i.e. Logistic Regression and Key informant interview) and proposed an organisational intervention plan (i.e. Force Field Analysis). Therefore, so far as reflexive interpretation is concerned, the text is evidence that the practice known as 'reflexivity three', specifically from 'individual' to 'social' level, has been met.

'Reflexivity four' is described as;

> *… a radical mode of reflexivity, not bound by either paradigms or disciplines. This is trans-disciplinary reflexivity …not simply another paradigm; it is a way of handling and transcending the interminable debates which have laid-down disciplinary and paradigm*

boundaries. It is an aspect of the elusive post-modernism… All existing boundaries, disciplines, paradigms, class structures, gendered groups etc. invite critical attention since they are obstacles to reflexivity, laden with ideological traps which seek to narrow our vision" (Holland, 1999, pp476-7).

As previously discussed, the author has shown that he has traversed disciplines and paradigms in the completion of this research. However, hyper-reflexivity and post-modernism have only been touched on in this chapter. With the exception of the structure of this chapter (i.e. the first person-third person dichotomy) the author has chosen to minimise this type of reflexivity for the purposes of clarity. The author has utilised alternative disciplines to illuminate the research problem and assist in generating alternative approaches, rather than simply criticise them for any intrinsic short-comings. The author has questioned mono-method approaches (and expanded his research tool-set) and specifically considered how practitioners have (and will most likely) receive the findings. Therefore, notwithstanding the inherent hyper-reflexive complexity, so far as reflexive interpretation is concerned, the author has partially met this more radical level of practice.

7.6. Summary

This chapter has been structured in such a way as to provide a vehicle to illustrate and provide a catalyst for reflexivity and its various levels, descriptions, practices and definitions. Through the creation of the first person-third person dichotomy as a rhetorical device the author's voice has been authentically surfaced and the reader has received relevant details of his education, work and research experience.

This experimental style of writing is a departure from the rest of this dissertation which has proved challenging. However, the author has structured the chapter by making use of the IS research definitions of reflexivity; (a) Meta-theoretical (b) Theoretical (c) Research Methods and (d) Interpretive (Weber, 2003); interspersed with other relevant reflexive practice definitions and descriptions.

In terms of the author's meta-theoretical commitments it has been shown how previous experience has shaped the author's preferences and motivations for research and the research topic itself. The author was originally unaware of the traditions in which he received his pre-doctoral education and this research study itself is an example of a researcher accessing new research possibilities through mixed methods. Furthermore, the reflexive exercise of writing this chapter has also created additional research possibilities which were not substantially explored in this dissertation (e.g. critical theory, social constructionism, the reflexive voice and hyper-reflexivity). However, there are practical limits as to how much a single research project can take on. So far as the meta-theoretical reflexive section was concerned, the chapter has illustrated a fundamental difference between reflecting on experience (i.e. the author's MBA and DBA experiences), reflecting on a plan (i.e. the author's registration excerpt) and the reflexive research possibilities that these have presented.

The theoretical reflexive section of this chapter has shown how, based on interactions with his first progression examiner and elsewhere, the author has substantially adapted the original theoretical lenses used to investigate the research area. This has enabled a much stronger conceptual model to be developed via a critical (or intellectual) reflexive practice on the part of the author. However, as discussed the conceptual model remains theoretical, and only partially subjected to dialogical reflexive practice given that the researcher had collaborated with his examiner and had not yet fully engaged with his respondents/participants at this mid-stage of the project.

The research methods reflexive section was regarded by the author as far more comprehensive assessment of the research project using the excerpts and overview of some of the major methodological decisions in tabular form. Of necessity, parts of this section were predominantly to do with methodological reflexivity and operational means of sustaining objectivity. However, this section also demonstrated the challenges experienced in data collection and the strength of the research in terms of drawing on mixed-methods to create new research possibilities. This chapter has asserted that any research project is at some level fallible and as the author pointed out; it is a table such as this that would be used when engaging in the more disruptive reflexive practices highlighted in this section.

The interpretation reflexivity section was designed to put an example of the mixed-methods findings to the most comprehensive five-level reflexivity test highlighted in this section (Holland, 1999). First of all, the author was able to show that the research findings interpretive reflexive practice was the product of moving substantially beyond a single paradigm or discipline boundaries, known as 'reflexivity one' (Holland, 1999). Secondly, the research findings interpretive reflexive practice was shown to have juxtaposed different methods and had eclectically drawn on disparate disciplines such as psychological intention-based models (i.e. TPB), IT governance (i.e. ITG stage-based models) and organisational diagnostics (i.e. FFA), known as 'reflexivity two a & b' (Holland, 1999). Furthermore, the author showed that the research had augmented individual psychological theory (TPB), with IT governance (ITG) and organisational diagnostics (FFA) to enable analysis of "personal processes" (i.e. driving and inhibiting factors) with "societal conditions" (i.e. organisational OSS adoption and usage), known as ‘reflexivity three’ (Holland, 1999). Finally, this section returned to themes of post modernism and hyper-reflexivity, known as ‘reflexivity four’ (Holland, 1999); and identified partially with these perspectives as a catalyst or inspiration for some of the earlier innovations in research detailed in this section.

Having thoroughly reviewed the various reflexive practices from a variety of perspectives the next chapter will summarise and conclude this research.

Chapter 8: Summary and Conclusions

8.1. Introduction

This chapter provides a conclusion to this research and the major findings. It begins with a review of the findings of each chapter, followed by the conclusions of the research, the contribution to industry and academia, the limitations of the research and finally some suggestions for future research projects.

8.2. Dissertation Review

The dissertation began with an orientation of the major topics in the OSS field. The introductory chapter described the origins of OSS from the fledgling software industry through to the burgeoning PS corporations and the resulting potential friction with the OSS community. The open innovation legal constructs which underpin the OSS community-based IPR were described. In addition, the growing commercial and academic interest in OSS was highlighted and contrasted with an apparent lack of OSS adoption specifically at an organisational level. Broadly speaking this lack of adoption was the catalyst for this research project from which the aim of this research was derived:

> *To identify and establish the extent to which organisational adoption and usage of OSS technology can be shown to be a function of the driving and inhibiting salient beliefs of the managers involved for a specific sample.*

The reader was provided with an outline and scholarly precedent, from IS research and elsewhere, for the overall research approach and scope.

Chapter two explored the adoption and usage of innovation in organisations in the IS field. As recommended by IS research (Webster, 2002), this chapter reported on a process of literature classification aimed and identifying the major contributions relevant to the aims and objectives of this research. With this in mind, a tiered approach of the extant IS literature (Lyytinen et al., 2007) and a conceptual analysis of key dimensions is adoption and usage research was also used (Williams et al., 2009). This enabled the identification of major theoretical themes and constructs, and the development of a more sophisticated hypothetico-deductive conceptual model which could be tested and then further developed and operationalised for practice. This chapter highlighted that the majority of IS research makes use of the 'variance' theoretical approaches, and some 'process' theory-based research (Webster, 2002). However, as a professional doctoral study, through a combination of widely-used variance theory (i.e. TPB) and process theories (i.e. FFA and ITG) this chapter was able to produce a relatively unique 'hybrid theory' best suited for deployment in an operational setting (Webster, 2002).

Chapter three described the major methodological decisions which were made throughout this research. This chapter introduced and justified the philosophical assumptions which were considered most appropriate for this study. The data collection strategy was also described along with some major challenges which were experienced (i.e. unworkably low response from invitations to participate). Through collaboration with other students, university staff and acquiring skills via university workshops in non-parametric statistical techniques these issues were successfully overcome. This chapter also established scholarly precedent for these types of approaches from researchers in similar situations. This chapter then described the design process of the survey instrument, the extent to which this study has claimed mixed-methods research, and developed an approach to leverage the quantitative and qualitative data collected via the closed and open questions in the questionnaire.

Chapter four described how the questionnaire was further developed and how it incorporated Likert-type scales, open ended questions and the proposed driving and inhibiting factors for organisational OSS adoption originally derived from the literature review. In addition, this chapter described the initial performance of the conceptual model which successfully distilled the 67 literature-based factors down to; 14 for OSS Adoption, 15 for Intention to Adopt OSS, of which seven factors overlapped both organisational OSS adoption behaviour groups, from a self-selected sample of 32 respondents.

All of these factors were shown to be statistically significant to varying degrees (i.e. ranging from 95% to 99.5% confidence levels). In so doing the pilot study; rejected the first hypothesis (H1) in relation to individual profile of attributes, partially supported the organisational profile of attributes (H2) in so much as organisational size was found to be negatively associated with organisational adoption, and supported the remaining hypotheses in relation to the TPB constructs; i.e. Attitude (H3), Subjective Norm (H4) and Perceived Behavioural Control (H5). The chapter showed that the conceptual model had been successfully tested and that the main study could be completed for a more comprehensive range of organisational OSS adoption scenarios.

Chapter five described the analysis and findings achieved from the main study. The questionnaire was further simplified after the pilot study which was shown to generate substantially improved completion rates. This chapter clearly demonstrated the extent to which the adoption and usage of OSS could be shown to be a function of the self-reported salient beliefs (expressed as driving and inhibiting factors) of the managers involved for a self-selected sample of 45 respondents. For example, of the original 67 factors identified in the literature review, the analysis showed a relatively parsimonious 13 factors for general OSS Adoption (2010 to 2012) and Intention to Adopt OSS (2013/14). Of these 13 factors, four were found to be greater than 99.5% confidence level, and eight were found to be greater than 99%. Importantly, a single factor (i.e. security) was found to be common to all the aforementioned organisational OSS adoption behaviour groups. Logically, this made it a strong candidate to be addressed in an operational setting for management interventions. Similar results were found for other organisational OSS adoption behaviour which was in the various NAPCS categories and ITG stage-base models. Further driving and inhibiting factors were identified via content analysis of the qualitative data collected which, when combined with quantitative data, facilitated additional mixed-methods findings. The findings suggested that original quantitative findings in certain OSS adoption groups could be augmented by qualitative findings which were also found to be statistically significant. In hypothetico-deductive terms, the main study rejected H1 and partially supported; H2, H3, H4 and H5 to the extent indicated in the chapter (i.e. confidence levels and statistical strength) for the various organisational OSS adoption scenarios.

Chapter six evaluated the research findings against certain criteria published by current IS research specifically relevant to mixed-methods research such as this study (Venkatesh et al., 2013). For example, the models relating to specific organisational OSS adoption behaviour were rigorously tested for internal validity using binomial logistic regression analysis as with other IS research (Barbosa and Musetti, 2010, Ngai et al., 2008). This chapter showed that a maximum internal validity was achieved with a 97.10% overall predictive capability, which corresponded to a 90% true-negative (i.e. the model correctly predicted OSS non-adoption in 2012) and 100% true-positive (i.e. the model correctly predicted OSS adoption in 2012). This was considered adequate for most operational scenarios and would therefore be considered an important aid to appropriate management interventions based on these results. This chapter also showed through mixed-methods how qualitative results, established as statistically significant to OSS adoption outcomes, produced marginal improvements to the models predictive capabilities. Given the time and effort involved, this was considered to be of limited value in an operational setting. However, the discussion section which followed compared the quantitative results, with existing IS research and showed how qualitative results substantially augmented the results in terms of depth and richness. In addition, this chapter sought to support findings by evidence from data sourced by the supply-side and demand-side key informant interviews.

Chapter seven provided a more in-depth insight into some of the underlying principles which were important to the theoretical and methodological decisions made during this study. Using an experimental writing technique this chapter has expanded on the personal, professional and academic experiences of the researcher which further informed the reader as to the metaphorical research 'lenses' used throughout (Weber, 2003). In addition, this chapter raised questions as to the methodological, philosophical, epistemological and ontological decisions which were made and the extent to which these provide alternative research possibilities and potential findings. This chapter has shown, through examples and experimental reflexive writing techniques, that there are a wide range of reflexive possibilities within management research in general (Johnson and Duberley, 2003) and IS research in particular (Weber, 2003).

8.3. Research Conclusions

This research has successfully devised a means of establishing the driving and inhibiting factors which were shown to influence organisational OSS adoption to varying a degree of confidence level, statistical strength and a means by which the subsequent models can be suitably tested for internal validity. Furthermore, these quantitative findings were augmented by qualitative data and mixed-methods research. However, in terms of internal validity the mixed-methods results were somewhat marginal which, given the additional effort, would inevitably draw into question the utility when replicated in an operational environment. This research has been designed to take into consideration industry-standard NAPCS categories and has shown how these categories also surface a different set of driving and inhibiting factors using the same approach. Furthermore, the conceptual model has been shown to be compatible with sophisticated multi-stage models designed specifically to address organisational adoption and use, such as ITG stage-based models. Importantly, for a professional doctorate, it has also been shown that these models and results are well suited to practical operational environments in which management intervention may be planned using well-known tools such as FFA. Specifically, the major conclusion of this research is that the driving and inhibiting factors (or salient beliefs) associated with organisational OSS adoption can, and have, been identified for a specific sample of managers in an organisational context. In particular, the model was shown to be the most accurate for the selected sample for organisational OSS adoption in 2012 yielding a 97.10% overall predictive capability, which represented a 37.54% improvement on “block zero” or straight forward probability calculation (i.e. without the use of the conceptual model). Additionally, Figure

8.1 illustrates the aforementioned organisational OSS adoption behaviour in terms of driving and inhibiting factors, statistical significance (p) and correlation coefficient (phi).

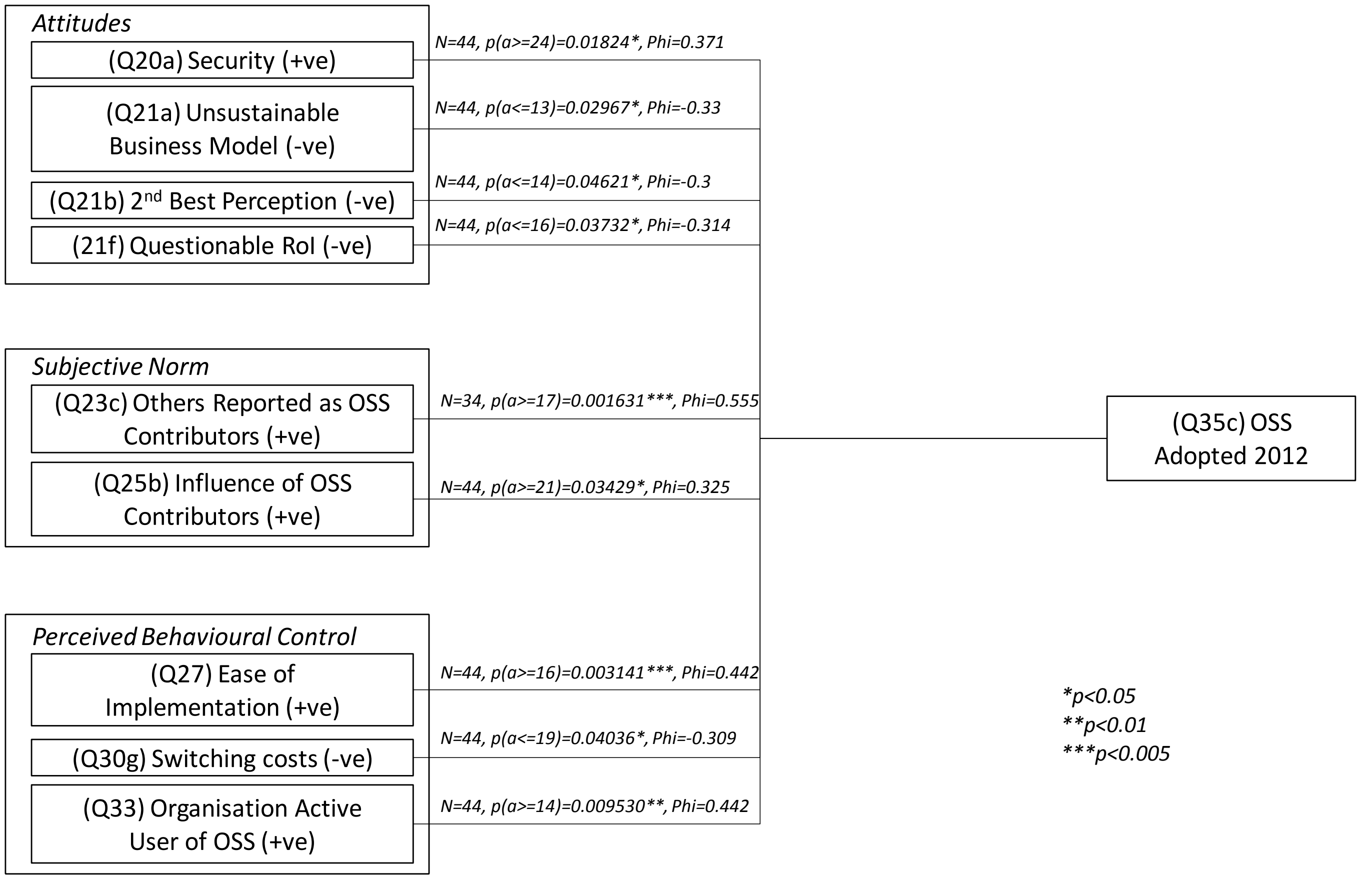


Figure 8.1: Example of Driving and Inhibiting Factors for OSS Adoption

This research concludes that this information would be of value managers in an operational setting as follows. For example, the reader will note that the most statistically significant driver was the OSS Contributors' Reported factor (i.e. greater than 99.5% confidence level), which also happens to have the strongest positive correlation coefficient (i.e phi=+0.555). This would suggest that this would be an appropriate area for management intervention in line with the aforementioned FFA process (e.g. strengthening organisational links with the relevant OSS community). Similarly, the most statistically significant inhibitor was the Unsustainable Business Model factor, which also happens to have the strongest negative correlation coefficient (i.e. phi=-0.33). By the same token, this would suggest that this would be an appropriate area for management intervention via FFA (e.g. producing evidence of longevity of relevant OSS projects). In an operational setting, as with this research, these conclusions have been augmented with richer and deeper qualitative data to further aid understanding. In this way, this research allows management interventions to take place in a more targeted manner, in the most significant areas for a range of organisational OSS adoption behaviours (i.e. by year, by NAPCS category and by ITG stage), and avoids time-consuming alternatives to OSS implementation strategy, such as trial and error.

8.4. Research Implications

8.4.1. Implications for Academia

In academic terms, this research has modestly advanced the conceptual models and theoretical constructs that are traditionally used to address OSS adoption. From the comprehensive literature review there is a paucity of empirical IS research in OSS adoption in organisations. Of the existing research it has been argued that many of these theories perhaps do not lend themselves to the complexities of the organisational context. Specifically, having utilised TPB (Ajzen, 1991) constructs which are crucial to organisational scenarios, such as PBC, can be taken into careful consideration.

Furthermore, this research has modestly advanced theory by uniquely incorporating theoretical constructs from organisational diagnostics (i.e. Force Field Analysis - FFA) and IS research (i.e. ITG multi-stage models). In terms of research methodology, this research has also taken a unique mixed-method approach in which positivist, quantitative empirical methods, have been complemented by more interpretive and qualitative perspectives and subsequently combined, via mixed-methods, to produce further findings. It is reasonable to conclude that these theories and methodologies, which are optimised for the organisational context, will provide researchers with the opportunity to explore this problem space more effectively.

In summary, this research has highlighted and sought to address, a small but significant gap in the existing research in relations to organisational OSS adoption. Additionally, a predominant adoption and usage theoretical construct (i.e. TPB) has been augmented with a suitable organisational multi-stage model (from ITG research) and an appropriate implementation model (from organisational diagnostics) i.e. FFA.

8.4.2. Implications for Industry

From an industry perspective, and drawing on 'design science' principles (Hevner et al., 2004), this research has designed a methodology and artefact which can be easily reproduced in industry (i.e. the survey instrument, statistical/content analysis and graphical reporting) to best enable managers to pragmatically and heuristically develop intervention programmes to aid the adoption of OSS. Although this research has extensively made use of SPSS, many of the statistical procedures are also available as add-ins for MS Excel, which is a ubiquitous analysis tool in industry.

In addition, the approach of utilising FFA in change management and organisational diagnostics tool is well known, in terms of augmenting drivers and suppressing inhibitors to effect change (Cronshaw and McCulloch, 2008, Couger et al., 1993, Wagner et al., 2011). Hence, it is reasonable to expect that such a design will provide a valuable tool to operational managers who wish to adopt (or not adopt) OSS in line with corporate strategy.

In summary, this research has sought to devise a conceptual model and methodology drawn from a philosophy of practical adequacy which can most likely be implemented by practitioners.

8.4.3. Implications for Policymakers

Certain governments are prohibited or otherwise disinclined to make use of US company's proprietary software for largely political reasons (e.g. Cuba and Venezuela) and have subsequently turned to OSS as an alternative by necessity or expedience (Tennant, 2008). Alternatively, other governments (e.g. in the U.K.), have elected to propose a 'level playing field' for OSS procurement for reason of 'flexibility' and the ability to 're-use' software (UKGovernment, 2010). More recently, in January 2014, the UK government has proposed the wider use of particular OSS projects (i.e. OpenOffice) in order to save some of the GBP200m spent by the UK public sector on MS Office licenses alone since 2010[7]. However, as previously discussed, Gwebu and Wang (2011) have argued that unless an innovation is properly accepted (i.e. by implementers and end-users) organisations cannot realistically claim that attempts to deploy an innovation have been successful(Gwebu and Wang, 2011)(Gwebu and Wang, 2011)(Gwebu and Wang, 2011). Therefore, as with the contribution to industry, this research can claim to have provided a practical and theoretically robust means of identifying driving and inhibiting factors to assist policymakers with intervention strategies for the wider deployment of OSS technologies.

8.5. Limitations

Like any other research project time and resources for this study were limited. Combined with significantly lower than expected response rates, this did affect the sample size that was achieved in this study. This has led to some challenges in relation to the ability to generalise the results (Seddon and Scheepers, 2012), having made use of a non-probability sampling technique (Saunders et al.,

[7] The Guardian http://www.theguardian.com/technology/2014/jan/29/uk-government-plans-switch-to-open-source-from-microsoft-office-suite

2009). Statistically significant representation, and generalisation to wider populations, may have otherwise been possible.

The results from the mixed-methods analysis were found to have marginal impact on the predictive power of the subsequent model in terms of internal validity (via binomial logistic regression). Although this was considered a worthwhile learning and research exercise, because of the time and effort expended, this inevitably draws into question the viability of such an approach in an operational setting. However, as discussed, the qualitative data was considered to augment the quantitative findings in terms of depth and richness of insight.

IS research has been criticised in the past for producing studies with poor statistical power, inappropriate research design and inadequate validation (Lee et al., 1997). However, other research argues that provided there is meta-analysis from an appropriate series of previous studies (i.e. the factors derived from the literature review), a research precedent and the appropriate theoretical structure (also developed in the literature review) then analytical, as opposed to statistical, generalisation can be cautiously claimed (Seddon and Scheepers, 2012).

Seddon and Scheeper (2013) have argued that 'generalisation' is defined as, "the researcher's act of arguing, by induction, that there is a reasonable expectation that a knowledge claim already believed to be true in one or more settings is also true in other clearly defined settings" (Seddon and Scheepers, 2012, p7, Table 1). However, in line with the same researchers' recommendations this research makes no claims with respect to generalisation, and leaves any conclusions as to transferability of the findings into other settings entirely to the reader.

8.6. Future Research

The following sections discuss some possible future avenues of research.

8.6.1. Methodological

From the reflexivity chapter, 'methodological reflexivity' is a common form of practice to identify new research possibilities at a technical or foundational level (Johnson and Duberley, 2003). This research originally planned to obtain a statistical representative sample of the FTSE500 list of companies, which was not possible for the reasons already explained. Therefore, with more time and resources a similar methodological approach, with greater emphasis on achieving the requisite sample size would be of greater academic and industrial importance than this research was able to achieve. The results of which would assist operational managers with more nomothetic, generalizable driving and inhibiting factors, which would prove a worthwhile pre-cursor to research more specific to the organisation in question, as represented by this research.

IS research has argued that longitudinal studies are, "Likely to be particularly revealing, as they can help us better understand the fluid relationships that exist between an adoption model's constructs and a variety of mutually influential set of behaviours users typically engage…" (Benbasat and Barki, 2007, p215). Although, this research did seek to reflect the changing 'rate of adoption' from 2010 to 2012 and rate of intention to adopt from 2013 to 2014, as well as differences in factors across ITG stages, a more traditional longitudinal approach where respondents are re-visited, would also prove fruitful.

Finally, the methodology developed for this research has been selected for its repeatability in an operational setting (e.g. via the popular MS Excel package). However, the analysis has been labour intensive. Some of the OSS projects which were reviewed in this research would be ideal platforms to automate these processes, and the code generated could be released as an OSS project, making the proposed research part of the OSS movement itself. This potential future research project would also be an example of 'communal reflexivity', also discussed in the reflexivity chapter (von Krogh and Spaeth, 2007).

8.6.2. Epistemological Reflexivity

From the reflexivity chapter, reviewing research at a fundamental epistemological level can also identify new research possibilities (Johnson and Duberley, 2003). This research touched on a more emancipatory approach to the subject area drawing on some of the critical theory epistemological perspectives which were originally referred to in the registration document for this research. In critical theory, more emphasis would be placed on the power structures at play in the IT software and IPR industries, and as discussed, would also prove a rich research vein.

8.6.3. Deconstructionist or Hyper-reflexivity

Also from the reflexivity chapter, more radical forms of reflexivity can also produce new research opportunities (Johnson and Duberley, 2003). As identified in this research, OSS production methods have been compared to academic discourse (Benkler, 2002). As demonstrated in this research organisational adoption of OSS is far from binary. That is, it is significantly complicated by the multi-stage processes of ITG and the multiple categories within organisational software itself (i.e. NAPCS categories). As discussed in the introductory chapter the global IT software industry has been valued at nearly USD3Trillion in the last ten years (Marketline, 2012). Therefore, drawing on post-modernist reflexive practice to some a diamond might seem an appropriate metaphor for this research space. It may also seem appropriate to form partnerships between government, universities and industry to develop OSS artefacts that follow the richest research vein of all, an integrated suite of OSS applications and systems alternatives to these categories of software as shown in Figure 8.2. The vertical market applications have been placed at the top of the figure as they are typically most relevant to end-users. The systems software has been placed to the bottom as they are typically less relevant to the end-users and more relevant to the IT department. Such partnerships could involve degree courses and research projects aimed at the further development and support of OSS artefacts.

As a resurgent form of software production, distribution and innovation, OSS has a great potential to include millions of individual (and organisational) developers drawn from every conceivable background (including academia, government and industry) (Benkler, 2002, Boulanger, 2005), and not restricted to a few thousand developers employed by a few large software organisations. The implication of this extended participation should be sustained innovation and competition in the industry, even if the industry consolidates to even fewer vendors. It can be reasonably expected, that this research and others like it, should assist operational managers to identify and overcome barriers and augment enablers in the adoption and usage of OSS in organisations.

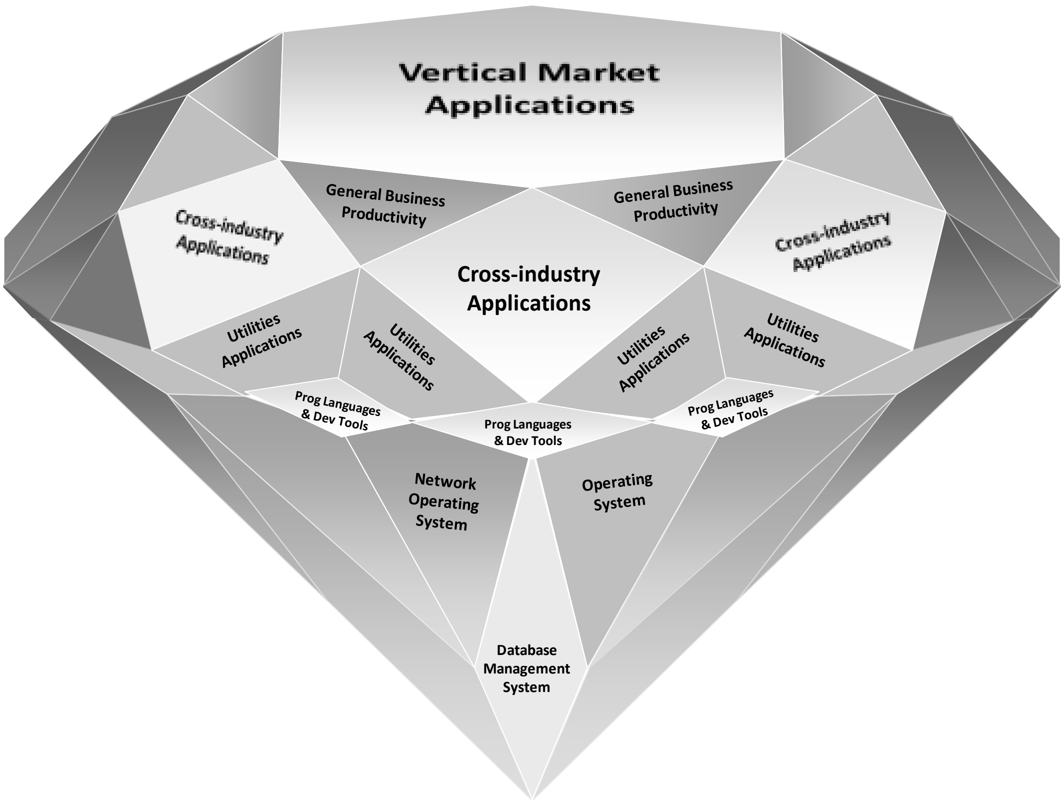


Figure 8.2: A Proposed Integrated Suite of Applications and Systems Software Based on a Diamond Metaphor (Adapted from NAPCS)

8.7. Summary

This research has successfully established a method of surveying a self-selected/purposive sample population to identify the driving and inhibiting factors associated with a variety of organisational OSS adoption behaviour to varying confidence levels and statistical strength. This study has drawn on well-known IS, psychological and organisational theoretical constructs (i.e. Theory of Planned Behaviour, Force Field Analysis, and IT Governance multi-stage model) to create a set of flexible and sophisticated conceptual models which were established via well-known non-parametric statistical techniques (i.e. Fisher Exact Test). The findings of this research are that the models developed have proven very accurate in predicting certain organisational OSS adoption behaviour (via Binomial Logistic Regression Analysis). This research also used a combination of quantitative and complimentary qualitative data (via Content Analysis) to establish a set of mixed-methods results (or meta-inferences) which would have otherwise not been possible via mono-methods alone. Furthermore, this mixed-method approach has found marginal improvement on quantitative results in the predictive capability of the models in a small number of organisational OSS adoption behaviours.

The findings of this research have modestly advanced the organisational OSS adoption and usage of innovation research field in which there has been a notable lack of empirical studies examining multiple stages of organisational OSS adoption and subcategories of software types. Additionally, this has been achieved in such a way so as to suit an operational environment in which a management intervention could accelerate OSS adoption through popular organisational diagnostics tools (such as Force Field Analysis) and readily available software tools such as MS Excel. As a result of this research experience the author has also made some recommendations for some potentially exciting future research studies which hint at the potential that OSS holds for academia, policy-makers and industry.

References

(ISI Web of Knowledge 2009) "Open Source" query in "Topic" field. Thomson Reuters, http://www.isiwebofknowledge.com/ (Downloaded Jan 2009).

ADAMS, D. A., NELSON, R. R. & TODD, P. A. (1992) PERCEIVED USEFULNESS, EASE OF USE, AND USAGE OF INFORMATION TECHNOLOGY - A REPLICATION. *MIS Quarterly,* 16**,** 227-247.

AHUJA, M. K. & THATCHER, J. B. (2005) Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use. *Mis Quarterly,* 29**,** 427-459.

AJZEN, I. (1991) THE THEORY OF PLANNED BEHAVIOR. *Organizational Behavior and Human Decision Processes,* 50**,** 179-211.

AJZEN, I. & MADDEN, T. J. (1986) PREDICTION OF GOAL-DIRECTED BEHAVIOR - ATTITUDES, INTENTIONS, AND PERCEIVED BEHAVIORAL-CONTROL. *Journal of Experimental Social Psychology,* 22**,** 453-474.

AKSULU, A. & WADE, M. (2010) A comprehensive review and synthesis of open source research. *Journal of the Association for Information Systems,* 11**,** 576-656.

ALLEN, J. P. & IEEE (2010) Open Source Deployment at the City and County of San Francisco: From Cost Reduction to Rapid Innovation. *43rd Hawaii International Conference on Systems Sciences Vols 1-5.*

ALSHARE, K. A., FREEZE, R. & KWUN, O. (2009) STUDENT INTENTION TO USE EXPERT SYSTEMS: AN EXPLORATORY STUDY. *Journal of Computer Information Systems,* 49**,** 105-113.

ALVESSON, M. (1995) The meaning and meaninglessness of postmodernism: Some ironic remarks. *Organization Studies,* 16**,** 1047-1075.

ALVESSON, M. (1996) Leadership studies: From procedure and abstraction to reflexivity and situation. *Leadership Quarterly,* 7**,** 455-485.

ALVESSON, M., HARDY, C. & HARLEY, B. (2008) Reflecting on reflexivity: Reflexive textual practices in organization and management theory. *Journal of Management Studies,* 45**,** 480-501.

ANFINNSEN, S., GHINEA, G. & DE CESARE, S. (2010) Web 2.0 and folksonomies in a library context. *International Journal of Information Management,* 31**,** 63-70.

ARGYRIS, C. (1977) DOUBLE LOOP LEARNING IN ORGANIZATIONS. *Harvard Business Review,* 55**,** 115-125.

AU, Y. A. & KAUFFMAN, R. J. (2003) What do you know? Rational expectations in information technology adoption and investment. *Journal of Management Information Systems,* 20**,** 49-76.

AVISON, D. E. & FITZGERALD, G. (2008) *Information systems development: methodologies, techniques, and tools: 4th Edition*, Blackwell Scientific Publications.

BAHMANZIARI, T., PEARSON, J. M. & CROSBY, L. (2003) Is trust important in technology adoption? A policy capturing approach. *Journal of Computer Information Systems,* 43**,** 46-54.

BANDURA, A. (1977) SELF-EFFICACY - TOWARD A UNIFYING THEORY OF BEHAVIORAL CHANGE. *Psychological Review,* 84**,** 191-215.

BARBOSA, D. H. & MUSETTI, M. A. (2010) Logistics information systems adoption: an empirical investigation in Brazil. *Industrial Management & Data Systems,* 110**,** 787-804.

BARRETT, M., HERACLEOUS, L. & WALSHAM, G. (2013) A Rhetorical Approach To It Diffusion: Re-conceptualizing The Ideology-Framing Relationship In Computerization Movements. *Mis Quarterly,* 37**,** 201-220.

BASKERVILLE, R. & PRIES-HEJE, J. (2001) A multiple-theory analysis of a diffusion of information technology case. *Information Systems Journal,* 11**,** 181-212.

BECKER, J. U., CLEMENT, M. & SCHAEDEL, U. (2010) The Impact of Network Size and Financial Incentives on Adoption and Participation in New Online Communities. *Journal of Media Economics,* 23**,** 165-179.

BENBASAT, I. & BARKI, H. (2007) Quo vadis, TAM? *Journal of the Association for Information Systems,* 8**,** 211-218.

BENKLER, Y. (2002) Coase's penguin, or, Linux and The Nature of the Firm. *Yale Law Journal,* 112**,** 369-+.

BHATTACHERJEE, A. & SANFORD, C. (2006) Influence processes for information technology acceptance: An elaboration likelihood model. *Mis Quarterly,* 30**,** 805-825.

BIXLER, R. P. & TAYLOR, P. L. (2012) Toward a Community of Innovation in Community-Based Natural Resource Management: Insights from Open Source Software. *Human Organization,* 71**,** 234-243.

BOUDREAU, M. C., GEFEN, D. & STRAUB, D. W. (2001) Validation in information systems research: A state-of-the-art assessment. *Mis Quarterly,* 25**,** 1-16.

BOULANGER, A. (2005) Open-source versus proprietary software: Is one more reliable and secure than the other? *IBM Systems Journal,* 44**,** 239-248.

BROWN, J. L. & KIERNAN, N. E. (2001) Assessing the subsequent effect of a formative evaluation on a program. *Evaluation and Program Planning,* 24**,** 129-143.

BROWN, S. A. & VENKATESH, V. (2005) Model of adoption of technology in households: A baseline model test and extension incorporating household life cycle. *Mis Quarterly,* 29**,** 399-426.

BRYDON, M. & VINING, A. R. (2008) Adoption, improvement, and disruption: Predicting the impact of open source applications in enterprise software markets. *Journal of Database Management,* 19**,** 73-94.

BRYMAN, A. (2008) Of methods and methodology. *Qualitative Research in Organizations and Management: An International Journal,* 3**,** 159 - 168.

BSA (2014) The Business Software Alliance, (downloaded February 2014). http://www.bsa.org/about-bsa.

BUENO, S. & GALLEGO, M. D. (2010) *Evaluating acceptance of OSS-ERP based on user perceptions,* Berlin, Springer-Verlag Berlin.

BURNS, A. C. & BUSH, B. R. F. (2007) *Basic Marketing Research Using Microsoft Excel Data Analysis*, Prentice Hall Press.

CAMPBELL-KELLY, M. (2008) Historical reflections Will the future of software be open source? *Communications of the ACM,* 51**,** 21-23.

CASSELL, M. (2008) Why governments innovate: Adoption and implementation of open source software by four European cities. *International Public Management Journal,* 11**,** 193-213.

CASSON, T. & RYAN, P. S. (2006) Open Standards, Open Source Adoption in the Public Sector, and Their Relationship to Microsoft s Market Dominance. *STANDARDS EDGE: UNIFIER OR DIVIDER?, Sherrie Bolin, ed., p. 87, Sheridan Books, 2006*.

CASTANEDA, J. A., MUNOZ-LEIVA, F. & LUQUE, T. (2007) Web Acceptance Model (WAM): Moderating effects of user experience. *Information & Management,* 44**,** 384-396.

CAVUSOGLU, H., HU, N., LI, Y. & MA, D. (2010) Information Technology Diffusion with Influentials, Imitators, and Opponents. *Journal of Management Information Systems,* 27**,** 305-334.

CHAU, P. Y. K. & TAM, K. Y. (2000) Organizational adoption of open systems: a 'technology-push, need-pull' perspective. *Information & Management,* 37**,** 229-239.

CHELIOTIS, G. (2009) From open source to open content: Organization, licensing and decision processes in open cultural production. *Decision Support Systems,* 47**,** 229-244.

CHENGALUR-SMITH, I., NEVO, S. & DEMERTZOGLOU, P. (2010) An Empirical Analysis of the Business Value of Open Source Infrastructure Technologies. *Journal of the Association for Information Systems,* 11**,** 708-729.

COMPEAU, D. R. & HIGGINS, C. A. (1995) COMPUTER SELF-EFFICACY - DEVELOPMENT OF A MEASURE AND INITIAL TEST. *Mis Quarterly,* 19**,** 189-211.

CONLON, M. P. (2012) Open Source Software in the Vertical Market: An Open Niche? *Journal of Information Systems Applied Research,* 5**,** 16.

CORNFORD, T., SHAIKH, M. & CIBORRA, C. (2010) Hierarchy, Laboratory and Collective: Unveiling Linux as Innovation, Machination and Constitution. *Journal of the Association for Information Systems,* 11**,** 809-837.

CORNFORD, T. & SMITHSON, S. (2006) *Project Research in Information Systems,* London, Palgrave.

COUGER, J. D., HIGGINS, L. F. & MCINTYRE, S. C. (1993) (UN)STRUCTURED CREATIVITY IN INFORMATION-SYSTEMS ORGANIZATIONS. *Mis Quarterly,* 17**,** 375-397.

CRONSHAW, S. F. & MCCULLOCH, A. N. A. (2008) Reinstating the Lewinian vision: From force field analysis to organization field assessment. *Organization Development Journal,* 26**,** 89-103.

CUNLIFFE, A. L. (2002) Reflexive dialogical practice in management learning. *Management Learning,* 33**,** 35-61.

CUNLIFFE, A. L. (2009) The Philosopher Leader: On Relationalism, Ethics and Reflexivity-A Critical Perspective to Teaching Leadership. *Management Learning,* 40**,** 87-101.

CURRIE, G. & KNIGHTS, D. (2003) Reflecting on a critical pedagogy in MBA education. *Management Learning,* 34**,** 27-49.

CYR, D. (2008) Modeling web site design across cultures: Relationships to trust, satisfaction, and e-loyalty. *Journal of Management Information Systems,* 24**,** 47-72.

DANCHEV, A. (2006) Social capital and sustainable behavior of the firm. *Industrial Management & Data Systems,* 106**,** 953-965.

DAVIDSON, E. & HESLINGA, D. (2007) Bridging the IT adoption gap for small physician practices: An action research study on electronic health records. *Information Systems Management,* 24**,** 15-28.

DAVIS, F. D. (1989) PERCEIVED USEFULNESS, PERCEIVED EASE OF USE, AND USER ACCEPTANCE OF INFORMATION TECHNOLOGY. *Mis Quarterly,* 13**,** 319-340.

DEDRICK, J. & WEST, J. (2003) Why Firms Adopt Open Source Platforms: Grounded Theory of Innovation and Standards Adoption. *MISQ Special Issue Workshop: Standard Making A Critical Research Frontier for Information Systems*.

DELIBASIC, B., VUKICEVIC, M. & JOVANOVIC, M. (2013) White-Box Decision Tree Algorithms: A Pilot Study on Perceived Usefulness, Perceived Ease of Use, and Perceived Understanding. *International Journal of Engineering Education,* 29**,** 674-687.

DEWBERRY, C. (2004) *Statistical Methods for Organizational Research: Theory and Practice,* Routledge.

DISHAW, M. T. & STRONG, D. M. (1999) Extending the technology acceptance model with task-technology fit constructs. *Information & Management,* 36**,** 9-21.

DIVAKARAN, P. K. P. (2013) Pre-release member participation as potential predictors of post-release community members' adoption behaviour: evidence from the motion picture industry. *Behaviour & Information Technology,* 32**,** 545-559.

DOBSON, P., JACKSON, P. & GENGATHAREN, D. (2013) EXPLAINING BROADBAND ADOPTION IN RURAL AUSTRALIA: MODES OF REFLEXIVITY AND THE MORPHOGENETIC APPROACH. *Mis Quarterly,* 37**,** 965-991.

DOS SANTOS, B. L. & PEFFERS, K. (1998) Competitor and vendor influence on the adoption of innovative applications in electronic commerce. *Information & Management,* 34**,** 175-184.

EPO (2013) Intellectual property rights intensive industries: contribution to economic performance and employment in the European Union. http://oami.europa.eu/ows/rw/resource/documents/observatory/IPR/joint_report_epo_ohim.pdf (downloaded 29th November 2013).

EUROPEAN-COMMISSION (2011) http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm (Downloaded 7th February 2011). Brussels, The European Commission.

FARZANDIPOUR, M., SHEIKHTAHERI, A. & SADOUGHI, F. (2009) Effective factors on accuracy of principal diagnosis coding based on International Classification of Diseases, the 10th revision (ICD-10). *International Journal of Information Management,* 30**,** 78-84.

FICHMAN, R., G. (1992) Information technology diffusion: a review of empirical research. *Proceedings of the thirteenth international conference on Information systems.* Dallas, Texas, United States, University of Minnesota.

FIELD, A. (2005) Discovering statistics with SPSS. *London: Sage, Last access: August,* 27**,** 2012.

FISHBEIN, M. & AJZEN, I. (2010) *Predicting and changing behavior : the reasoned action approach,* New York, Psychology Press.

FITZGERALD, B. (2006a) The transformation of open source software. *Mis Quarterly,* 30**,** 587-598.

FITZGERALD, B. (2006b) The transformation of open source software. *Mis Quarterly***,** 587-598.

FITZGERALD, B. & AGERFALK, P. J. (2005) The Mysteries of Open Source Software: Black and White and Red All Over? *System Sciences, 2005. HICSS '05. Proceedings of the 38th Annual Hawaii International Conference on.*

FLYVBJERG, B. & BUDZIER, A. (2011) Why your IT project may be riskier than you think. *Harv Bus Rev,* 89**,** 23-25.

FSF (2014) The Free Software Foundation (downloaded February 2014). *http://www.fsf.org/licensing/essays/free-sw.html*.

GALLAUGHER, J. M. & WANG, Y. M. (2002) Understanding network effects in software markets: Evidence from Web server pricing. *Mis Quarterly,* 26**,** 303-327.

GALLEGO, M. D., LUNA, P. & BUENO, S. (2007) Designing a forecasting analysis to understand the diffusion of open source software in the year 2010. *Technological Forecasting and Social Change,* 75**,** 672-686.

GALLEGO, M. D., LUNA, P. & BUENO, S. (2008) User acceptance model of open source software. *Computers in Human Behavior,* 24**,** 2199-2216.

GDS (2012) UK Government Cabinet Office, Government Digital Services, https://gds.blog.gov.uk/2012/10/12/coding-in-the-open/ (downloaded 4th August 2014). UK Government.

GLYNN, E., FITZGERALD, B., EXTON, C. & IEEE (2005) *Commercial adoption of open source software: An empirical study*.

GOODE, S. (2005) Something for nothing: management rejection of open source software in Australia's top firms. *Information & Management,* 42**,** 669-681.

GWEBU, K. L. & WANG, J. (2011) Adoption of Open Source Software: The role of social identification. *Decision Support Systems,* 51**,** 220-229.

HAIDER, A. (2008) *Issues of Open Source Software Uptake in Australian Government Agencies*.

HANSETH, O., JACUCCI, E., GRISOT, M. & AANESTAD, M. (2006) Reflexive standardization: Side effects and complexity in standard making. *Mis Quarterly,* 30**,** 563-581.

HARMAN, K. & KOOHANG, A. (2005) Frequency of publication and topical emphasis of knowledge management books versus doctoral dissertations: 1983-2005. *Journal of Computer Information Systems,* 46**,** 64-68.

HAU, Y. S. & KIM, Y. G. (2011) Why would online garners share their innovation-conducive knowledge in the online game user community? Integrating individual motivations and social capital perspectives. *Computers in Human Behavior,* 27**,** 956-970.

HAUGE, O., AYALA, C. & CONRADI, R. (2010) Adoption of open source software in software-intensive organizations - A systematic literature review. *Information and Software Technology,* 52**,** 1133-1154.

HEVNER, A. R., MARCH, S. T., PARK, J. & RAM, S. (2004) Design science in Information Systems research. *Mis Quarterly,* 28**,** 75-105.

HILTON, T., OH, S. H. D. & AL-LAWATI, H. (2006) Information systems ethics in the triad. *Journal of Computer Information Systems,* 46**,** 78-102.

HOLLAND, R. (1999) Reflexivity. *Human Relations,* 52**,** 463-484.

HOVAV, A., PATNAYAKUNI, R. & SCHUFF, D. (2004) A model of Internet standards adoption: the case of IPv6. *Information Systems Journal,* 14**,** 265-294.

HOWCROFT, D. & LIGHT, B. (2010) The Social Shaping of Packaged Software Selection. *Journal of the Association for Information Systems,* 11**,** 122-148.

HWANG, W. & MIN, H. (2013) Assessing the impact of ERP on supplier performance. *Industrial Management & Data Systems,* 113**,** 1025-1047.

JEYARAJ, A., ROTTMAN, J. W. & LACITY, M. C. (2006) A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of Information Technology,* 21**,** 1-23.

JINWEI, C., CREWS, J. M., MING, L., DEOKAR, A., BURGOON, J. K. & NUNAMAKER JR, J. F. (2006) Interactions Between System Evaluation and Theory Testing: A Demonstration of the Power of a Multifaceted Approach to Information Systems Research. *Journal of Management Information Systems,* 22**,** 207-235.

JOHNSON, P. & DUBERLEY, J. (2000) *Understanding management research : an introduction to epistemology,* London, SAGE.

JOHNSON, P. & DUBERLEY, J. (2003) Reflexivity in management research. *Journal of Management Studies,* 40**,** 1279-1303.

JOHNSON, R. B. & ONWUEGBUZIE, A. J. (2004) Mixed methods research: A research paradigm whose time has come. *Educational researcher,* 33**,** 14-26.

JOHNSTON, R. B. & GREGOR, S. (2000) A theory of industry-level activity for understanding the adoption of interorganizational systems. *European Journal of Information Systems,* 9**,** 243-251.

JUN, K. N. & WEARE, C. (2011) Institutional Motivations in the Adoption of Innovations: The Case of E-Government. *Journal of Public Administration Research and Theory,* 21**,** 495-519.

KARAHANNA, E., STRAUB, D. W. & CHERVANY, N. L. (1999) Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *Mis Quarterly,* 23**,** 183-213.

KHAIATA, M. & ZUALKERNAN, I. A. (2009) A Simple Instrument to Measure IT-Business Alignment Maturity. *Information Systems Management,* 26**,** 138-152.

KIM, H. W., CHAN, H. C. & GUPTA, S. (2007) Value-based adoption of mobile internet: An empirical investigation. *Decision Support Systems,* 43**,** 111-126.

KING, J. L., GURBAXANI, V., KRAEMER, K. L., MCFARLAN, F. W., RAMAN, K. S. & YAP, C. S. (1994) INSTITUTIONAL FACTORS IN INFORMATION TECHNOLOGY INNOVATION. *Information Systems Research,* 5**,** 139-169.

KOGUT, B. & METIU, A. (2001) Open-source software development and distributed innovation. *Oxford Review of Economic Policy,* 17**,** 248-264.

KONANA, P. & BALASUBRAMANIAN, S. (2005) The Social-Economic-Psychological model of technology adoption and usage: an application to online investing. *Decision Support Systems,* 39**,** 505-524.

LANGLEY, A. (1999) Strategies for theorizing from process data. *Academy of Management review,* 24**,** 691-710.

LEE, B., BARUA, A. & WHINSTON, A. B. (1997) Discovery and representation of causal relationships in MIS research: A methodological framework. *Mis Quarterly,* 21**,** 109-136.

LEE, S. M. & LEE, S. H. (2012) Success factors of open-source enterprise information systems development. *Industrial Management & Data Systems,* 112**,** 1065-1084.

LI, J. P., CHEN, R., LEE, J. & RAO, H. R. (2013a) A case study of private-public collaboration for humanitarian free and open source disaster management software deployment. *Decision Support Systems,* 55**,** 1-11.

LI, Y., TAN, C.-H., XU, H. & TEO, H.-H. (2011) Open source software adoption: motivations of adopters and amotivations of non-adopters. *ACM SIGMIS Database,* 42**,** 76-94.

LI, Y., TAN, C. H. & YANG, X. (2013b) OSS ADOPTION: ORGANIZATIONAL INVESTMENT IN INTERNAL HUMAN CAPITAL. *Journal of Computer Information Systems,* 54**,** 42-52.

LIANG, H. G., SARAF, N., HU, Q. & XUE, Y. J. (2007) Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. *Mis Quarterly,* 31**,** 59-87.

LIANG, T. P. & HUANG, J. S. (1998) An empirical study on consumer acceptance of products in electronic markets: a transaction cost model. *Decision Support Systems,* 24**,** 29-43.

LUFTMAN, J. & BEN-ZVI, T. (2010) KEY ISSUES FOR IT EXECUTIVES 2010: JUDICIOUS IT INVESTMENTS CONTINUE POST-RECESSION. *Mis Quarterly Executive,* 9**,** 263-273.

LUNDELL, B., LINGS, B. & LINDQVIST, E. (2010a) Open source in Swedish companies: where are we? *Information Systems Journal,* 20**,** 519-535.

LUNDELL, B., LINGS, B. & SYBERFELDT, A. (2010b) Practitioner perceptions of Open Source software in the embedded systems area. *Journal of Systems and Software,* 84**,** 1540-1549.

LYYTINEN, K., BASKERVILLE, R., IIVARI, J. & TE'ENI, D. (2007) Why the old world cannot publish? Overcoming challenges in publishing high-impact IS research. *European Journal of Information Systems,* 16**,** 317-326.

LYYTINEN, K. & DAMSGAARD, J. (2011) Inter-organizational information systems adoption - a configuration analysis approach. *European Journal of Information Systems,* 20**,** 496-509.

MACREDIE, R. D. & MIJINYAWA, K. (2011) A theory-grounded framework of Open Source Software adoption in SMEs. *European Journal of Information Systems,* 20**,** 237-250.

MALHOTRA, Y. & GALLETTA, D. (2005) A multidimensional commitment model of volitional systems adoption and usage behavior. *Journal of Management Information Systems,* 22**,** 117-151.

MARKETLINE (2012) Global Software. *Software Industry Profile: Global.* MarketLine, a Datamonitor business.

MARSAN, J., PARE, G. & WYBO, M. D. (2012) Has open source software been institutionalized in organizations or not? *Information and Software Technology,* 54**,** 1308-1316.

MARTINEZ-GARCIA, A., MORENO-CONDE, A., JODAR-SANCHEZ, F., LEAL, S. & PARRA, C. (2013) Sharing clinical decisions for multimorbidity case management using social network and open-source tools. *Journal of Biomedical Informatics,* 46**,** 977-984.

MATA, F. J., FUERST, W. L. & BARNEY, J. B. (1995) Information technology and sustained competitive advantage: A resource-based analysis. *Mis Quarterly,* 19**,** 487-505.

MEHRA, A., DEWAN, R. & FREIMER, M. (2011) Firms as Incubators of Open-Source Software. *Information Systems Research,* 22**,** 22-38.

MEYER, J. W. & ROWAN, B. (1977) Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology,* 83**,** 340-363.

MINGERS, J. (2001) Combining IS research methods: Towards a pluralist methodology. *Information Systems Research,* 12**,** 240-259.

MINGERS, J. (2003) The paucity of multimethod research: a review of the information systems literature. *Information Systems Journal,* 13**,** 233-249.

MOORE, G. C. & BENBASAT, I. (1991) Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research,* 2**,** 192-222.

MORAD, S., KUFLIK, T. & SOCIETY, I. C. (2005) *Conventional and open source software reuse at orbotech - An industrial experience*.

MORGAN, L., FELLER, J. & FINNEGAN, P. (2012) Exploring value networks: theorising the creation and capture of value with open source software. *European Journal of Information Systems,* 22**,** 569-588.

MOSOVAL, F., GARDINER, J., HEALEY, P., PRESTEDGE, A., JOHNSTON, K. & PACIS (2006) *The State of Open Source Software (OSS) In South Africa*.

MOUNT, M. P. & FERNANDES, K. (2013) Adoption of free and open source software within high-velocity firms. *Behaviour & Information Technology,* 32**,** 231-246.

NAGY, D., YASSIN, A. M. & BHATTACHERJEE, A. (2010) Organizational Adoption of Open Source Software: Barriers and Remedies. *Communications of the Acm,* 53**,** 148-151.
NGAI, E. W. T., LAI, K.-H. & CHENG, T. C. E. (2008) Logistics information systems: The Hong Kong experience. *International Journal of Production Economics,* 113**,** 223-234.
NGWENYAMA, O. K. & LEE, A. S. (1997) Communication richness in electronic mail: Critical social theory and the contextuality of meaning. *Mis Quarterly,* 21**,** 145-167.
NICKERSON, J. V. & ZUR MUEHLEN, M. (2006) The ecology of standards processes: Insights from Internet standard making. *Mis Quarterly,* 30**,** 467-488.
OLIVER, D. & ROMM, C. (2002) Justifying enterprise resource planning adoption. *Journal of Information Technology,* 17**,** 199-213.
ORLIKOWSKI, W. J. (2000) Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Science,* 11**,** 404-428.
OSI (2014) The Open Source Initiative (downloaded in February 2014). *http://opensource.org/osd*.
PARE, G., WYBO, M. & DELANNOY, C. (2009a) Barriers to Open Source Software Adoption in Quebec's Health Care Organizations. *Journal of Medical Systems,* 33**,** 1-7.
PARE, G., WYBO, M. D. & DELANNOY, C. (2009b) Barriers to Open Source Software Adoption in Quebec's Health Care Organizations. *Journal of Medical Systems,* 33**,** 1-7.
PERR, J., APPLEYARD, M. M. & SULLIVAN, P. (2011) Open for business: emerging business models in open source software. *International Journal of Technology Management,* 52**,** 432-456.
PHILLIPS, E. & PUGH, D. (2007) *How to get a PhD: A handbook for students and their supervisors*, McGraw-Hill International.
PING, W. (2009) Popular Concepts beyond Organizations: Exploring New Dimensions of Information Technology Innovations. *Journal of the Association for Information Systems,* 10**,** 1-30.
POBA-NZAOU, P. & RAYMOND, L. (2011) Managing ERP system risk in SMEs: a multiple case study. *Journal of Information Technology,* 26**,** 170-192.
RASCH, R. H. & TOSI, H. L. (1992) FACTORS AFFECTING SOFTWARE DEVELOPERS PERFORMANCE - AN INTEGRATED APPROACH. *Mis Quarterly,* 16**,** 395-413.
RECKER, J. & LA ROSA, M. (2012) Understanding user differences in open-source workflow management system usage intentions. *Information Systems,* 37**,** 200-212.
REMENYI, D., WHITE, T. & SHERWOOD-SMITH, M. (1999) Language and a post-modern management approach to information systems. *International Journal of Information Management,* 19**,** 17-32.
RHODES, C. & BROWN, A. D. (2005) Writing responsibly: Narrative fiction and organization studies. *Organization,* 12**,** 467-491.
ROGERS, E. M. (2003) *Diffusion of Innovations,* London, Simon & Schuster.
SACCOL, A. Z. & REINHARD, N. (2006) The Hospitality Metaphor as a theoretical lens for understanding the ICT adoption process. *Journal of Information Technology,* 21**,** 154-164.
SAMBAMURTHY, V. & ZMUD, R. W. (1999) Arrangements for information technology governance: A theory of multiple contingencies. *Mis Quarterly,* 23**,** 261-290.
SANTOS, C., KUK, G., KON, F. & PEARSON, J. (2013) The attraction of contributors in free and open source software projects. *Journal of Strategic Information Systems,* 22**,** 26-45.
SAUNDERS, M., THORNHILL, A. & LEWIS, P. (2009) *Research methods for business students,* Financial Times/Prentice Hall.
SCOTT, S. V. & BARRETT, M. I. (2005) Strategic risk positioning as sensemaking in crisis: the adoption of electronic trading at the London international financial futures and options exchange. *Journal of Strategic Information Systems,* 14**,** 45-68.
SEDDON, P. B. & SCHEEPERS, R. (2012) Towards the improved treatment of generalization of knowledge claims in IS research: drawing general conclusions from samples. *European Journal of Information Systems,* 21**,** 6-21.

SEN, R. (2007) A strategic analysis of competition between open source and proprietary software. *Journal of Management Information Systems,* 24**,** 233-257.
SHEPPARD, B. H., HARTWICK, J. & WARSHAW, P. R. (1988) THE THEORY OF REASONED ACTION - A META-ANALYSIS OF PAST RESEARCH WITH RECOMMENDATIONS FOR MODIFICATIONS AND FUTURE-RESEARCH. *Journal of Consumer Research,* 15**,** 325-343.
SLEDGIANOWSKI, D. & KULVIWAT, S. (2009) USING SOCIAL NETWORK SITES: THE EFFECTS OF PLAYFULNESS, CRITICAL MASS AND TRUST IN A HEDONIC CONTEXT. *Journal of Computer Information Systems,* 49**,** 74-83.
SMALL, M. H. & YASIN, M. (2000) Human factors in the adoption and performance of advanced manufacturing technology in unionized firms. *Industrial Management & Data Systems,* 100**,** 389-401.
SOJA, P. (2011) Examining Determinants of Enterprise System Adoptions in Transition Economies: Insights From Polish Adopters. *Information Systems Management,* 28**,** 192-210.
SOJER, M. & HENKEL, J. (2010) Code Reuse in Open Source Software Development: Quantitative Evidence, Drivers, and Impediments. *Journal of the Association for Information Systems,* 11**,** 868-901.
SON, J. Y., KIM, S. S. & RIGGINS, F. J. (2006) Consumer adoption of net-enabled infomediaries: Theoretical explanations and an empirical test. *Journal of the Association for Information Systems,* 7**,** 473-508.
STAHL, B. C. (2014) Interpretive accounts and fairy tales: a critical polemic against the empiricist bias in interpretive IS research. *European Journal of Information Systems,* 23**,** 1-11.
STEWART, K. J., AMMETER, A. P. & MARUPING, L. M. (2006) Impacts of license choice and organizational sponsorship on user interest and development activity in open source software projects. *Information Systems Research,* 17**,** 126-144.
STEWART, K. J. & GOSAIN, S. (2006) THE IMPACT OF IDEOLOGY ON EFFECTIVENESS IN OPEN SOURCE SOFTWARE DEVELOPMENT TEAMS. *MIS Quarterly,* 30**,** 291-314.
STREINER, D. L. (2003) Starting at the beginning: An introduction to coefficient alpha and internal consistency. *Journal of Personality Assessment,* 80**,** 99-103.
SUSSMAN, S. W. & SIEGAL, W. S. (2003) Informational influence in organizations: An integrated approach to knowledge adoption. *Information Systems Research,* 14**,** 47-65.
TAN, J., TYLER, K. & MANICA, A. (2007) Business-to-business adoption of eCommerce in China. *Information & Management,* 44**,** 332-351.
TANSLEY, C., HUANG, J. & FOSTER, C. (2013) Identity ambiguity and the promises and practices of hybrid e-HRM project teams. *Journal of Strategic Information Systems,* 22**,** 208-224.
TASHAKKORI, A. & CRESWELL, J. W. (2007) Editorial: The new era of mixed methods. *Journal of mixed methods research,* 1**,** 3-7.
TAYLOR, S. & TODD, P. A. (1995) Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research,* 6**,** 144-176.
TENNANT, D. (2008) Who's Anticompetitive? *Computerworld.* 42 ed.
TORAL, S. L., ROCIO MARTINEZ-TORRES, M., BARRERO, F. & CORTES, F. (2009) An empirical study of the driving forces behind online communities. *Internet Research,* 19**,** 378-392.
TRUEX, D., HOLMSTRÃ¶M, J. & KEIL, M. (2006) Theorizing in information systems research: A reflexive analysis of the adaptation of theory in information systems research. *Journal of the Association for Information Systems,* 7**,** 797-821.
UKGOVERNMENT (2010) The Open Source, Open Standards and Re-use Strategy. *UK Government, The Cabinet Office Website.*
US DEPARTMENT OF LABOR, B. O. L. S. (2011) http://www.bls.gov/soc/ (downloaded February 2011). Washington DC, US Federal Government.
USCB (2003) United States Census Bureau, http://www.census.gov/eos/www/napcs/index.html (downloaded 2nd December 2013). Washington DC, US Federal Government.

USPTO (2012) Intellectual Property and the US Economy: Industries in Focus. http://www.uspto.gov/news/publications/IP_Report_March_2012.pdf. (Downloaded 29th November 2013). US Patent and Trademark Office.
VAN ROOIJ, S. W. (2011) Higher education sub-cultures and open source adoption. *Computers & Education,* 57**,** 1171-1183.
VEN, K. & VERELST, J. (2008) The impact of ideology on the organizational adoption of open source software. *Journal of Database Management,* 19**,** 58-72.
VEN, K. & VERELST, J. (2009) The Importance of External Support in the Adoption of Open Source Server Software. IN BOLDYREFF, C. C. K. L. B. W. A. I. (Ed.) *Open Source Ecosystems-Diverse Communities Interacting.*
VEN, K., VERELST, J. & MANNAERT, H. (2008) Should You Adopt Open Source Software? *Software, IEEE,* 25**,** 54-59.
VENKATESH, V., BROWN, S. A. & BALA, H. (2013) Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *Mis Quarterly,* 37**,** 21-54.
VENKATESH, V. & DAVIS, F. D. (2000) A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science,* 46**,** 186-204.
VENKATESH, V., MORRIS, M. G., DAVIS, G. B. & DAVIS, F. D. (2003) USER ACCEPTANCE OF INFORMATION TECHNOLOGY: TOWARD A UNIFIED VIEW. *Mis Quarterly,* 27**,** 425-478.
VITHARANA, P., KING, J. & CHAPMAN, H. S. (2010) Impact of Internal Open Source Development on Reuse: Participatory Reuse in Action. *Journal of Management Information Systems,* 27**,** 277-304.
VON KROGH, G. (2009) Individualist and collectivist perspectives on knowledge in organizations: Implications for information systems research. *Journal of Strategic Information Systems,* 18**,** 119-129.
VON KROGH, G. & SPAETH, S. (2007) The open source software phenomenon: Characteristics that promote research. *Journal of Strategic Information Systems,* 16**,** 236-253.
WAGNER, H. T., MORTON, S. C., DAINTY, A. R. J. & BURNS, N. D. (2011) Path dependent constraints on innovation programmes in production and operations management. *International Journal of Production Research,* 49**,** 3069-3085.
WARD, D. J. & TAO, E. Y. (2009) *Open Source Software Use in Municipal Government: Is full immersion possible?*
WEB-OF-KNOWLEDGE (2014). New York, London and Toronto, Thomson Reuters Corporation, Web of Knowledge.
WEBER, R. (2003) Editor's Comments: The Reflexive Researcher. *MIS Quarterly,* 27**,** v-xiv.
WEBSTER, J., WATSON, R.T. (2002) Analyzing the Past to Prepare for the Future: Writing a Literature Review. *Mis Quarterly***,** xiii-xxiii.
WEITZEL, T., BEIMBORN, D. & KONIG, W. (2006) A unified economic model of standard diffusion: The impact of standardization cost, network effects, and network topology. *Mis Quarterly,* 30**,** 489-514.
WHITMORE, A., CHOI, N. & ARZRUMTSYAN, A. (2009) OPEN SOURCE SOFTWARE: THE ROLE OF MARKETING IN THE DIFFUSION OF INNOVATION. *Information Technology and Control,* 38**,** 91-101.
WILLIAMS, M. D., DWIVEDI, Y. K., LAL, B. & SCHWARZ, A. (2009) Contemporary trends and issues in IT adoption and diffusion research. *Journal of Information Technology,* 24**,** 1-10.
WIPO (2013) What is Intellectual Property? , http://www.wipo.int/about-ip/en/ (downloaded 29th November 2013).
XUE, Y. J., LIANG, H. G. & BOULTON, W. R. (2008) Information technology governance in information technology investment decision processes: The impact of investment characteristics, external environment, and internal context. *Mis Quarterly,* 32**,** 67-96.

YATES, F. (1984) Tests of Significance for 2x2 Contingency Tables. *Journal of the Royal Statistical Society. Series A (General)*, 147**,** 426-463.
ZAIONTZ (2014) Dr Charles Zaiontz, "Real Statistics using MS Excel Website", http://www.real-statistics.com/author/downloaded (Resource Pack downloaded January 2014).
ZHOU, Z. Y., JIN, X. L., VOGEL, D. R., FANG, Y. L. & CHEN, X. J. (2011) Individual motivations and demographic differences in social virtual world uses: An exploratory investigation in Second Life. *International Journal of Information Management*, 31**,** 261-271.
ZHU, K., DONG, S. T., XU, S. X. & KRAEMER, K. L. (2006) Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. *European Journal of Information Systems*, 15**,** 601-616.
ZHU, K., KRAEMER, K. L., XU, S. & DEDRICK, J. (2004) Information technology payoff in e-business environments: An international perspective on value creation of e-business in the financial services industry. *Journal of Management Information Systems*, 21**,** 17-54.

Appendices

Appendix A: NAPCS Software Industry Classification

Systems Software

According to the USCB, systems software (working group 1.9.1) can be defined as, "Low-level software published on own-account that is designed to manage computer resources and support the production or execution of application programs but which is not specific to any particular application" (USCB, 2003). Systems software can be further divided between Operating System (1.9.1.1), such as Microsoft Windows; Network System (1.9.1.2), such as Novell; Database Management (1.9.1.3), such as Oracle Database; and Development Tools and Programming Languages categories (1.9.1.4), such as Microsoft VisualStudio (ibid.)

Operating System Software

Firstly, the Operating System Software category is classified as, "Systems software published on own-account that is designed to handle the interface to peripheral hardware, schedules tasks, allocate storage, and present a default interface to the user when no application program is running. Includes: all client and network operating systems" (USCB, 2003). An example of a proprietary software Operating System is Microsoft Corporation's Windows (Sen, 2007, Goode, 2005, Gallego et al., 2008). An example of an OSS alternative is Linus Torvald's Linux (ibid).

Network System Software

Secondly, the Network System Software category is classified as, "Systems software published on own-account that is designed to control, monitor, manage and communicate with operating systems, networks, network services, databases, storage, and networked applications in an integrated and cooperative fashion across a network from a central location. Includes: all network management software, server software, security & encryption software, and middleware etc." (USCB, 2003). An example of a proprietary software network system is The Microsoft Corporation's Internet Information Server (Microsoft IIS), commonly known as a Web Server (Goode, 2005, Sen, 2007). An example of an OSS alternative would be The Apache Foundation's Apache Web Server (ibid).

Database Management System Software

Thirdly, the Database Management System (DBMS) software category is classified as, "Collection/suite of systems software published on own-account that is designed to enable storage, modification, and extraction of information from a database. Includes: DBMSs ranging from small systems that run on personal computers to huge systems that run on mainframes, e.g. Oracle" (USCB, 2003). An example of a proprietary database management system is The Oracle Corporation's relational database (Sen, 2007). An example of an OSS alternative relational database is PostGreSQL (ibid).

Development Tools and Programming Languages Software

Fourthly, the Development Tools and Programming Languages category is classified as, "Systems software published on own-account that is designed to assist in the development and/or authoring of computer programs. Includes software products that support the professional developer in the design, development, and implementation of a variety of software systems and solutions; and all program development tools and programming languages software" (USCB, 2003). An example of a proprietary development tool would be The Microsoft Corporation's Visual Studio (reference?). An example of an OSS alternative is The Eclipse Foundation's Eclipse Platform (Brydon and Vining, 2008). These development tools are effectively applications which facilitate programmer productivity, rather than end-user productivity, which explains the systems categorisation. The programming languages themselves are part of what defines OSS (i.e. access to source code) and therefore examples of proprietary or OSS alternatives are not considered here.

Applications Software

According to USCB, applications software (working group 1.9.2) can be defined as, "Software published on own-account that is designed to perform a specific function directly for the end user" (USCB, 2003). Applications software can be further divided between General Business Productivity Applications (1.9.2.1), Cross-industry Applications (1.9.2.2), Vertical Market Applications (1.9.2.3), Utilities Applications (1.9.2.4) and Home Entertainment, education, and Computer Game Applications (1.9.2.5) (ibid). As this study is concerned with organisational adoption and usage of software, only the first four categories, and therefore Computer Game Applications will not be considered here.

General Business Productivity Software

Firstly, the General Business Productivity category is classified as, "Software published on own-account that is designed for general business purposes to improve productivity. Includes: office suite applications such as word processor, spreadsheet, and simple database software; graphics applications software; project management software, computer-based training software, and reference software etc." (USCB, 2003). An example of proprietary general business productivity software is The Microsoft Corporation Office Suite, or Microsoft Office (Goode, 2005). An example of an OSS alternative was OpenOffice (Goode, 2005, Brydon and Vining, 2008), which was later forked to LibreOffice after 2010 by The Document Foundation.

Cross-industry Software

Secondly, the Cross-industry category is classified as, "Software published on own-account that is designed to perform and/or manage a specific business function or process that is not unique to a particular industry. Includes: professional accounting software, human resource management software, customer relations management (CRM) software, geographic Information system software, and web page/site design software etc" (USCB, 2003). Examples of proprietary cross-industry category software include The Microsoft Corporation's "Microsoft CRM" or The Oracle

Corporation's "Oracle CRM" (Brydon and Vining, 2008). An example of an OSS alternative is SugarCRM (Brydon and Vining, 2008).

Vertical Market Software

Thirdly, the Vertical Market category is classified as, "Software published on own-account that is designed to perform a wide range of business functions for a specific industry such as manufacturing, retail, healthcare, engineering, and restaurants…" (USCB, 2003). Some researchers argue that, in its strictest definition, there are potentially as many vertical market software applications as there are vertical markets (Conlon, 2012). However, one study was only able to find ten such OSS applications, five of which were for library systems, two for microfinance and the remainder were restaurant point of sale, specialist machinery manufacture Enterprise Resource Planning (ERP) and financial analytics (ibid).

Utilities Software

Fourthly, the Utilities application software category is classified as, "Small computer programs published on own-account that are designed to perform a very specific task. Utilities differ from other applications software in terms of size, cost, and complexity. Includes: compression programs, anti-virus, search engines, font, file viewers, and voice recognition software etc" (USCB, 2003). An example of proprietary utilities software is The Corel Corporation's Winzip file compression and decompression software (Goode, 2005). An example of an OSS alternative is Igor Pavlov's 7-Zip utility (ibid).

Appendix B: Lessor-used Theories used in IS Adoption and Usage Research

The remaining 47 theories identified were, “"1-Actor-network theory (2);2-Adaptive Learning Theory; 3-Comptitive Advantage; 4-Contingency Theory; 5-Critical Theory; 6-Decomposed Theory of Planned Behaviour (DTPB); 7-Demand pull and Supply Push; 8-Dual-process models of informational influence; 9-Ecological Approach/Theory; 10-Economics of Adoption; 11-Economics of Intermediation; 12-Elaboration Likelihood Model; 13-Expectancy Theory; 14-External, Internal and Mixed influence models; 15-Flow Theory; 16-Hofstede's Work on Culture and Social Presence (2); 17-Information Behaviour Model; 18-Information Richness Theory; 19-Institutional Motivations; 20-Institution-based Trust Theory; 21-Institutional Theory; 22-Interactive model; 23-Kelman's Social Influence Framework; 24-Linked-chain Model; 25-MATH; 26-Mutual Shaping; 27-National Culture (2); 28-Network Externalities (6); 29-Phenomenology; 30-Perceived Critical Mass Effect (2); 31-Perceived e-Rediness Model; 32-Rational Expectation Hypothesis; 33-Resource Based Theory (2); 34-Sensemaking Perspective; 35-Social-Economic-Psychological (SEP) Model of Technology Adoption and Usage; 36-Social Identity Theory; 37-Social Shaping; Stakeholders Analysis; Task-technology fit Model (2); 38-Technology-Push (TP), Need-pull (NP); 39-The Hospitality Metaphor as a theoretical lense for understanding the ICT adoption; 40-Theory of Consumer Choice and Decision Making; Theory of Disruptive Technology; 41-Theory of Industry-level Activity; 42-Theories of Technology Use Mediation and Communities of Practice; 43-Transaction Cost Theory (3); 44-The Theory of Trying; Unified Economic Model; 45-Value-based Adoption Model (VAM); 46-Web Acceptance Mode; 47-UTAUT" (Williams et al., 2009)

Theories Associated with Adoption and Usage (Williams et al., 2009)	***Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)***	***Definition/Description (citation)***	***Theoretical Typology (Process, Variance or Hybrid)***
Competitive Advantage (CA)	2,202	"[Sustained CA is impacted by] the relative cost position of a firm, a firm's ability to differentiate its products, and the ability of firms to co-operate in strategic alliances" (Mata et al., 1995)	Process
Contingency Theory (CoT)	29	"[CoT} investigates how environmental variables influence the behaviours of organisations. Contingency theory is predicated on the premise that the firm's strategy, including information and communication technology (ICT) adoption strategy, depends on its endogenous and exogenous business environments" (Hwang and Min, 2013)	Process
Technology Push (TP), Need-pull (NP)	8	"Two schools of thought, namely the TP and the NP, propose and support two different arguments. The TP school suggests that innovation is driven by science, and thus drives technology and application: scientific discovery triggers the sequence of events which end in diffusion or application of the discovery. The TP force stems from recognition of a new technological means for enhancing performance... with appropriate structure and strategy, adoption of new technology could create substantial and sustainable competitive advantages... [On the other hand] the NP proponents argue that user needs are the key drivers of adoption... NP innovations have been found to be characterised by higher probabilities for commercial success than have technology-push innovations" (Chau and Tam, 2000)	Variance
Social Shaping (SS); Stakeholder Analysis/Theory (SA/ST), Task Technology Fit Model (TTFM)	8	"[SS] both examines the content of technology and offers an exploration of the particular processes and context that frame the technological innovation. It achieves this with the provision of explanatory concepts that pattern the design and use of technology... the innovation process [is] contradictory and uncertain, which contributes towards explaining why the excellence of a particular technological solution will not necessarily guarantee its success" (Howcroft and Light, 2010). "[ST] can be perceived as a composition of three interrelated and mutually supportive elements: [1] normative assumptions, [2] instrumental aspects, and [3] descriptive elements. [1] The normative assumptions argue that every organization has a variety of stakeholders and that organizations have moral and ethical duties to respect the interest of their stakeholders. [2] The instrumental aspect focuses on the efforts investigating the effectiveness of stakeholder theory, for example the actual impact of practical stakeholder management on traditional corporate objectives. [3] The descriptive elements of stakeholder theory are concerned with how to represent and describe organizations and organizational behaviour, which refers to the definition of stakeholders and tools to identify them (stakeholder analysis - SA) and to concepts that represent stakeholder salience toward managers" (Soja, 2011) "[TTFM] implies matching of the capabilities of the [innovation] to the demands of the task. [TTFM] posits that [innovation] will be used if, and only if, the functions available to the user support [i.e. fit] the activities of the user. Rational, experienced users will choose those [innovations] that enable them to complete the task with the greatest net benefit. [Innovation] that does not offer sufficient advantage will not be used" (Dishaw and Strong, 1999).	Process

Theories Associated with Adoption and Usage (Williams et al., 2009)	*Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)*	*Definition/Description (citation)*	*Theoretical Typology (Process, Variance or Hybrid)*
Transaction Cost Theory (TCT)	7	"[TCT is described by] the appropriate governance structures to conduct transactions. It argues that transaction costs are the major concern when a company is choosing between producing internally and acquiring over the market. [TCT] has been applied to analyse many issues such as strategic impact of information systems, resource allocation, and outsourcing decisions... it is assumed that information is symmetric in the market. Since both buyers and sellers are assumed to have the same amount of information, the transaction can be executed without cost. In reality, however, markets are often inefficient. In order to proceed with a transaction, consumers must conduct activities such as searching for information, negotiating terms, and monitoring the on-going process to ensure a favourable deal" (Liang and Huang, 1998).	Process
National Culture (NC)	7	"[There are 5 NC dimensions:] (1) Power distance—the extent to which a society accepts unequal distributions of power in organizations and institutions. (2) Uncertainty avoidance—how societies accommodate high levels of uncertainty and ambiguity in the environment. (3) Masculinity–femininity—in feminine societies, there is an emphasis on quality of life and relationships; cultures that focus on material success and assertiveness are considered more masculine in orientation. (4) Individualism–collectivism—in an individualist society, individuals are expected to consider personal interests over interests of the group and individual decision making is valued; in a collectivist culture the good of the group is more likely to be considered. (5) Time orientation—whether the focus in on short-term versus long-term considerations" (Cyr, 2008)	Process
Interactive Model (InterM)	6	"The [InterM] uses both technology-linking and need-linking to realize successful innovation diffusion. [An innovation] achieves context within actual or potential market demand. The market needs drive the [innovation], whereas the [innovation] enables a market strategy . . . market and [innovation] strategies are interdependent and need to be developed concurrently" (Baskerville and Pries-Heje, 2001)	Process
Resource Based Theory (RBT)	3	"[RBT] is based on two underlying assertions... : (1) that the resources and capabilities possessed by competing firms may differ (resource heterogeneity); and (2) that these differences may be long lasting (resource immobility)... include the ability of a firm to conceive, implement, and exploit valuable IT applications... Common resources do not meet the resource heterogeneity requirement, and thus are, at best, sources of competitive parity. On the other hand, if a firm possesses a resource or capability that is not currently possessed by competing firms, the condition of resource heterogeneity is met, and a firm may obtain at least a temporary competitive advantage" (Mata et al., 1995)	Process
Demand Pull (DP), Supply Push (SP)	2	"SP force for innovation comes from the production of the innovative product or process itself. DP force arises from the willingness of potential users to use the innovation. The choice is not either/or; both [i.e. SP and DP] are required for innovation, broadly considered. There can be no innovation without a new idea or artefact to adopt and apply, but innovators usually respond to established needs" (King et al., 1994)	Process

Theories Associated with Adoption and Usage (Williams et al., 2009)	*Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)*	*Definition/Description (citation)*	*Theoretical Typology (Process, Variance or Hybrid)*
Critical Theory (CrT)	2	"[CrT] seeks to be liberating and emancipatory by identifying inhibitors to human potential in a social context. In a more general sense, a critique of accepted social norms within the prevailing conventional wisdom may constitute a weaker version of critical theory" (Oliver and Romm, 2002)	Process
Network Externalities (NE)	1	"[NE or Network Effects model is described by] the value that consumers derive from a network product is a function of stand-alone benefit and network externalities" (Gallaugher and Wang, 2002)	Variance
Expectancy Theory (ET)	1	"[ET states] that highly motivated individuals will exert higher effort levels and consequently will tend to perform at higher levels than their less motivated contemporaries" (Rasch and Tosi, 1992)	Process
Web Acceptance Model (WAM)	0	"[WAM can be described as] first, [re]tested TAM moderated by experience in a free-content site. Second, [a consideration of] both inexperienced and experienced users, dealing with pre- and post-adopters. Thirdly, [a consideration of] the moderating effect of website experience" (Castaneda et al., 2007)	Variance
Value-based Adoption Model (VAM)	0	"[VAM is described by] the principles of cost–benefit analyses [which] are exemplified in the concept of value, which is broadly defined as the trade-off between total benefits received and total sacrifices. A [VAM model] capture[s] the monetary sacrifice element and present adoption as a comparison of benefits and costs" (Kim et al., 2007)	Variance
Unified Theory of Acceptance and Use of Technology (UTAUT)	0	"[UTAUT is described by] four constructs [which] play a significant role as direct determinants of user acceptance and usage behaviour: performance expectancy, effort expectancy, social influence, and facilitating conditions" (Venkatesh et al., 2003)	Variance
Theory of Industry-level Activity (TIA)	0	"[TIA is described by] the routine day-to-day activities of the firms and support organizations that make up an industry group can be coordinated in such a way that we can speak of an industry as engaged in purposeful activity… only through a deep understanding of the possibilities and nature of routine coordinated activity at this level can issues concerning promotion, implementation and adoption of inter-organisational systems by whole industries be properly framed" (Johnston and Gregor, 2000).	Process

Theories Associated with Adoption and Usage (Williams et al., 2009)	*Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)*	*Definition/Description (citation)*	*Theoretical Typology (Process, Variance or Hybrid)*
Theory of Consumer Choice and Decision Making (TCCD); Theory of Disruptive Technology (TDT)	0	"[TCCD is described as] a combination of economic reasoning and cognitive psychology. The value function is psychologically based and replaces the utility function from economics theory. The central principle of value function is that it is defined over perceived gains and losses relative to some natural reference point, suggesting that people tend to respond to cognitive comparisons rather than absolute levels, and that it is steeper for losses than for gains, signifying that sacrifices hurt more than the pleasure given by the benefits" (Kim et al., 2007). "[TDT is described as] a particular kind of incursion into a marketplace by a new entrant... Despite their capacity to change the competitive dynamics in an industry, disruptive technologies tend to be ignored by market incumbents because when they first come to attention their functionality is under-developed and current customers are not interested... Such a slow maturation process further convinces market leaders of their initial rejection... When the disruptive technologies are subsequently seized upon by rival companies, incumbents lack the internal resources to respond in a timely way" (Scott and Barrett, 2005)	Process
Theories of Technology Use Mediation and Communities of Practice	0	(Davidson and Heslinga, 2007)	
The Theory of Trying; Unified Economic Model	0	"[ToT] has been identified as an important antecedent to successful innovation with information technologies. Through trying to innovate, individuals identify successful applications of IT that may optimize task performance or organizational processes... [Specifically:] A user's goal of finding new uses of existing workplace information technologies" (Ahuja and Thatcher, 2005) "[UET is described by unification of] micro effects [i.e. individual standardisation decisions] and macro effects [i.e. network effects] into a singular formal model of standardization problems. The proposed model offers three contributions. First, the model consolidates isolated findings from the standardisation literature into a unified model. Second, the model helps identify a standardisation gap: the magnitude of available standardisation advantages that have remained unrealized. Third, the model, by incorporating network topology and density into the analysis, takes into account standard users' network embedded-ness" (Weitzel et al., 2006)	Process
The Hospitality Metaphor (HM) as a theoretical lens for ICT adoption	0	"[HM considers] social, behavioural and existential elements related to the adoption process, offering a critical and dialectical view of it… [The notion of] 'being-in-the-world' reveals that we are totally interconnected with other things and beings and that our understanding of the world [i.e. ICT adoption behaviour] is constructed through others, through socialisation" (Saccol and Reinhard, 2006).	Process

Theories Associated with Adoption and Usage (Williams et al., 2009)	***Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)***	***Definition/Description (citation)***	***Theoretical Typology (Process, Variance or Hybrid)***
Social Identity Theory (SIT)	0	"[SIT is described as] the perception of oneness with a group of persons... organisations can be categorised by social identity, given that organisational actors connect together in their joint endeavours to support their organisation in survival and expansion... provides ways in which individuals can be seen as part of a collective entity in the mind of themselves and others, by analysing processes of (self-) categorization and psychological commitment whilst elaborating on the likely causes of such ties between the individual and the collective" (Tansley et al., 2013)	Process
Social Economic Psychological (SEP) Model of Technology Adoption and Usage	0	"[SEP is described by taking established innovation adoption factors and classifying] these factors within and across economic, social, and psychological areas—some factors overlapped across multiple areas. We then built a theoretical framework that established a web of relationships between these factors. The considered factors and the proposed relationships between them together constitute the SEP model" (Konana and Balasubramanian, 2005)	Variance
Sense Making Perspective [SMP]	0	"[SMP] marks a move away from top-down planned or design models of strategy and is closely associated with contextual rationality and processes of situational assessment... The basic idea of sense making is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs" (Scott and Barrett, 2005)	Process
Rational Expectation Hypothesis (REH)	0	"[REH] is that [managers] form their expectations on the basis of the "true" structural model of the economy in which their decisions are made. So, expectations are essentially the same as predictions of the relevant economic theory: their expectations are informed predictions of future events. The REH equates [managers'] subjective, psychological expectations of economic variables to the mathematical conditional expectation of those variables. REH treats subjective expectations on average as equal to the variables' true values, and this is a central tenet of the theory... REH as a hypothesis that assumes every economic agent optimally utilizes available information in forming expectations" (Au and Kauffman, 2003)	Variance
Phenomenology	0	"Phenomenology... refer[s] to any first-person description of human experience. However, in a more specific sense that is typically implied in interpretive research, phenomenology stands for methods analysing consciousness... Etymologically, phenomenology stems from the Greek verb for 'to show oneself' defined the term phenomenon (Phanomen) as 'that-which-shows-itself-on-itself' or the evident (das Offenbare)" (Stahl, 2014).	Process
Perceived e-Readiness Model (PeRM)	0	"[PeRM] identifies many of the relevant contextual and organizational factors that might affect [innovation] adoption... The model includes two major constructs which measure both endogenous and exogenous factors: Perceived Organisational e-Readiness and Perceived External e-Readiness. Perceived Organisational e-Readiness is defined as managers' perception and evaluation of the degree to which they believe that their organisation has the awareness, resources, commitment, and governance to adopt [innovation]. The Perceived Environmental e-Readiness is the degree to which managers believe that market forces, government, and other supporting industries are ready to aid in their organisations' [innovation] implementation" (Tan et al., 2007)	Variance

Theories Associated with Adoption and Usage (Williams et al., 2009)	***Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)***	***Definition/Description (citation)***	***Theoretical Typology (Process, Variance or Hybrid)***
Perceived Critical Mass Effect (PCME)	0	"Critical mass is the point where enough users have adopted an innovation so that there is an acceleration of adoption of the innovation where upon it becomes self-sustaining. [PCME] is the degree to which a current or potential user of an innovation perceives that this point has been reached" (Sledgianowski and Kulviwat, 2009).	Process
Mutual Shaping (MS)	0	"Human agents build into technology certain interpretive schemes (rules reflecting knowledge of the work being automated), certain facilities (resources to accomplish that work), and certain norms (rules that define the organizationally sanctioned way of executing that work)" (Orlikowski, 2000)	Process
Model of Adoption of Technology in Households (MATH)	0	"[MATH is a TPB-based model and as such] the three constructs predicting intention in TPB are (1) attitude [defined as] applications for personal use, utility for children, utility for work-related use, applications for fun and status gains; (2) subjective norm [defined as] friends and family influences, secondary sources' influences and workplace referents' influences; and (3) perceived behavioural control [defined as] fear of technological advances, declining cost, cost, perceived ease of use and requisite knowledge " (Brown and Venkatesh, 2005).	Variance
Linked Chain Model	0	"According to [LCM], research leads to product innovation only in so far as it stimulates a design via either invention or analytical design... Five concurrent pathways or links characterize LCM: (1) market finding, an assessment of a product improvement or new product that meets an unfulfilled market; (2) analytical design, which is a preliminary design activity that establishes the scope of further design alternatives; (3) development, which includes detailed design, prototyping, and testing; (4) production, which includes redesign for manufacture and production; (5) marketing, which includes distribution as well as product marketing" (Baskerville and Pries-Heje, 2001)	Process
Kelman's Social Influence Framework (KSIF)	0	"[KSIF] argues that psychological attachment (to specific behaviours) is the construct of interest... commitment [is defined] as the users' psychological attachment to system use. Kelman's theory argues for understanding such commitment from the standpoint of 'the committed' [or] commitment to systems usage 'through the eyes of the users'" (Malhotra and Galletta, 2005)	Process
Institution-based Trust Theory (ITT)	0	"[ITT is described by] software offered by vendors will include services and guarantees that attest to the trustworthiness of both the product and the vendor... These services and guarantees are defined as… assurance structures" (Bahmanziari et al., 2003).	Process
Institutional Theory (InstT)	0	"[InstT is described] as a powerful explanation to account for the influence of external institutions on organizational decision making and outcomes... institutional forces retain their influence throughout the life cycle of complex enterprise systems as they are adopted and then evolve continuously" (Liang et al., 2007)	Process
Institutional Motivations (InstM)	0	"[InstM is described by] the goals that an institution pursues and the vigour with which it pursues those goal" (Jun and Weare, 2011)	Process

Theories Associated with Adoption and Usage (Williams et al., 2009)	*Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)*	*Definition/Description (citation)*	*Theoretical Typology (Process, Variance or Hybrid)*
Information Richness Theory (IRT)	0	"[IRT] suggests that: (1) richness (or leanness) is an intrinsic objective property of information technologies that serve as communication media and (2) managerial use of these media can be described and explained by this intrinsic property" (Ngwenyama and Lee, 1997)	Process
External, Internal and Mixed Influence Models (EIM, IIM and MIM)	0	"EIM assumes that adoption is driven by information from a source external to the social system and only by information from such sources... IIM assumes that adoption is driven [only] by communication within a specific community... MIM assumes that both internal and external sources influence the adoption decision" (Dos Santos and Peffers, 1998)	Process
Elaboration Likelihood Model (ELM)	0	"ELM classifies influence mechanisms or routes into central and peripheral types based on the type of information processed by a given user (e.g., task-relevant arguments or simple cues), explains circumstances under which that user may be more influenced by one route than the other, and discusses the long-term effects of each influence route" (Bhattacherjee and Sanford, 2006)	Process
Economics of Intermediation	0	"[Arguably] moving toward net-enabled commerce would lead to dis-intermediation, [however], online commerce has given rise to a new breed of intermediaries, so-called information intermediaries... [the success of which have been shown to depend on] the determinants of transaction costs, such as, asset specificity [i.e. perceived value of customer-supplier relationship] and uncertainty [i.e. concerns in relation to the environment or supplier behaviour]" (Son et al., 2006)	Variance
Economics of Adoption (EoA)	0	"[EoA represents] the influence of community effects (economics)... a primary factor in creating such an environment is the presence of positive network externalities. This refers to the benefits created through the adoption of the new standard by other organizations in the community. Positive network externalities provide support to expectations of widespread adoption of a standard" (Hovav et al., 2004)	Process
Ecological Approach/Theory (EA/T)	0	"Economic self-interest alone cannot explain all aspects of the [adopted innovation], it is not simply a matter of rational actors gaming each other. An approach that describes an ecology (a set of relations between different standards institutions, ideas, and participants) provides needed explanations" (Nickerson and zur Muehlen, 2006).	Process
Dual-process Models of Informational Influence	0	"Individuals are influenced by information received from others to the degree that they assess it as useful evidence about reality" (Sussman and Siegal, 2003)	Process

Theories Associated with Adoption and Usage (Williams et al., 2009)	***Number of Citations in Trade Publications (Sourced from Business Source Complete April 2014)***	***Definition/Description (citation)***	***Theoretical Typology (Process, Variance or Hybrid)***
Decomposed Theory of Planned Behaviour (DTPB)	0	"In [DTPB] attitudinal, normative and control beliefs are decomposed into multi-dimensional belief constructs. This decomposition approach provides several advantages. First, it has been noted that it is unlikely that monolithic belief structures, representing a variety of dimensions will be consistently related to the antecedents of intention. By decomposing beliefs, those relationships should become clearer and more readily understood. In addition, the decomposition can provide a stable set of beliefs which can be applied across a variety of settings. This overcomes some of the disadvantages in operationalization that have been noted with respect to the traditional intention models. Finally, by focusing on specific beliefs, the model becomes more managerially relevant, pointing to specific factors that may influence adoption and usage" (Taylor and Todd, 1995).	Variance
Adaptive Learning Theory (ALT)	0	"[ALT] assume that economic agents know the correct specification of the equilibrium relationships between market prices and private signals but are uncertain about some of the parameters of those relationships" (Au and Kauffman, 2003)	Variance
Actor Network Theory (ANT)	0	"Primarily developed and used to analyse the alignment of social networks... Central concepts are closure, stabilisation, and enrolment and alignment. Specifically, closure indicates a state where consensus emerges around a particular technology... It is achieved through a negotiation process and by enrolling actors/elements of various kinds into a network" (Hanseth et al., 2006)	Process

Appendix C: Questionnaire (Main Study)

Questionnaire Part One – Welcome Page

Dear Sir/Madam

Thank you for participating in the OSS survey.

There has been widespread academic and industrial acclaim for the benefits of Open Source Software (OSS) and yet organisational adoption rates remain low compared to traditional proprietary alternatives. This survey seeks to investigate some of the motivating and inhibiting factors involved in the adoption of OSS.

This survey is divided into ten parts and should take around half an hour to complete.

1 - Welcome
2 - The survey
3 - About you
4 - Your role
5 - Your organisation
6 - Your attitude toward OSS
7 - Influence and behaviour of others; and OSS
8 - Ability to act and OSS
9 - Past behaviour, future intention and OSS
10 - Request for summary report

If you would like to receive a summary report of this research please remember to complete your contact details at the end. Your responses will remain anonymous.

Yours faithfully

Neil Greenley, Doctoral Candidate, University of Hertfordshire

n.greenley@herts.ac.uk

Dr Jyoti Choudrie, Supervisor, University of Hertfordshire

j.choudrie@herts.ac.uk

Questionnaire Part Two – The Survey

This survey is concerning the driving and inhibiting factors in the adoption of Open Source Software (OSS) in organisations.

1. How closely are you involved with the selection of appropriate software for IT projects in your organisation?

○ 1 - Not at all ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 - Very much

If you have answered between 1 and 4, please feel free to continue with the survey, but please also consider sending a copy of the survey to a colleague who is more involved in software selection.

Questionnaire Part Three – About You

Gender

2. Are you male or female? *(Optional)*

- Male
- Female

Age and tenure

3. How old are you?

- Under 20 years
- Between 20 and 30 years
- Between 31 and 40 years
- Between 41 and 50 years
- Between 51 and 60 years
- Over 60 years

4. Please indicate your length of service at your organisation

- Under 5 years
- Between 5 and 10 years
- Between 11 and 15 years
- Between 16 and 20 years
- Over 20 years

Education

5. How would you describe your education?

- Secondary School/High School
- Further Education/College
- Higher Education (Bachelors)
- Higher Education (Masters)
- Higher Education (Doctorate)

Location

6. In which country are you located?

Select an answ er

a. If you selected **Asia**, please indicate which country. *(Optional)*

Select an answ er

b. If you selected **Europe**, please indicate which country *(Optional)*

Select an answ er

c. If you selected **Americas**, please indicate which country *(Optional)*

Select an answ er

d. If you selected **Africa**, please indicate which country *(Optional)*

Select an answ er

e. If you selected **Oceania**, please indicate which country *(Optional)*

Select an answ er

Questionnaire Part Four – Your Role

Position

7. How would you categorise your occupation?

Select an answer

If you selected Other, please specify:

a. If you answered **Management Occupation**, please categorise further *(Optional)*

Select an answer

i. If you selected **Operations Specialties Managers**, please categorise further *(Optional)*

Select an answer

b. If you answered **Computer and Mathematical Occupations**, please categorise further *(Optional)*

Select an answer

If you selected Other, please specify:

Priorities

8. Which phrase best characterises the main priorities of your role?

- Managing strategic "top-down" concerns
- Managing divisional "middle-down" concerns
- Managing operational "bottom-up" concerns

Questionnaire Part Five – Your Organisation

Organisation

9. What is the name of your organisation? *(Optional)*

Number of Employees

10. How many people would you say are employed in your organisation?

- Less than 10
- Between 10 and 50
- Between 51 and 250
- Greater than 250

IT Development Staff

11. What percentage of IT staff would you say are employed as software developers in your organisation?

- None
- Less than 10%
- Between 11% and 25%
- Between 26% and 50%
- Between 51% and 75%
- Greater than 76%

Organisational Sector

12. Which sector best describes your organisation's business?

Select an answer

If you selected Other, please specify:

a. If **private sector** please indicate industrial sector *(Optional)*

Select an answer

If you selected Other, please specify:

b. If **public sector** please specify sub sector *(Optional)*

Select an answer

If you selected Other, please specify:

Annual Turnover/Revenue

13. If you answered **private sector** please indicate your company's annual turnover or revenue *(Optional)*

- Less than EURO2m (USD2.6m)
- Between EURO2m and EURO10m (USD2.6m to USD13m)
- Between EURO10m and EURO50m (USD13m to USD65m)
- Greater than EURO50m (USD65m)

Age of Organisation

14. When was your organisation established?

- Less than 1 year ago
- Between 1 and 5 years ago
- Between 6 and 10 years ago
- Between 11 and 20 years ago
- Between 21 and 30 years ago
- Over 30 years ago

Organisational Strategy & IT Management Structure

Please help us to understand a little about your organisation's business strategy and IT management structure.

15. In your opinion, which is the predominant business strategy in your organisation?

- Differentiator (i.e. investment to improve design, brand, innovation etc.)
- Cost leadership (i.e. investment to reduce cost, improve operational efficiency etc)
- Both
- Neither
- Not applicable

16. Who does your senior IT manager, (i.e.) Chief Information Officer (CIO), report to?

- Senior business manager (i.e.) Chief Executive Officer (CEO)
- Senior financial manager (i.e.) Chief Financial Officer (CFO)
- I don't know
- Other *(please specify)*:

Questionnaire Part Six - Your Attitude Toward OSS

Attitudes Toward Open Source Software (OSS)

17. For me to implement an IT project incorporating OSS within the year is

1 Extremely productive 2 3 4 5 6 7 Extremely counter-productive

18. To what extent do you believe, that in certain horizontal domains (i.e. Operating system and web server), OSS is a "category killer" or most dominant innovation.

1 Strongly agree 2 3 4 5 6 7 Strongly disagree

19. How else would you describe your general attitude toward implementing an IT project incorporating OSS within the year? *(Optional)*

Behavioural Beliefs

20. Compared to proprietary alternatives to what extent do you believe that OSS could enable the outcomes listed.

	OSS impact on the different outcomes listed		
	Absolutely imperative or vital	Enabling	No impact whatsoever
a. Greater security *(i.e. many eyes make all bugs shallow philosophy)*	◯	◯	◯
b. Reduced cost *(i.e. reduced software license fees and extended utility of hardware)*	◯	◯	◯
c. Increased quality *(i.e. greater reliability)*	◯	◯	◯
d. Improved flexibility *(e.g. ability to switch from one software to another)*	◯	◯	◯
e. Greater technological disruption *(i.e. the concept of OSS as a low cost partial alternative which will rapidly improve to address mainstream demand)*	◯	◯	◯
f. Relative advantage *(i.e. Improvements over previous versions)*	◯	◯	◯
g. Increased job performance *(i.e. perceived usefulness)*	◯	◯	◯
h. Improved transparency *(i.e. understanding of the overall design of the IT project)*	◯	◯	◯
i. Increased perpetuity *(i.e. longevity of data and formats)*	◯	◯	◯
j. Greater freedom to modify and adapt *(e.g. the ability to customise software as required)*	◯	◯	◯
k. Greater speed *(e.g. rapid deployment)*	◯	◯	◯
l. More knowledge creation *(i.e. coding or programming knowledge)*	◯	◯	◯
m. Greater creativity and innovation	◯	◯	◯
n. Reduced vendor lock-in *(i.e. less reliance on single vendor)*	◯	◯	◯

o. Enhanced observability *(i.e. demonstrable results)*	◌	◌	◌
p. Ideological compatibility *(i.e. the ability to freely modify software as an alignment with personal values)*	◌	◌	◌

21. To what extent do the factors below inhibit implementing projects incorporating OSS in your organisation?

	Impact on OSS adoption		
	Absolute block or barrier	Inhibiting	No impact whatsoever
a. Unsustainable business model *(i.e. OSS is unlikely to prevail in a competitive market)*	◌	◌	◌
b. Perceived as second best or inferior *(i.e. compared to proprietary marque brands)*	◌	◌	◌
c. Perceived as no more reliable than proprietary alternatives	◌	◌	◌
d. "A de-skilling effect" denying vested interests *(i.e. developing skills in proprietary is more valuable)*	◌	◌	◌
e. Most OSS projects fail *(i.e. to attract sufficient contributors and participants)*	◌	◌	◌
f. Questionable return on investment *(i.e. hidden costs)*	◌	◌	◌
g. Commercial versions of OSS licenses are not free *(i.e. some software companies use OSS model as a marketing model)*	◌	◌	◌

22. In your opinion, are there any other outcomes you would expect from implementing an IT project incorporating Open Source Software (OSS)? *(Optional)*

Questionnaire Part Seven – Influence and Behaviour of Others; and OSS

Behaviour of others

23. How would you say others that you are aware of have implemented OSS?

	Adoption and contribution of others to OSS				
	None	**Some**	**Most**	**All**	**I don't know**
a. Proportion of others that you are aware of who have adopted OSS	○	○	○	○	○
b. Proportion of others that you are aware of who describe "OSS success stories"	○	○	○	○	○
c. Proportion of others that you are aware of who have contributed (i.e. actually written code) to OSS projects.	○	○	○	○	○

Influence of others

24. To what extent do the following factors enable or inhibit incorporating OSS in your organisation's IT projects?

	Impact of factors on OSS adoption				
	Absolutely imperative or requirement	**Enabling**	**Neutral**	**Inhibiting**	**Absolute block or obstruction**
a. Personal identification *(i.e. the degree to which you have a personal sense of belonging to the OSS community)*	○	○	○	○	○
b. Strong network effects *(i.e. enhanced utility due to a sufficient number of others using OSS)*	○	○	○	○	○
c. Internal politics	○	○	○	○	○
d. External politics	○	○	○	○	○
e. Organisational culture	○	○	○	○	○
f. Champion or sponsor for OSS	○	○	○	○	○
g. Localism *(i.e. a commitment to support local suppliers and consultants)*	○	○	○	○	○
h. Lack of legally responsible third party	○	○	○	○	○

25. How do the groups below encourage or discourage you to implement IT projects incorporating OSS in the next year.

	Expectations of groups listed in terms of OSS adoption				
	Absolutely imperative or requirement	**Encouraging or Enabling**	**Neutral**	**Discouraging or inhibiting**	**Absolute block or obstruction**
a. Friends or acquaintances	○	○	○	○	○
b. OSS contributors *(i.e. from OSS community)*	○	○	○	○	○
c. Colleagues *(i.e. in line of business)*	○	○	○	○	○
d. Colleagues *(i.e. in IT)'*	○	○	○	○	○
e. Top management	○	○	○	○	○
f. Competitors	○	○	○	○	○
g. Third party partners	○	○	○	○	○
h. Suppliers	○	○	○	○	○
i. Customers	○	○	○	○	○
j. Government *(i.e. central, federal or local)*	○	○	○	○	○
k. The media *(i.e. broadcast, trade press, the web)*	○	○	○	○	○
l. The general public	○	○	○	○	○

26. To your knowledge, are there any other significant groups or individuals who would have expectation one way or another, for you to implement IT projects incorporating OSS within the year. *(Optional)*

Questionnaire Part Eight – Ability to Act and OSS

Ability to act

Please help us to understand your perceptions about your ability to implement IT projects incorporating OSS.

27. For me to implement an IT project incorporating OSS within the year is

1 Extremely difficult 2 3 4 5 6 7 Extremely easy

28. Whether or not I implement an IT project incorporating OSS within the year is completely up to me.

1 Strongly disagree 2 3 4 5 6 7 Strongly agree

How factors influence OSS adoption

29. To what extent do you believe these organisational factors **drive** or **inhibit** the implementation of IT projects incorporating OSS within the year.

	Organisational factors and impact on OSS adoption				
	Absolutely imperative or compelling	**Enabling**	**Neutral**	**Inhibiting**	**Absolute block or barrier**
a. Set of standards *(i.e. which specify OSS)*	○	○	○	○	○
b. Professionalism of IT Department	○	○	○	○	○
c. Availability of OSS resources, expertise and familiarity	○	○	○	○	○
d. Availability of training	○	○	○	○	○
e. Availability of time	○	○	○	○	○
f. Internal OSS installed base	○	○	○	○	○
g. Inertia *(i.e. a level of satisfaction, or at least acceptance, of existing infrastructure capabilities)*	○	○	○	○	○
h. Conservative management *(i.e. risk averse management)*	○	○	○	○	○
i. Availability of commercial support	○	○	○	○	○
j. 'Trial-ability' (i.e. the opportunity to demonstrate capability)	○	○	○	○	○

30. To what extent do you believe these factors relating to OSS inhibit the implementation of IT projects incorporating OSS within the year.

	OSS factors which influence adoption		
	Absolute block or barrier	**Inhibiting**	**No impact whatsoever**
a. Unacceptable license terms *(e.g. the requirement to cede intellectual property rights of any code changes to OSS community)*	○	○	○
b. Overwhelming number of patches and	○	○	○

upgrades *(i.e. perceived as excessive number)*			
c. Lack of technical support	○	○	○
d. Complexity *(i.e. lack of productisation)*	○	○	○
e. Presence of volume or bulk purchase agreement *(i.e. proprietary license fees seen as sunk costs)*	○	○	○
f. Lack of resource *(i.e. knowledge to benefit from OSS customisation capabilities)*	○	○	○
g. Switching costs	○	○	○
h. Set of standards *(i.e. which specify proprietary software)*	○	○	○
i. Lack of relevance *(i.e. demand or opportunity to solve business problems specifically through OSS)*	○	○	○

31. In your opinion, are there any other factors that may drive or inhibit your implementation of IT projects incorporating OSS? *(Optional)*

Questionnaire Part Nine – Past Behaviour, Future Intention and OSS

Perceived Systems Use

32. In the past, working for this organisation, I have implemented IT projects incorporating OSS.

1 Extensively 2 3 4 5 6 7 Minimally

Adoption

33. My organisation is an active user of OSS

1 Strongly disagree 2 3 4 5 6 7 Strongly agree

34. In general terms, how would you characterise the stage your organisation is at with respect to OSS.

Prior to initiation (i.e. no real consideration)

Initiation (i.e. acknowledge triggers and stimuli)

Development (i.e. proposal drawn from search, design, judgement, evaluation, analysis and negotiation)

Management (i.e. guided through hierarchy by a champion)

Approval (i.e. authorisation for funding on review of proposal)

Post approval (i.e. OSS in general adoption)

Rate of Adoption

35. In your opinion, please indicate the percentage of IT projects which have been implemented, and which will be implemented, incorporating OSS in your organisation.

	Rate of adoption				
	None	**Some**	**Most**	**All**	**I don't know**
a. 2014	○	○	○	○	○
b. 2013	○	○	○	○	○
c. 2012	○	○	○	○	○
d. 2011	○	○	○	○	○
e. 2010	○	○	○	○	○

Application Software Diffusion & Intention

Application software is designed to perform a specific function directly for the end user. **Diffusion** is the extent to which an organisation exploits an innovation.

36. To the best of your knowledge, please indicate the OSS **Application Software** which your organisation has used in the past (*) and which you believe will be used within a year (**).

	Used in the past (*).					Intended use in the future - within a year (**)				
	None	Some	Most	All	I don't know	None	Some	Most	All	I don't know
a. General Business Productivity Applications Software: *Designed for general business purposes to improve productivity. Includes office suite applications such as word processor, spreadsheet, and simple database software; graphics applications software; project management software, computer based training software, and reference software.*	○	○	○	○	○	○	○	○	○	○
b. Cross-industry Applications Software: *Designed to perform and/or manage a specific business function or process that is not unique to a particular industry. Includes professional accounting software, human resource management software, customer relations management software, geographic Information system software, and web page/site design software, etc.*	○	○	○	○	○	○	○	○	○	○
c. Utilities Software: *Designed to perform a very specific task. Utilities differ from other applications software in terms of size, cost, and complexity. Includes compression programs, anti-virus, search engines, font, file viewers, and voice recognition software, etc.*	○	○	○	○	○	○	○	○	○	○
d. Vertical markets application software: *Designed to perform a wide range of business functions for specific industries (i.e. manufacturing, retail, healthcare, engineering, restaurants etc).*	○	○	○	○	○	○	○	○	○	○

Systems Software Diffusion & Intention

System software is designed to manage computer resources and support the production or execution of application programs but which is not specific to any particular application. **Diffusion** is the extent to which an organisation exploits an innovation.

37. To the best of your knowledge, please indicate which OSS **System Software** your organisation has used in the past (*), and which you believe will be used within a year (**).

	Used in the past (*)					Intended use in the future - within a year (**)				
	None	Some	Most	All	I don't	None	Some	Most	All	I don't

					know					know
a. Operating Systems Software: *Designed to handle the interface to peripheral hardware, schedules tasks, allocate storage, and present a default interface to the user when no application program is running. Includes all client and network operating systems.*	○	○	○	○	○	○	○	○	○	○
b. Network Systems Software: *Designed to control, monitor, manage and communicate with operating systems, networks, network services, databases, storage, and networked applications in an integrated and cooperative fashion across a network from a central location. Includes all network management software, server software, security and encryption software, and middleware, etc.*	○	○	○	○	○	○	○	○	○	○
c. Database Management Systems Software: *Designed to enable storage, modification, and extraction of information from a database. Includes DBMSs ranging from small systems that run on personal computers to huge systems that run on mainframes.*	○	○	○	○	○	○	○	○	○	○
d. Development Tools and Programming Languages Software: *Designed to assist in the development and/or authoring of computer programs. Includes software products that support the professional developer in the design, development, and implementation of a variety of software systems and solutions; and all program development tools and programming languages software.*	○	○	○	○	○	○	○	○	○	○

Questionnaire Part Ten – Request for Summary Report

Your Contact Details

Complete this section if you would like to receive a summary report of this research,

38. Your Name *(Optional)*

39. Your Email *(Optional)*

Further Research

Complete this section if you would be prepared to participate in a further short telephone interview with regard to your use of OSS.

40. Your telephone number (including country and area code) *(Optional)*

Your email (for brief follow-up questionnaire) *(Optional)*

Appendix D: Method of Categorising Tiers of Research Articles Adopted in Literature Review

Step 1(a): "High Impact" Journals Selected: IS research has identified 5 journals as high-ranking based on various criteria (Lyytinen et al., 2007). For the purposes of this research these will be categorised as "High Impact".

Step 1(b): "Mid Impact" Journals" Selected: Other IS research has also identified nineteen journals, based on different criteria (Williams et al., 2009), which happens to include the previously identified "High Impact". For the purposes of this research, the additional 14 journals will be categorised as "Mid Impact".

Step 1(c): "Third Tier" Journals Selected: IS research has encouraged IS studies to consider research outside leading IS articles and beyond the IS field (Webster, 2002). Therefore for the purposes of this research, "Third Tier" research was considered any outside of the previously identified leading IS categories (i.e. "High Impact" and "Mid Impact" journals).

Step 2(a): Searched "High Impact" Journals: Publication titles were "cut and pasted" as "key words" into search bar of the "Publication Name" field (as below), making use of the Boolean search operator, "OR", in order to query the selected database (Web-of-Knowledge, 2014). See **Error! Reference source not found.**.

> *"MIS Quarterly" OR "Information Systems Research" OR "Journal of Management Information Systems" OR "Journal of the Association for Information Systems" OR "European Journal of Information Systems"*

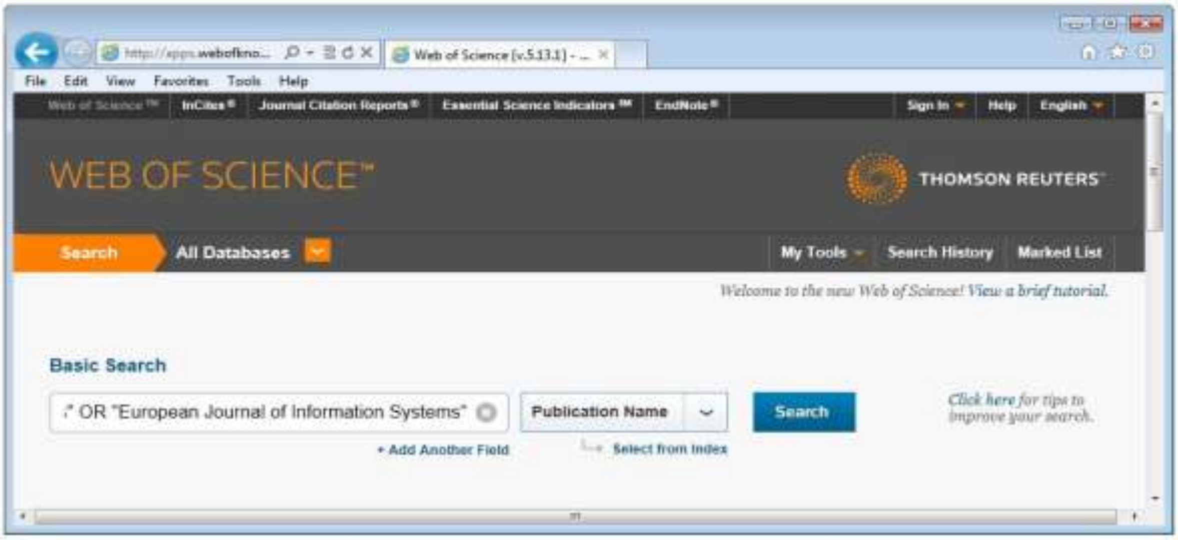


Figure 0.1: Example of Use of Boolean Search Operator to Query Specific Publications

This query yielded 50 articles published by the five "High Impact" journals between 2000 and 2013, which represented 1.3% of the total scholarly articles written on OSS. **Error! Reference source not found.**

Step 2(b): Search for "Mid Impact" Journals: The same process was followed as Step2(a) with the exception of using previously defined "Mid Impact" publications as "key words" (as below).

> *"Information & Management" OR "Communications of the ACM" OR "Journal of Computer Information Systems" OR "International Journal of Information Management" OR "Journal of Information Technology" OR "Industrial Management & Data Systems" OR "Decision Support Systems" OR "Journal of Strategic Information Systems" OR "JOURNAL OF ORGANIZATIONAL COMPUTING AND ELECTRONIC COMMERCE" OR "Information Society" OR "Information Systems Journal" OR "Information Systems Management" OR "DATABASE for Advances in Information Systems" OR "Journal of Global Information Management"*

This query yielded 88 articles published by the 14 “Mid Impact” journals between 1999 and 2014, which represented 2.2% of the total scholarly articles written on OSS. **Error! Reference source not ound.**

Step 2(c): Search for Third Tier Journals: In order to identify research outside of the leading IS research articles it was necessary to specify a concept in the topic field (e.g. “Open Source Software”) after which the previously identified leading IS categories (i.e. “High Impact” and “Mid Impact” journals) could be eliminated. This was achieved by placing “Open Source Software” as a “key word” in the “topic” field, and then by specifying the “High Impact” and “Mid Impact” journals to be excluded by again making us of the “NOT” Boolean operator. See Figure 0.2: Example of Topic Specific Query (Which Excludes Certain Publications).

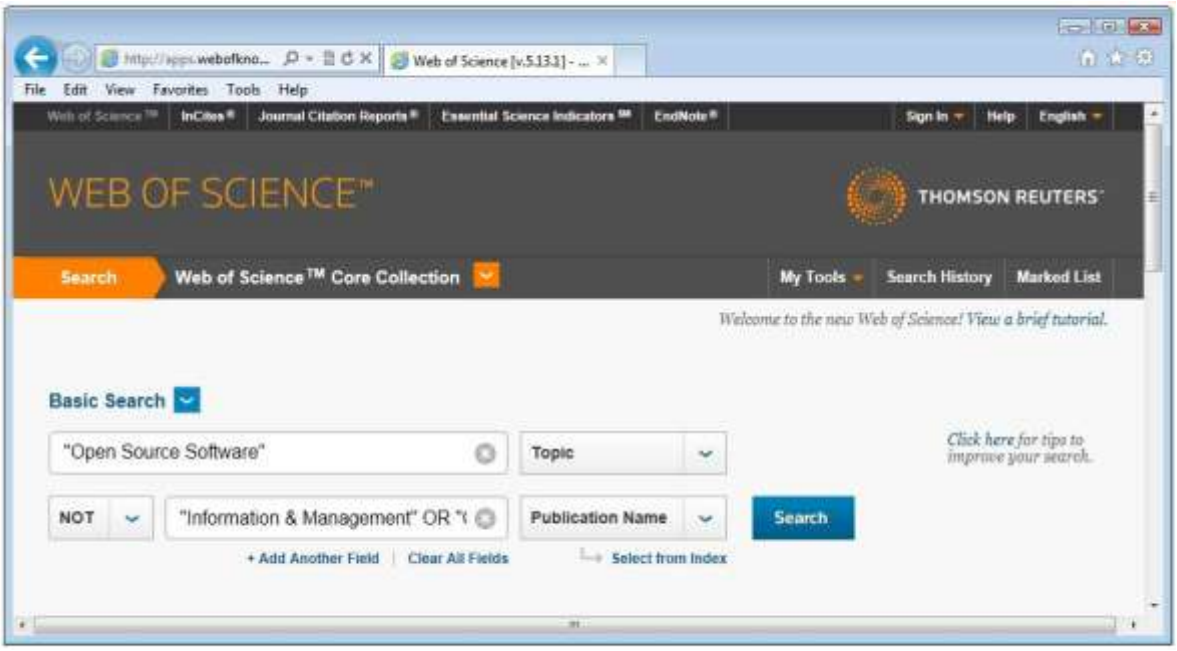
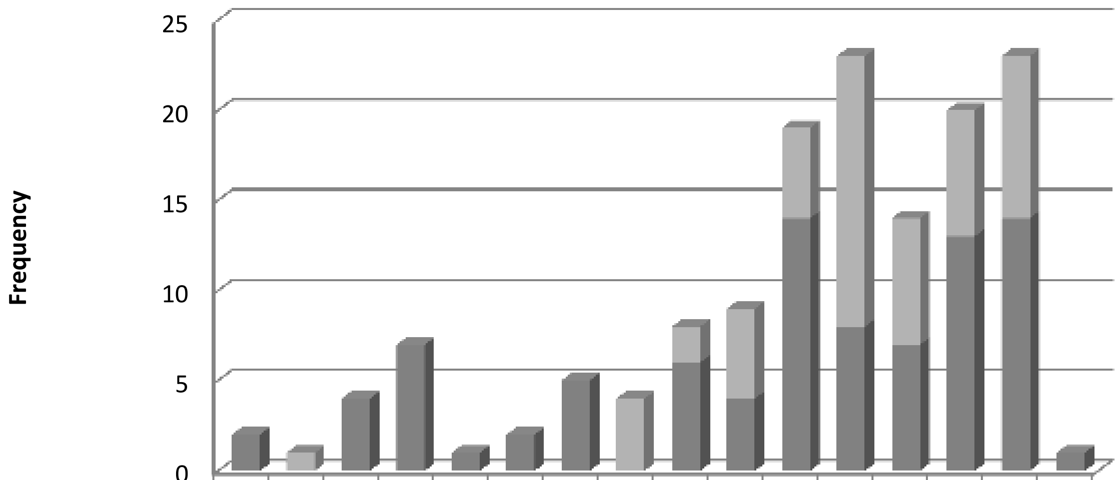


Figure 0.2: Example of Topic Specific Query (Which Excludes Certain Publications)

This query yielded 3,914 articles published by 1,185 “Third Tier” journals between 1999 and 2014, which represented 96.5% of the total scholarly articles written on OSS. **Error! Reference source not ound.**

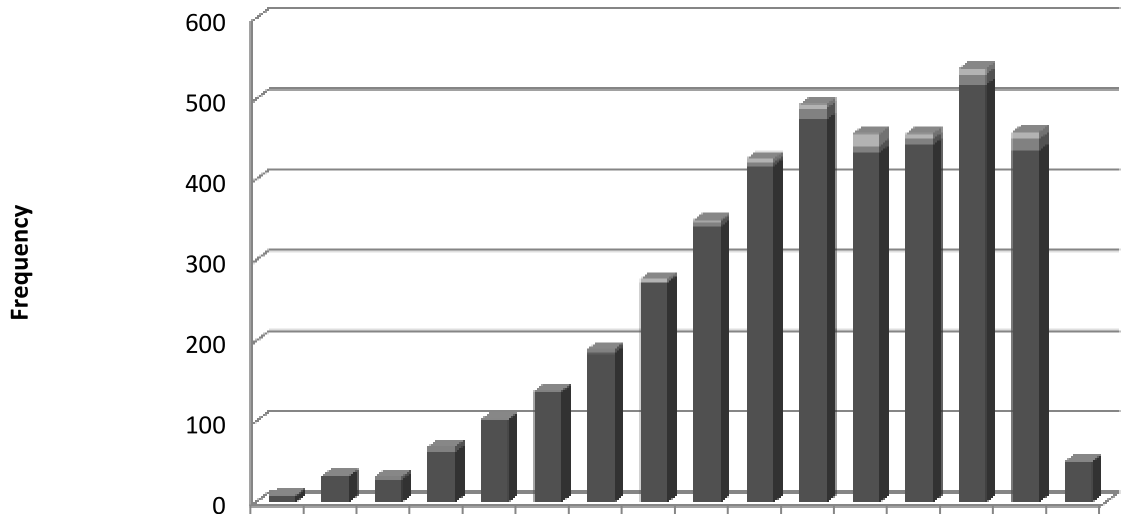
Figure 0.3: Annual OSS Research Articles for "High Impact" and "Mid Impact" Research illustrates sporadic growth in OSS research peaking at 23 annual articles (in 2010 and 2013).



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
5 "Tier One" Journals	0	1	0	0	0	0	0	4	2	5	5	15	7	7	9	0
14 "Tier Two" Journals	2	0	4	7	1	2	5	0	6	4	14	8	7	13	14	1

Figure 0.3: Annual OSS Research Articles for "High Impact" and "Mid Impact" Research

Figure 0.4 shows the same analysis including all three tiers. It illustrates consistent growth except in recent years and peaking in 2012.



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
5 "Tier One" Journals	0	1	0	0	0	0	0	4	2	5	5	15	7	7	9	0
14 "Tier Two" Journals	2	0	4	7	1	2	5	0	6	4	14	8	7	13	14	1
1,185 "Tier Three" Journals	7	32	28	62	102	136	185	273	342	417	475	434	443	518	436	50

Figure 0.4: Annual OSS Research Articles from All Tiers

The table and graphs above are consistent with IS research claims that a significant quantity of research is available outside leading IS articles (Webster, 2002).

Appendix E: Force Field Analysis (FFA) and Theory of Planned Behaviour (TPB) Proposed Process

FFA process has been defined as follows: “1. Write a brief statement of the problem to be solved. 2. Describe what the situation would be like if everything fell apart [i.e. absolute catastrophe] 3. Describe what the situation would be like if it were ideal. 4. With catastrophic at the left of the continuum and ideal at the right, draw a centre line. 5. List what forces are "tugging" right now in the situation to help make it more ideal and what forces are ‘tugging’ now to make it more catastrophic"(Couger et al., 1993). Furthermore, the same research successfully used the process to establish the adoption of creative problem-solving techniques in a target organisation (ibid). Figure 0.5: Example Implementation of Force Field Analysis (Couger, 1993).

(Problem: How to Ensure Creativity Techniques Are Utilized)

Catastrophe:	**Ideal:**
Minimal use of creativity techniques despite training and availability of materials.	Use of creativity techniques in everyday activities for all IS employees.
(−) **Forces**	**(+)**
Incorporated in standards manual but not enforced.	Used in system development methodology for all new applications.
Managers do not use creativity techniques themselves.	Managers demonstrate value by use of creativity techniques in their own activities.
No change in ways IS department runs its meetings.	Meeting procedures changed to include creativity approaches.
Training not reinforced.	Follow-up sessions held regularly.
Little recognition given employees for creative ideas.	Management gives high visibility and recognition to creative employees.
Creativity skills not stressed for advancement.	Skill list for promotion includes knowledge of creativity techniques.
Creativity not rewarded.	Bonuses and salary increases provided to reward creativity.

Figure 0.5: Example Implementation of Force Field Analysis (Couger, 1993)

However, other research has criticised the existing research for over-simplifying FFA such that, “the fundamental properties of field forces [draws on] concepts of force and vector directly from physics. A close reading [the original research] shows that force [was intended] to refer to a dynamic concept that, as a cause of change over time, has the properties strength, direction, and point of application” (Cronshaw and McCulloch, 2008). Therefore, this research will seek to establish methods of accommodating these factors.

Stage One: This research utilise a survey instrument to collect data and analyse the significance of the various factors in the context of OSS adoption and intention to adopt (OSS intention). See Research Methodology.

Stage Two: The factors established as significant, along with any other factors if considered necessary, are then used to inform an assessment and diagnosis as described in the steps of FFA, adapted to reflect some of the shortcomings previously identified.

1. Write a brief statement of the problem to be solved.

This research is not necessarily concerned with whether OSS is to be encouraged. It is for the organisations management to decide whether OSS should be used more, none or only in certain software categories. As an adaption to the FFA process previously discussed, this research will require this step to include an assessment of which ITG stage the target software is currently in. For example, (a) initiation – acknowledge triggers and stimuli (b) development – proposal drawn from search, design, judgement, evaluation, analysis and negotiation (c) management – guided through hierarchy by a champion (d) approval – authorisation for funding on review of proposal. Therefore an example problem statement could include:

This organisation does not take sufficient advantage of the cost savings of mature and well established OSS projects in certain software categories such as Systems Software which is broadly considered to be in the “Development” stage of IT governance in this organisation and at present.

2. Describe what the situation would be like if everything fell apart or absolute catastrophe.

For example, if costs are allowed to continue to grow they may become unmanageable, represent too high a percentage of operational overhead and fail to deliver value for money.

3. Describe what the situation would be like if it were ideal.

For example, using OSS projects appropriately could allow the organisation to introduce competition, save on capital expenditure and maintain low operational expenditure in certain instances.

4. With catastrophic at the left of the continuum and ideal at the right, draw a centre line.

See figure

5. List what forces are "tugging" right now in the situation to help make it more ideal and what forces are ‘tugging’ now to make it more catastrophic.

As a further adaption to the FFA process previously discussed, this step should also include an assessment of which management tier are most affected by the force being described. For example, (a) Strategic – “top down” (b) Divisional – “middle down” or (c) Operational – “Bottom up”.

6. Action Plan

As a further adaption to the previously described FFA process an action plan step is to be included specifically addressing how to, “1. Strengthen an already present positive force. 2. Weaken an already present negative force. 3. Add a new positive force” with responsibilities agreed and an appropriate review session planned.

Table 0.1: Example of Proposed Implementation of Force Field Analysis and Proposed Conceptual Model, illustrates the theoretical framework adapted from elements of FFA and this researches

implementation of TPB, using the examples described earlier and in the format of a proposed management intervention planning document.

Problem Definition: *This organisation does not take sufficient advantage of the cost savings of mature and well established OSS projects*					
Target Software Category (i.e. Generic, Systems, Applications or sub-category): *Systems Software Category and Operating System Sub-category*					
Organisational Stage (i.e. Initiation, Development, Management or Approval): *Development Stage*					
Catastrophic Scenario: *Costs are allowed to continue to grow until they may become unmanageable, represent too high a percentage of operational overhead and/or fail to deliver value for money.*			**Ideal Scenario:** *Using OSS projects appropriately could allow the organisation to introduce competition, save on capital expenditure and maintain low operational expenditure in certain instances.*		
TPB Construct	**ITG Most Relevant Management Tier**	**FFA Inhibiting Forces -VE (p>0.05 Confidence Interval)**	**FFA Driving Forces +VE (p>0.05 Confidence Interval)**	**ITG Most Relevant Management Tier**	**TPB Construct**
Attitude		*1^{st} Inhibiting Force (Strong)*	*1^{st} Driving Force (Strong)*		*Attitude*
Attitude		*2^{nd} Inhibiting Force (Strong)*	*2^{nd} Driving Force (Strong)*		*Attitude*
Subjective Norm		*3^{rd} Inhibiting Force (Medium)*	*3^{rd} Driving Force*		*Subjective Norm*
Subjective Norm		*4^{th} Inhibiting Force (Medium)*	*4^{th} Driving Force*		*Subjective Norm*
Perceived Behavioural Control		*5^{th} Inhibiting Force (Medium)*	*5^{th} Driving Force*		*Perceived Behavioural Control*
Perceived Behavioural Control		*6^{th} Inhibiting Force (Medium)*	*6^{th} Driving Force*		*Perceived Behavioural Control*

Table 0.1: Example of Proposed Implementation of Force Field Analysis and Proposed Conceptual Model

Appendix F: Comparison of Key Conceptual Areas in OSS Research

Figure 0.6: Venn Diagram of Key Conceptual Areas, illustrates the number of research articles in these conceptual areas using the previously identified 4,083 OSS research articles as a universal set. The diagram also shows that the majority of OSS research (77.2%) is in areas other than concepts selected for this research, which provides a broader potential research base than previous OSS research which reported only 88 out of 1,355 reviewed journals as concerned with OSS diffusion (Aksulu and Wade, 2010). However, diagram shows that only 7 articles occupy the space where all three conceptual areas intersect (i.e. AUDA^TAUT^OEF), which yields a much narrower research base and further motivates this study's research question, aims and objectives. For the purposes of this research, the intersection has been referred to as the, "Core OSS Research" space (i.e. TAUT^AUDA^OEF) and those outside will be defined as, "Non-core OSS Research" (e.g. TAUT^OEF~AUDA).

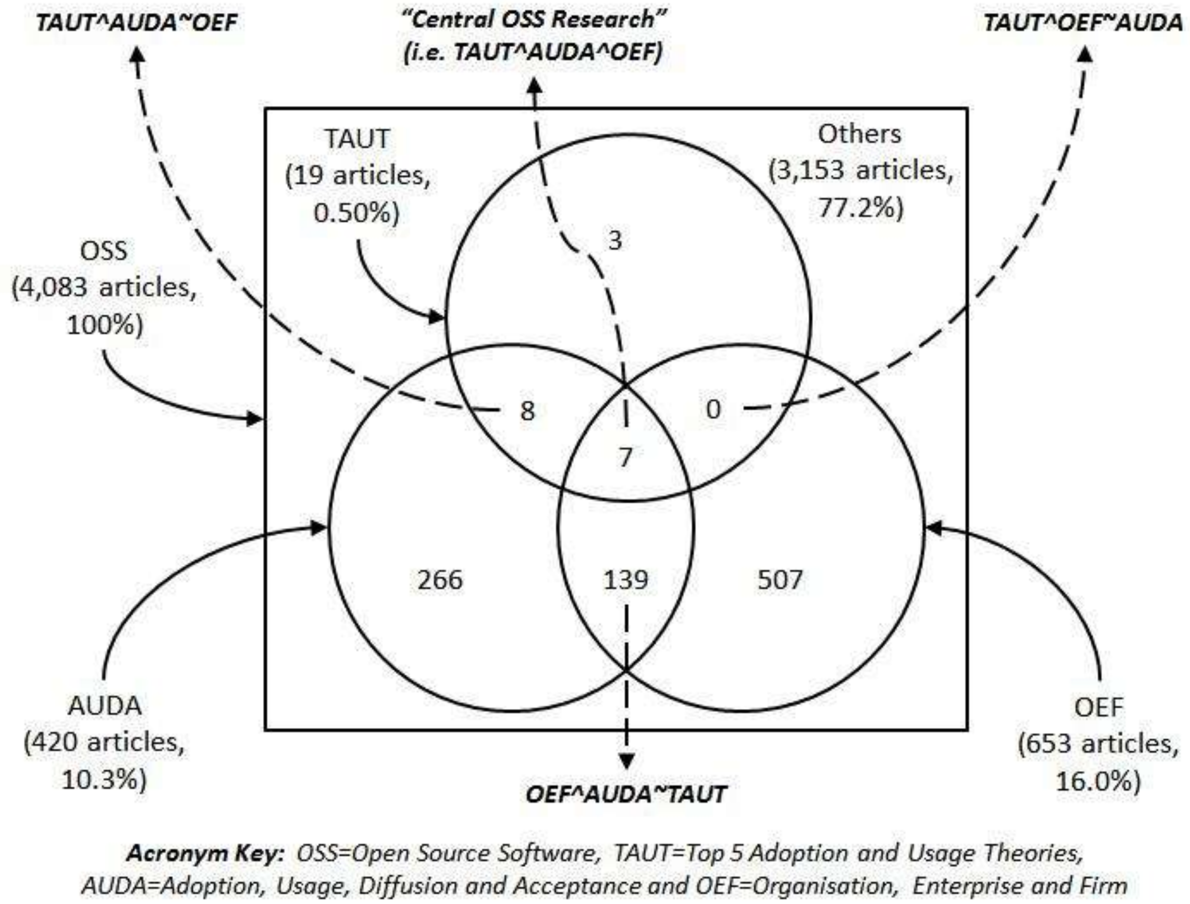


Figure 0.6: Venn Diagram of Key Conceptual Areas

High Impact OSS Research

Figure 0.7: Venn Diagram of Key Conceptual Areas - High Impact (below) shows the conceptual analysis of 55 High Impact research articles defined in the Literature review. These divided into; 2 TAUT articles (4.0%), 17 AUDA (31%) articles, 29 OEF (53.0%) articles and 16 others (29.0%). This suggests there has been proportionally considerably more focus on the conceptual areas in High Impact compared to the wider OSS research population previously discussed (i.e. 71% High Impact versus 22.8% wider population). However, only one article where all three areas intersected (i.e. TAUT^AUDA^OEF) was produced from the High Impact research journals. As these are the leading IS research publications, this further illustrates the need for research in this area.

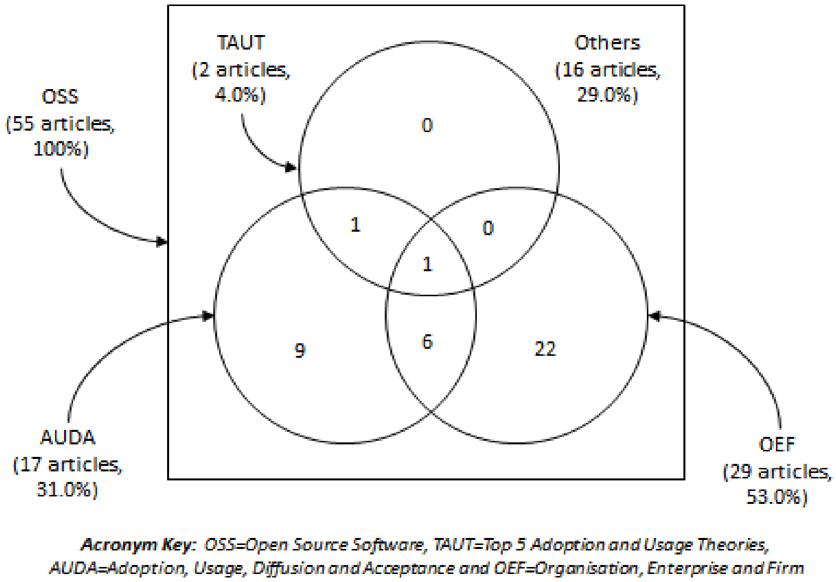


Figure 0.7: Venn Diagram of Key Conceptual Areas - High Impact

Mid Impact

Figure 0.8: Venn Diagram of Key Conceptual Areas - Mid Impact (below) shows the conceptual analysis of Mid Impact research defined in the Literature review. These articles divided into; 2 TAUT articles (2.3%), 18 AUDA (20.5%) articles, 34 OEF (38.6%) articles and 57 others (65.0%). This suggests there has been proportionally more focus on the conceptual areas in Mid Impact compared to the wider OSS research population previously discussed (i.e. 35% Mid Impact versus 22.8% wider population). However, notably less than the High Impact research (i.e. 35% Mid Impact, versus 71.0% High Impact). Furthermore, the space where all three areas intersect (i.e. “Central”) produced no articles. This lack of a single contribution from the second tier of leading IS research journals further illustrates the need for research in this area, and further motivates this study.

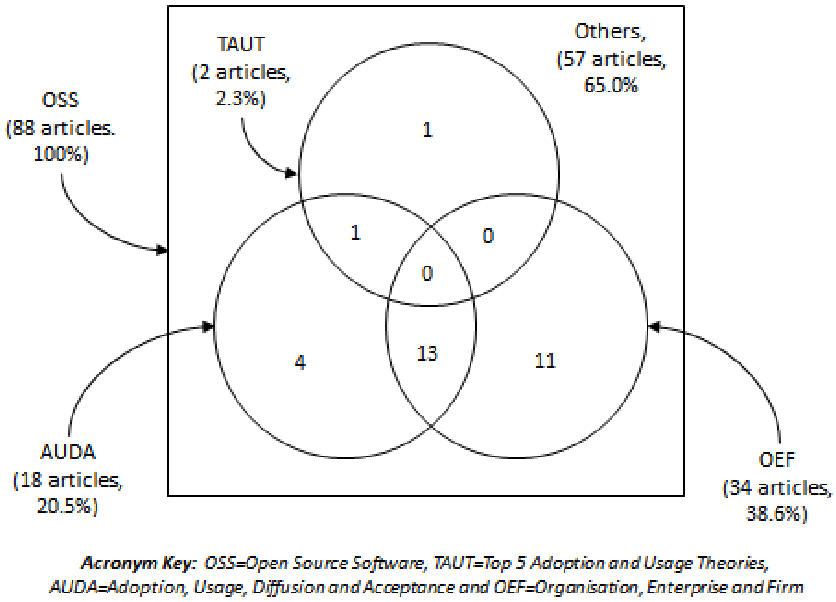


Figure 0.8: Venn Diagram of Key Conceptual Areas - Mid Impact

Third Tier

Figure 0.9: Venn Diagram of Key Conceptual Areas - Third Tier (below) shows the conceptual analysis of Third Tier research defined in the Literature review. Further analysis has shown that the previously established 3,940 OSS Third Tier research articles divided into; 13 TAUT articles (0.3%), 385 AUDA (9.8%) articles, 590 OEF (15.0%) articles and 3,080 others (78.2%). This suggests there has been proportionally; (a) slightly less focus on the conceptual areas than the wider OSS research population previously discussed (i.e. 21.8% Third Tier versus 22.8% wider population), (b) less than the Mid Impact research (i.e. 21.8% Third Tier versus 35% Mid Impact) and (c) significantly less than High Impact (i.e. 21.8% Third Tier versus 71% High Impact). However, where all three areas overlapped produced 6 articles from third tier of research targeted for this study, which is consistent with IS research arguments (previously referred to) that such publications can be a valuable source of research (Webster, 2002). Despite this comparatively large number of articles (i.e. One article from

High Impact and Mid Impact versus six from Third Tier), in the context of a total of 3,940 Third Tier OSS articles, it is evident there is still a relative lack of OSS Adoption and Usage Research which further motivates this study.

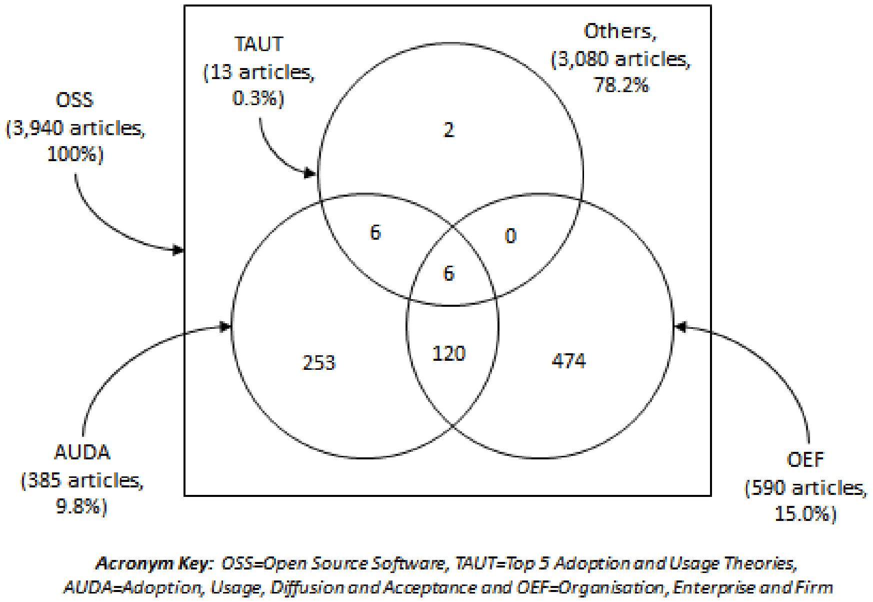


Figure 0.9: Venn Diagram of Key Conceptual Areas - Third Tier

Other OSS Research

This literature review identified a further three areas which were considered of potential significance to the objectives of this research, specifically the intersections of; TAUT, AUDA or OEF, excluding TAUT^AUDA^OEF, which was discussed in the previous section. That is, TAUT^AUDA~OEF (containing 8 articles), TAUT^OEF~AUDA (containing no articles) and OEF^AUDA~TAUT (containing 139 articles). See Comparison of Key Conceptual Areas in OSS Research

Articles Occupying The OSS{TAUT^AUDA~OEF} Research Space

This research space can be broadly described as OSS research, written on previously defined; top adoption and usage theories (TAUT); adoption, usage, diffusion and acceptance topics (AUDA); and excluding organisational topics (OEF); stemming from High Impact, Two and Three research. As such, although this may not directly concern organisational topics, it was considered an important area in identifying driving and inhibiting factors in OSS adoption.

The only High Impact contribution in this research space which was identified by this survey was written by a US author who developed an abstract mathematical model to emulate competition between rival PS products and OSS projects/releases; using analytical mathematical methods, in a positivist paradigm and specifically taking into account strong or weak network effects (Sen, 2007). That is, the utility of an artefact increasing proportionally with the size of the existing user base (ibid). Therefore, this would suggest that there is scope for this research to make a relatively unique contribution by building network effects as a driving/inhibiting factor in the conceptual model of this research.

The only Mid Impact contribution in this research space which was identified by this survey was written by a US author who investigated 280 end-users (i.e under-graduates, graduates and professionals) in the US; using empirical quantitative data, collected via a survey instrument, in a positivist paradigm and making use of a combination of TAM and Social Identity Theory (SIT) (Gwebu and Wang, 2011). The same research postulated that a range of factors could influence adoption decisions, including; security, cost, quality, flexibility, perceived usefulness, reduced vendor lock-in, personal identification, ease of use/implementation, training, unacceptable OSS license terms, overwhelming number of OSS patches and upgrades (ibid), Therefore, this would suggest that there is scope for this research to make a relatively unique contribution, by developing a conceptual model based on a theory other than TAM (as previously discussed) and by testing the aforementioned factors as driving/inhibiting beliefs for organisational OSS adoption.

The first Third Tier contribution in this space was made in 2009 by a US scholar who made use of mathematical modelling methods to emulate the diffusion of a particular OSS project (i.e. eMule), adopted a positivist paradigm, empirically gathered secondary quantitative data gathered via downloads and then analysed using the Bass Diffusion Model (BDM) (Whitmore et al., 2009). This would suggest that there is scope for relatively unique contribution by a research project which made use of primary data (as opposed to secondary) and analysed via appropriately selected mixed methods (as opposed to mathematical modelling).

The second Third Tier contribution in this space was made in 2010 by a German scholar who investigated the success of on-line communities, adopted a positivist paradigm, empirically gathered quantitative data via a survey of 541 respondents which were analysed via non-parametric statistical methods and a conceptual model based on TPB incorporating network size and financial incentives (Becker et al., 2010). Although this research is not directly associated with OSS, (i.e. OSS is regarded in this instance as part of a wider on-line community), it shows the successful use of TPB, survey and non-parametric statistical methods in this area. It also suggests that network size and financial incentives should be taken into consideration as potentially significant beliefs in this type of research.

The third Third Tier contribution was made in 2012 by an Australian author who investigated global users (i.e. students, academics and practitioners) of a particular OSS Business Process Management (BPM) systems project (i.e. YAWL), in a positivist paradigm, using empirical quantitative data gathered via a survey instrument from 220 respondents analysed via Structure Equation Modelling (SEM) and a bespoke conceptual model (broadly TPB-based) (Recker and La Rosa, 2012). The same research linked perceived behavioural control, intrinsic motivations (e.g. enjoyment), extrinsic motivations (e.g. outcomes), usefulness, social motives and intention to adopt and use (ibid). As the study post-dated the data collection phase of this research (i.e. Dec 2012) these factors were not included in the conceptual model. However, the study does support the use of TPB, positivist and quantitative data and analysis methods, as well as the need for application level unit of analysis.

The three remaining Third Tier contributions also post-date the data collection stage of this research and therefore did not influence the development of the conceptual model for this research.

Articles Occupying The OSS{TAUT^OEF~AUDA} Research Space

Initial studies of OSS adoption emerged in the form of a global study of 138 OSS projects (Stewart et al, 2006). In 2010 the working practices of developers at a major US technology company (i.e. internal software re-use at IBM) were investigated to show how knowledge creation occurred as an outcome/goal of OSS-type working practices The business value of an OSS project (i.e. MySQL) was also investigated to establish whether factors based on IT skills, infrastructure and IT business relationships are of significance to OSS adoption (Chingalur-Simth et al, 2010). Finally, a European perspective form Germany investigated individual OSS developers' code re-use where the Theory of Planned Behaviour (TPB) was used to test for efficiency and quality as driving factors of OSS adoption (Sojer and Henkel, 2010).

The inhibiting forces in non-adopting Australian public listed companies (PLCs) were also investigated where it was found that:, "There is a lack of research into inhibitors to technology adoption. This is unfortunate, as knowledge of the factors causing technology rejection should be as valuable as that on technology adoption" (Goode, 2005) ibid.

OSS Research Selected Occupying Remaining Areas

Further OSS research was selected which was considered to contribute to potential driving and inhibiting factors from the remaining areas identified in Figure 2.4: OSS Research Central to this Study. As with the other defined research areas these journals appear in Bibliographic Profile of Other OSS Research.

Appendix G: Systematic Profile of OSS Research Central to this Study

Existing IS research has argued that in order to, “encourage debate about critical issues in the field,” and, “assist in the identification of alternative theoretical and methodological perspectives,” it is necessary to systematically profile, “a set of existing publications in terms of author, institution, country, publication year, research paradigm employed, nature of primary data, research methods, theories and theoretical constructs, and the technology examined” (Williams et al., 2009). Therefore, this research will make use of these dimensions in analysing the existing research.

Table 0.2: Systematic Profile of Seven Articles Identified as Central to this Study

OSS{TAUT^OEF^AUDA}=7							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Macredie (2011), EJIS, High Impact	UK & UK	Small & Medium-sized enterprises (SMEs) in IT and factors influencing the adoption of OSS.	Positivist.	Empirical, qualitative	Case Study (10 SMEs)	Grounded Theory, Decomposed Theory of Planned Behaviour (DTPB)	Small- to medium-sized enterprises (SMEs); adoption; innovation; Decomposed Theory of Planned Behaviour; case study evaluation
Bueno (2010), Innovations and Advances in Computer Sciences and Engineering, Third Tier	Spanish Author, global respondents	IT Managers at Companies downloading ERP OSS	Positivist	Empirical & quantitative	Survey of 703 contacts who had downloaded ERP OSS from Sourceforge.net	Technology Acceptance Model (TAM)	PERCEIVED USEFULNESS, IMPLEMENTATION, TECHNOLOGY, MODEL, ENTERPRISE, SYSTEM, PERSPECTIVE, EXTENSION, INTERNET

OSS{TAUT^OEF^AUDA}=7							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Gallego (2008), Computers in Human Behavior, Third Tier	Spain, 11 european countries	Registered linux users	Positivist	Empirical & quantitative	Survey of 347 out of 1736 Linux users	Technology Acceptance Model (TAM)	PERCEIVED USEFULNESS; INTRINSIC MOTIVATION; BEHAVIORAL INTENTION; COGNITIVE ABSORPTION; CONSUMER ACCEPTANCE; INTERNET; SYSTEMS
Divakaran (2013), Behaviour & Information Technology, Third Tier	France, Global	Movie-based on-line community	Positivist	Empirical & quantitative	Survey	Theory of Planned Behaviour (TPB)	online community, customer participation, community behaviour, market, VIRTUAL BRAND COMMUNITIES, WORD-OF-MOUTH, ONLINE, USER COMMUNITIES, PLANNED BEHAVIOR, SOCIAL-INFLUENCE, IMPACT INNOVATION

OSS{TAUT^OEF^AUDA}=7							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Mount (2013), Behaviour & Information Technology, Third Tier	UK	Organisation	Positivist	Empirical, Quantitative	On-line survey of 69 high-velocity firms investigated with Exploratory Factor Analysis.	Technology Acceptance Model (TAM)	behavioural intentions, INFORMATION-TECHNOLOGY, USER ACCEPTANCE, HYPERCOMPETITIVE ENVIRONMENTS, DYNAMIC CAPABILITIES, INFRASTRUCTURE, DETERMINANTS, ORGANIZATION, ANTECEDENTS
Bixler (2012), Human Organization, Third Tier	US author, US research	Individuals	Positivist	Empirical, qualitative	21 Semi-structured interviews, field observation	Diffusion of Innovation	community-based natural resource management, watershed management, transferability, WATERSHED PARTNERSHIPS, MOVEMENT, SYSTEMS
Hau (2011), Computers in Human Behavior, Third Tier	China, South Korea	On-line game players	Positivist	Empirical quantitative	Analysis of 1244 members of gaming community in South Korea	Theory of Planned Behaviour	Online game, Innovation-conducive knowledge sharing, User innovation, Individual motivations, Social capital, VIRTUAL COMMUNITIES, NETWORKS, CREATION, TRUST, ASSISTANCE

Appendix H: Bibliographic Profile of OSS Research Central to this Study

OSS{TAUT^OEF^AUDA}=7					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Computers in Human Behavior	2008	Gallego, M. Dolores Luna, Paula Bueno, Salvador	24/5/2199-2216	User acceptance model of open source software	"[AIM:] …to identify the variables and factors [which] have a direct effect on individual attitude towards OSS adoption [behaviour]…[METHOD:] Technological acceptance model [was used, from users' attitudes] towards a solution based on OSS. [FINDINGS:] OSS is a viable solution for information management for organizations.
Innovations and Advances in Computer Sciences and Engineering	2010	Bueno, S. Gallego, M. D.	//55-60	Evaluating acceptance of OSS-ERP based on user perceptions	"[AIM:] To focus on the OSS [Enterprise Resource Planning] ERP users' acceptance and use… [METHOD] a research model based on the Technology Acceptance Model (TAM) for testing the users' [behaviour] toward OSS-ERP." FINDINGS: (a) Users should be involved at earlier stages (b) OSS ERP should be selected which is (i) easy to use (ii) useful (c) OSS ERP is a viable alternative to PS for SMEs.
Computers in Human Behavior	2011	Hau, Y. S. Kim, Y. G.	27/2/956-970	Why would online gamers share their innovation-conducive knowledge in the online game user community? Integrating individual motivations and social capital perspectives	"[AIM:] This study investigates what drives community users to freely share their innovation-conducive knowledge, [METHOD:] using the theory of planned behaviour… Based on an empirical analysis of the data from 1244 members of a South Korean online game user community, [FINDINGS:] it reveals that intrinsic motivation, shared goals, and social trust are salient factors in promoting users' innovation-conducive knowledge sharing. Extrinsic motivation and social tie, however, were found to affect such sharing adversely, contingent upon whether a user is an innovator or a non-innovator. The study illustrates how social capital, in addition to individual motivations, forms and influences users' innovation-conducive knowledge sharing in the online gaming context."

OSS{TAUT^OEF^AUDA}=7					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
European Journal of Information Systems	2011	Macredie, Robert D. Mijinyawa, Kabiru	20/7/237-250	A theory-grounded framework of Open Source Software adoption in SMEs	"[AIM: To develop a valid framework] that enables critical evaluation and common understanding of factors influencing OSS adoption… [METHOD:] this paper used the Decomposed Theory of Planned Behaviour (DTPB) as a basis for the research propositions, with the aim of: (i) developing a framework of empirical factors that influence OSS adoption; and (ii) appraising it through case study evaluation with 10 U.K. Small- to medium-sized enterprises in the IT sector. [FINDINGS:] a reliable explanation of the complex and subjective factors that influence attitudes, subjective norms and control over the use of OSS. The paper further argues that the DTPB proved useful in this research area and that it can provide a variety of situation-specific insights related to factors that influence the adoption of OSS.
Human Organization	2012	Bixler, R. P. Taylor, P. L.	71/3/234-243	Toward a Community of Innovation in Community-Based Natural Resource Management: Insights from Open Source Software	"[AIM:] Community-based natural resource management (CBNRM)… organised through the traditional top-down diffusion of innovation approach, can produce many barriers.... [METHOD:] However, [metaphorically] reframed as a more "open" and emergent process, the burdens of transfer may be reduced and benefits increased. We draw on an analogy from the Open Source Software (OSS) movement to suggest an [organisational] rationale for exchange and principles such as "porting," the "kernel," "copy-left," and "forking" that [FINDINGS:] can guide CBNRM and for community-based organizations challenged to share their approach to conservation".

OSS{TAUT^OEF^AUDA}=7					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Behaviour & Information Technology	2013	Divakaran, P. K. P.	32/6/545-559	Pre-release member participation as potential predictors of post-release community members' adoption behaviour: evidence from the motion picture industry	"[AIM:] This study shows pre-release member participation and members' online activities as potential predictors of community members' future adoption behaviour by (1) focusing on product-specific member participation and (2) by differentiating between pre-release and post-release member participation. Community members participate in online communities not only after product purchase or usage but also long before the product is introduced in the market (i.e. pre-release member participation) and especially in response to firms' announcement of upcoming product releases. [METHOD:] Within this context of new product preannouncement, the Theory of Planned Behaviour is applied [FINDINGS:] pre-release member participation in online activities is a potential predictor of the entire community's post-release adoption behaviour, using a movie-based online community. Moreover, the community adoption behaviour shows a strong positive association (mirroring effect) with market adoption behaviour suggesting that online community is a good representation of market adoption behaviour.
Behaviour & Information Technology	2013	Mount, M. P. Fernandes, K.	32/3/231-246	Adoption of free and open source software within high-velocity firms	"[AIM:] To conduct an investigation of FOSS adoption in firms operating in high-velocity environments and identify factors [which] have an impact on the adoption process. [METHOD:] Primary data were gathered from a cluster of firms operating in a high-velocity environment. [FINDINGS:] Our results indicate that performance attitude of managers, data regulation and facilitating conditions are important determinants of a firm's behavioural intention (BI) to adopt and use FOSS. Interestingly, influences from social and organisational domains have little effect on a firm's BI to adopt FOSS solutions. Overall, the article provides a structure to FOSS adoption which is relevant to managers and academics".

Appendix I: Systematic Profile of Other OSS Research

Articles Occupying OSS{AUDA^TAUT~OEF} Research Space

There were 4,083 articles published on the topic of OSS of which only 8 articles have been produced in this space. Comparison of Key Conceptual Areas in OSS Research shows that of these 8 articles; one originated from the High Impact leading IS journals, one from Mid Impact and the remaining six from Third Tier.

Table 0.3: Systematic Profile of Eight OSS Articles Identified as Relevant to this Study

OSS{AUDA^TAUT~OEF}=8							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Sen (2007), Journal of Management Information Systems, High Impact	US author, analytical	Abstract mathematical	Positivist	Non-empirical, analytical	Mathematical, descriptive	Network effects, Mathematical modelling to emulate competition between OSS and PS.	commercial open source, economics of open source, software competition, software market
Gwebu (2011), Decision Support Systems, Mid Impact	US Author, US respondents	End users undergraduates, graduates and professionals	Positivist	Empirical & quantitative	Survey of 280 students, graduates and working professionals.	Social Identity theory (SIT) & Technology Acceptance Model (TAM)	Social identification, personal innovativeness, adoption decisions
Martinez (2013), Journal of Biomedical Informatics, Third Tier	Spain	Individuals	Positivist	Empirical & quantitative	Survey of 10 medical practitioners use of OSS based social network	Technology Acceptance Model (TAM)	Decision Support Systems, Clinical, Social Network, Healthcare

OSS{AUDA^TAUT~OEF}=8							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Delibasic (2013), IEEE Transactions on Education, Third Tier	Italy	Individual Senior Management Students	Positivist	Empirical, quantitative	Experiment with 118 senior management students	Technology Acceptance Model (TAM)	Algorithms, Decision Support Systems, Decision Trees.
Becker (2010), Journal of Media Economics, Third Tier	German, global	Individual users of online communities	Positivist	Empirical, quantitative	Survey and non-parametric analysis of 541 respondents (Mann-Whitney and Partial Least Squares)	Theory of Planned Behaviour (TPB) adapted for Network Size and Financial Incentives	INTRINSIC MOTIVATION; SCALE DEVELOPMENT; BEHAVIOR; INTERNET; MODEL; PERFORMANCE; DEVELOPERS; INTENTION
Whitmore (2009), Information Technology and Control, Third Tier	US, global	Diffusion of specific OSS Project (eMule), number of downloads	Positivist	Empirical, quantitative	Mathematical modelling	Bass Diffusion Model	Marketing

OSS{AUDA^TAUT~OEF}=8							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Recker (2012), Information Systems, Third Tier	Australian author, global research	Individuals (students, academics and practitioners) use of particular OSS project for workplace management system (i.e. YAWL)	Positivist	Empirical, quantitative	Survey via online forums obtaining 220 responses analysed via Structure Equation Modelling	Bespoke model linking Perceived Behavioural Control, Intrinsic Mothivations and Intention to continue to use OSS	INFORMATION-TECHNOLOGY; INTRINSIC MOTIVATION; PERCEIVED EASE; EMPIRICAL-ANALYSIS; IMPACT; COMMUNITIES; CONTINUANCE

Articles Occupying OSS{AUDA^OEF~TAUT} Research Space

Comparison of Key Conceptual Areas in OSS Research shows that 139 articles were produced in the space defined as the intersection of OEF and AUDA; excluding TAUT. This is a comparatively large amount of journals and is consistent with previous IS research in terms of the number of alternative theoretical constructs in use outside the TAUT (Top Adoption and Usage Theories). Due to the relatively high volume of articles in this area this section will review the 6 High Impact and 13 Mid Impact journals.

Table 0.4: Systematic Profile of Six OSS Articles Identified as Relevant to this Study

High Impact OSS{AUDA^OEF~TAUT}=6							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
[8]Singh (2013), Information Systems Research, High Impact	US, Global Research	Individual Developers and OSS Projects	Positivist	Empirical, Quantitative	2000 randomly selected developers	Affiliation Networks	Social Influence, Social Networks,
[8]Barrett (2013), MIS Quarterly, High Impact	UK, Global	Competing discourses	Interpretative	Non-empirical	Comparison of proprietary, free and OSS discourses.	Computerization movements theory, framing and ideology	Computerization movements,, IT innovation, discourse, free software, ideology, rhetoric

[8] These articles post-date the data collection phase of this research and therefore were not included in the initial phase of the Literature Review

High Impact OSS{AUDA^OEF~TAUT}=6							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Vitharana (2010), Journal of Management Information Systems, High Impact	USA & USA	Division of IBM and its adoption of OSS methodologies, known as Internal Open Source (IOS) within organisational boundaries, and its effect on software reuse.	Positivist (i.e. postulates a theory as a hypothesis and then explores its' relation to a dataset	Empirically recording and transcript of interviews, qualitative	Case Study and structured interview.	Multi-level analysis postulating, info sharing, reuse, skills and openness.	Closed source; internal open source; participatory reuse; software reuse
Chengular-smith (2010), Journal of the Association for Information Systems, High Impact	US Author, global research	Individual's assessment of Business Value of Open source databases (specifically, MySQL) as an instance of OSS	Positivist	Empirical, quantitative.	Confirmatory Factor Analysis and PLS analysis of 149 responses from 898 MySQL implementing organisations	Three key IS resources: IT skill & knowledge, technical infrastructure, IT/Business relationship.	FLOSS; sustainability; organizational ecology; legitimacy; developer activity
Sojer (2010), Journal of the Association for Information Systems, High Impact	German author	Individual developers	Positivist	Empirical & Quantitative	686 responses from OSS developers	Theory of Planned Behaviour and regression analysis.	Innovation, software development, code re-use software re-use

High Impact OSS{AUDA^OEF~TAUT}=6							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Stewart (2006), Information Systems Research, High Impact	US author, global research	OSS projects	Positivist	Quantitative and empirical	138 OSS projects from Freshmeat were selected and analysed for driving factors.	Technology Acceptance Model (TAM) utilising concepts of Organisational Sponsorship and license restrictiveness	Software development, software licensing, success

.

Table 0.5: Systematic Profile of 13 Articles Identified as Relevant to this Study

Mid Impact OSS{AUDA^OEF~TAUT}=13							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Goode (2005), Information & Management, Mid Impact	Australian author, Australian research	Key individuals in non-adopting organisations which were leading public companies.	Positivist	Qualitative, empirical	Survey of 108 respondents	Inhibitor Determination Methodology (IDM)	Adoption barriers
Von Grogh (2007), Journal of Strategic Information Systems, Mid Impact	Swiss author, global	Authors assessments of OSS as a form of innovation and parallels with inter-disciplinary research	Descriptive, intepretative	Non-empirical	Selective literature review aimed at explaining proliferation of OSS research.	Collective Innovation Model (CIM)	interdisciplinary research; innovation, DEVELOPING-COUNTRIES; LINUX; PARTICIPATION; PROPRIETARY; COMMUNITY; PROJECTS; TECHNOLOGY; DEVELOPERS
Von Grogh (2009), Journal of Strategic Information Systems, Mid Impact	Swiss author, non-specific territory	Authors assessments of individualist, collectivist and combined perspectives of KM	Descriptive	Non-empirical	Selective literature review	N/A	Organizational knowledge, organization theory, knowledge-based view of the firm, organizational knowledge creation theory, individualist perspective, collectivist perspective,

Mid Impact OSS{AUDA^OEF~TAUT}=13							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Lundell (2010), Information Systems Journal, Mid Impact	Swedish author, Swedish companies	key individuals in companies in Sweden who had adopted various OSS projects.	Positivist	Empirical & Qualitative	58 Semi-structured interviews via purposeful sampling by telephone in 2006	Biological symbiosis analogy: parasitic, mutualistic and commensalistic	qualitative survey, adoption, perceptions of Open Source
Poba-Nzaou (2011), Journal of Information Technology, Mid Impact	Canadian Author, Canadian Research	Small and Medium Enterprises (SME's) adoption of ERP	Positivist.	Empirical & qualitative	Four case studies using semi-structured interviews	Technology Organisation Environment (TOE) Model. Organisational Buying Behavoiur (OBB)	ERP; enterprise system; SME; adoption process; risk management
Lee (2012), Industrial Management and Data Systems, Mid Impact	US, Korea	Organisations	Positivist	Empirical and Quantitative	Survey Instrument used to collect 157 enterprise software end-user responses and analysed with Structured Equation Modelling.	IS Success Model	Enterprise Information Systems

Mid Impact OSS{AUDA^OEF~TAUT}=13							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Marsan (2012), Journal of Strategic Information Systems, Mid Impact	Canada, Global	Organisations	Positivist	Empirical, quantitative	Analysis of public discourse and rate of adoption of OSS in organisations	Institutional Theory, Organising Vision, Rhetorical Theory	Organising vision, institutionalisation, dynamics, transformation.
[8]Li (2013) December, Decision Support Systems, Mid Impact	US, Global	Organisations	Positivist	Empirical, Qualitative	Case study gathered from key informants.	Technology, Organisation and Environment (TOE) Framework	Disaster Management, Humanitarian, Collaboration.
[8]Li (2013), Journal of Computer Information Systems, Mid Impact	France	Organisation	Positivist	Empirical and quantitative	Survey of 114 respondents expert in IT systems	Organisational Investment and Human Capital	Internal Human Capital, Firm Specificity, Learning-related Scale.
[8]Santos (2013), Journal of Strategic Information Systems, Mid Impact	Brazil	OSS projects	Positivist	Empirical and quantitative data.	Analysis of 4000 OSS projects using structured equation modelling	Contextual and causal factors of project attractiveness.	Attractiveness, preferential attachment

Mid Impact OSS{AUDA^OEF~TAUT}=13							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
[8]Lee (2014), Information Systems Management, Mid Impact							

Selected OSS Research

Other articles were selected which were considered as contributing potential driving and inhibiting factors to OSS adoption in organisations.

Selected OSS Research=17 Articles							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Mehra (2011), Information Systems Research, High Impact	Indian author, Indian research	Organisational					programmer incentives; programmer compensation; learning by doing; principal/agent; signalling; game theory; business models CAREER CONCERNS; MOTIVATIONS; INFORMATION; DEVELOPERS; EXPERIENCE; WORKING; LABOR
Ven (2008), Software IEEE, Third Tier	Belgian author, global research	Organisational	Intepretivist	Non-empirical, qualitative	Selective OSS literature review	None	DP management, organisational aspects, public domain software, Linux, infrastructure software, organizations

Selected OSS Research=17 Articles							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Mosoval et al (2006), Pacific Asia Conference on Information Systems, Third Tier	South African author, South Africa research	Organisational	Positvist	Empirical quantitative	Survey of respondents for perceived advantages and disadvantages of OSS	IS Success Model	Training, Supply, Demand
Allen and IEEE, 43rd Hawaii International Conference on Systems Sciences, Third Tier	US author, US research	Organisational	Interpretive	Empirical, qualitative	Interview case study of public sector organisation (i.e. local government) deployment of 3 OSS projects	Grounded theory	None
Casson and Ryan (2006), STANDARDS EDGE: UNIFIER OR DIVIDER?, Sherrie Bolin, ed., p. 87, Sheridan Books, Third Tier	US author, global research	Organisational	Interpretivist	Non-empirical, qualitative	Case Study, Observational	None	OpenDocument, Microsoft, XML

Selected OSS Research=17 Articles

Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Haider (2008), 10th International-Business-Information-Management-Association Conference, Third Tier	Australian Author, Austalian and New Zealand research	Public sector organisation	Interpretivist	Empirical, qualitative	Key informant interview with representatives from several public sector organisations	None	None
Glynn et al (2005), International Symposium on Empirical Software Engineering, Third Tier	Irish author, irish research	Public sector organisation	Positivist	Empirical, qualitative	Case study of a single hospital after validation of framework via survey of 111 respondents	Improved innovation adoption theory	Systems
Ven and Verelst (2008), Journal of Database Management, Third Tier	Belgian author, Belgian research	Small organisations	?	?	?	?	INFORMATION-TECHNOLOGY; SMALL BUSINESS; MINDFULNESS; RELIABILITY; DECISIONS; SYSTEMS; MODEL

Selected OSS Research=17 Articles							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Brydon and Vining (2008), Journal of Database Management, Third Tier	Canadian author, global research	Organisational	Positivist	Empirical, qualitative	Observational, Four case studies of OSS projects (i.e. Eclipse, Apache, OpenOffice and MySQL) followed by analysis of SugarCRM	Diffusion of Innovations	INFORMATION-TECHNOLOGY; INNOVATION; DIFFUSION; ORGANIZATIONS; COMPETITION; ECONOMICS; FIRM
Nagy et al (2010), Communications of the ACM, Mid Impact	US author, global research	Organisational	Interpretivist	Empirical, qualitative	Descriptive, observational, proposes driving and inhibiting factors to OSS with possible remedies	None	Computer Science, Hardware & Architecture; Computer Science, Software Engineering; Computer Science, Theory & Methods
Benkler (2002), Yale Law Review, Third Tier	US author, global research	Organisational	Interpretivist	Non-empirical,	Descriptive, Literature review.	Tragedy of the commons, Commons Based Peer Production	GIFT EXCHANGE; PROPERTY; MOTIVATION; CONTRACTS; MARKETS; SYSTEM; NORMS

Selected OSS Research=17 Articles							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Hauge et al (2010, Information and Software Technology, Third Tier	Norwegian author,	Organisational	Positivist	Empirical, qualitative	Systematic Literature Review of 112 articles.	None	INFORMATION-SYSTEMS; EMPIRICAL-RESEARCH; EXPERIMENTAL-MODELS; SELF-ORGANIZATION; BUSINESS MODELS; LINUX KERNEL; DESK-TOP
Pare et al (2009), Journal of Medical Systems, Third Tier	Canadian author, Canadian research	Organisational	Positivist	Empirical, qualitative	15 semi-structured interviews	Grounded theory	Barriers to innovation; Software acquisition; Health care organizations
Toral et al (2009), Internet Research, Third Tier	Spanish author, global research	On-line communities	Positivist	Empirical, quantitative	Analysis of on-line community activity and success via Structured Equation Modelling	Social Network Theory	VIRTUAL COMMUNITIES; LINUX KERNEL; KNOWLEDGE; SUCCESS; WEB; PARTICIPATION; EDUCATION; NETWORKS

Selected OSS Research=17 Articles							
Author	**Country of origin (author & research)**	**Level or units of analysis**	**Paradigm**	**Primary research (empirical or non-empirical, quantitative or qualitative)**	**Research methods**	**Theories and theoretical constructs**	**Keywords (other than stipulated search criteria)**
Van Rooij (2011), Computers and Education, Third Tier	US author, US research	Education organisations	Positivist	Empirical, quantitative	Survey of 285 & 772 respondents analysed via Chi-square	Organisational Management Theory and Diffusion of Innovations	Organisational Culture
Ward and Tao (2009), World Congress on Engineering and Computer Science, Third Tier	US author, US research	Public sector organisations	Positivist	Empirical, quantitative,	Survey of 3,316 respondents	?	City Government; Municipal Government;
Dedrick and West (2003), MIS Quarterly, High Impact	US author, US research	Organisational	Positivist	Empirical, qualitative	In-depth interviews and 10 case studies	Diffusion of Innovation	standards adoption; computing platforms; grounded theory; economics of standards; MIS organizations.

Appendix J: Bibliographic Profile of Other OSS Research

Articles Occupying OSS{AUDA^TAUT~OEF} Research Space

OSS{ AUDA^TAUT~OEF}=8					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Journal of Management Information Systems	2007	Sen, R.	24/1/233-257	A strategic analysis of competition between open source and proprietary software	"[AIM/METHOD:] This paper [mathematically models and analyses] a software market consisting of a freely-available open source software (OSS), the commercial version of this OSS (OSS-SS), and the competing commercial proprietary software (PS). [FINDINGS:] …in software markets characterised by low direct network benefits, the PS vendor is better off in the presence of competition from OSS-SS. Furthermore, the OSS-SS vendor in these markets is better off by having lower usability than PS. Therefore, the PS vendor has little incentive to improve the usability of their software in these markets. On the other hand, in software markets characterized by high network benefits, a PS vendor is threatened by the presence of OSS-SS and can survive only if the PS is more usable than the competing OSS-SS".

OSS{ AUDA^TAUT~OEF}=8					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Information Technology and Control	2009	Whitmore, Andrew Choi, Namjoo Arzrumtsyan, Anna	38/2/91-101	Open Source Software: The Role Of Marketing In The Diffusion Of Innovation	"[AIM/METHOD: Through mathematical analysis] ...to attempt to fit a logistic model to a well-known OSS project as a confirmatory exercise supporting the use of a single factor growth model as suggested by the literature. [FINDINGS:] ...a logistic model, or any kind of single factor model [of the type used in Diffusion of Innovation-based models], is inadequate to describe the diffusion of [a particular] OSS project. The paper then explains conceptually and illustrates mathematically why single factor models cannot fully represent the diffusion of any OSS project. A well-known two-factor model drawn from the marketing literature is presented, shown to solve the problem of single factor models, and used to illustrate the importance of marketing in OSS projects. This research suggests that the OSS literature may be overemphasizing the importance of the size of the user and developer community during the initial stages of growth and that during these stages the diffusion of the OSS project is primarily driven by external forces such as advertising or marketing efforts."
Journal of Media Economics	2010	Becker, Jan U. Clement, Michel Schaedel, Ute	23/3/165-179	The Impact of Network Size and Financial Incentives on Adoption and Participation in New Online Communities	"[AIM:] ...this study analyses what drives community adoption and how direct and indirect financial incentives influence user participation. [METHOD:] Extending Ajzen's (1991) Theory of Planned Behaviour, this article shows, in 2 empirical studies, that network size significantly affects adoption in newly established communities. [FINDINGS:] The results of the first study indicate a strong effect of indirect financial incentives (saving money) on the intention to adopt. The second study indicates that direct financial incentives (earning money) may well help increase the network's size without altering user motivation through crowding-out effects. It is interesting to note that the presence of direct financial incentives attracts new users, but it does not increase usage."
Decision Support Systems	2011	Gwebu, K. L. Wang, J.	51/1/220-229	Adoption of Open Source Software: The role of social identification	"[AIM: to develop and evaluate] an integrated model for the acceptance of OSS. In addition to the traditional technology adoption variables the findings stress the importance of social identification as a key driver of OSS adoption…" [METHOD:]" A survey of undergraduate students, graduate students, and working professionals was used to collect the data. A URL to the online survey was distributed electronically to a sample of potential respondents and made available online for sixty days. A total of 280 usable responses were received." "[FINDINGS:] The proposed model provides a useful decision support tool for assessing and proactively designing interventions targeted at successful OSS adoption and diffusion".

OSS{ AUDA^TAUT~OEF}=8					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Information Systems	2012	Recker, Jan La Rosa, Marcello	37/3/200-212	Understanding user differences in open-source workflow management system usage intentions	"[AIM:] Our study provides a detailed understanding of the use of open-source workflow management systems in different user communities... [METHOD:] We collected data on the usage of an open-source workflow management system developed by a university research group, and examined this data with a focus on how three different user cohorts - students, academics and industry professionals - develop behavioral intentions to use the system. Building upon a framework of motivational components, [FINDINGS:] we examined the group differences in extrinsic versus intrinsic motivations on continued usage intentions. Moreover, it discusses implications for the provision of workflow management systems, the user-specific management of open-source systems and the development of services in the wider user community."
Journal of Biomedical Informatics	2013	Martinez-Garcia, A. Moreno-Conde, A. Jodar-Sanchez, F. Leal, S. Parra, C.	46/6/977-984	Sharing clinical decisions for multi-morbidity case management using social network and open-source tools	[AIM:] ...to develop a tool for collaborative work among health professionals for multi-morbidity patient care. [METHODS:] designed and developed the Shared Care Platform (SCP) ...a pilot study to assess the use and acceptance of the SCP by healthcare professionals through questionnaire based on the theory of the Technology Acceptance Model. [FINDINGS:] ...As part of the SCP, open source tools for Clinical Decision Support (CDS) [were] incorporated to provide recommendations for medication and problem interactions, as well as to calculate indexes or scales from validated questionnaires. ...The application of interoperability standards and open source software can bridge the gap between knowledge and clinical practice, while enabling interoperability and scalability. Open source with the social network encourages adoption and facilitates collaboration. ...we expect that the new CDS tools will increase the use by the health professionals.

OSS{ AUDA^TAUT~OEF}=8					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Ieee Transactions on Education	2013	Delibasic, B. Vukicevic, M. Jovanovic, M. Suknovic, M.	56/3/287-291	White-Box or Black-Box Decision Tree Algorithms: Which to Use in Education?	"[AIM:] provides a comparison between students' acceptance of both black-box [which hide the algorithm's details from the user] and white-box [which reveal the algorithm's structure, allowing users to assemble algorithms from algorithm building blocks] decision tree algorithms. [METHOD:] For these purposes, the technology acceptance model [was] used. The model [was] extended with perceived understanding and the influence it has on acceptance of decision tree algorithms. An experiment was conducted with 118 senior management students who were divided into two groups-one working with black-box, and the other with white-box algorithms-and their cognitive styles were analyzed. [FINDINGS:] The results of how cognitive styles affect the perceived understanding of students when using decision tree algorithms with different levels of algorithm transparency are reported here.
International Journal of Engineering Education	2013	Delibasic, B. Vukicevic, M. Jovanovic, M.	29/3/674-687	White-Box Decision Tree Algorithms: A Pilot Study on Perceived Usefulness, Perceived Ease of Use, and Perceived Understanding	"[AIM: To evaluate:] a recently proposed data mining framework for white-box decision tree algorithms design. [METHOD:] An open source data mining platform for white-box algorithm design will be evaluated as technologically enhanced learning tool for teaching decision tree algorithms. An experiment on 51 students was conducted. A repeated measures experiment was done: the students first worked with the black-box approach, and then with the white box approach on the same data mining platform. Student's accuracy and time efficiency were measured. Constructs from the technology acceptance model (TAM) were used to measure the acceptance of the proposed platform. [FINDINGS:] ...in comparison to the black-box algorithm approach, there is no difference in perceived usefulness, as well as in the accuracy of produced decision tree models. On the other hand, the black-box approach is easier for users than the white-box approach. However, perceived understanding of white-box algorithms is significantly higher. Evidence is given that the proposed platform could be very useful for student's education in learning data mining algorithms."

High Impact Articles Occupying OSS{AUDA^OEF~TAUT } Research Space

High Impact OSS{ AUDA^OEF~TAUT}=6					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Information Systems Research	2006	Stewart, K. J. Ammeter, A. P. Maruping, L. M.	17/2/126-144	Impacts of license choice and organizational sponsorship on user interest and development activity in open source software projects	"[AIM: To establish] what differentiates successful from unsuccessful open source software projects? [METHOD:] developed and tested a model of the impacts of license restrictiveness and organizational sponsorship on two indicators of success: user interest in, and development activity on, open source software development projects. Using data gathered from Freshmeat.net and project home pages, [FINDINGS:] (1) license restrictiveness and organizational sponsorship interact to influence user perceptions of the likely utility of open source software in such a way that users are most attracted to projects that are sponsored by nonmarket organizations and that employ non-restrictive licenses, and (2) licensing and sponsorship address complementary developer motivations such that the influence of licensing on development activity depends on what kind of organizational sponsor a project has. Theoretical and practical implications are discussed, and the paper outlines several avenues for future research."
Journal of Management Information Systems	2010	Singh, Param Vir Tan, Yong	27/3/179-210	Developer Heterogeneity and Formation of Communication Networks in Open Source Software Projects	"[AIM: to] develop a non-cooperative game-theoretic model to investigate the network formation in an OSS team and to characterize the stable and efficient structures. Developer heterogeneity in the network is incorporated based on their informative value. [FINDINGS:] We find that there may exist several stable structures that are inefficient and there may not always exist a stable structure that is efficient. The tension between the stability and efficiency of structures results from developers acting in their self-interest rather than the group interest. Whenever there is such tension, the stable structure is either under-connected across types or over-connected within type of developers from an efficiency perspective. We further discuss how an administrator can help evolve a stable network into an efficient one. [METHOD:] Empirically, [use of] latent class model and [analysis of] two real-world OSS projects hosted at Source Forge. For each project, different types of developers and a stable structure are identified, which fits well with the predictions of our model. Overall, our study sheds light on how developer abilities and incentives affect communication network formation in OSS projects.

High Impact OSS{ AUDA^OEF~TAUT}=6					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Journal of Management Information Systems	2010	Vitharana, P. King, J. Chapman, H. S.	27/1/277-304	Impact of Internal Open Source Development on Reuse: Participatory Reuse in Action	"[AIM:] ...how "internal open source" (IOS) affects reuse. [METHOD:] ...a qualitative case study, [to] examine the IOS program at IBM called "Community Source." [FINDINGS:] Analysing data gathered from multiple sources reveals that IOS adoption facilitates participatory reuse by enhancing information sharing and leveraging of broader community skills. Participatory reuse manifests itself when potential reusers participate in the entire development process leading to the creation of reusable assets. Based on data, we develop a theoretical model to illustrate how IOS affects reuse. While furthering research on IOS and reuse, the model informs managers wishing to foster participatory reuse that they are wise to adopt IOS as a vehicle to promote greater openness of the software development infrastructure for leveraging broader community skills and enhancing information sharing among projects' stakeholders."
Journal of the Association for Information Systems	2010	Chengalur-Smith, InduShobha Nevo, Saggi Demertzoglou, Pindaro	11/11/708-729	An Empirical Analysis of the Business Value of Open Source Infrastructure Technologies	"[AIM: To examine] the antecedents of the business value of open source infrastructure technologies. [METHOD:] The paper puts forward a new model for explicating the organizational benefits of these technologies. A PLS analysis of 149 responses from organizations that have implemented MySQL. [FINDINGS:] in order to realize benefits from open source infrastructure technologies, organizations should have the human and technological capacities to absorb and utilize them as well as the ability to establish, maintain, and leverage ties with the technologies' communities of developers and users. The paper focuses on open source databases (specifically, MySQL) as an instance of open source infrastructure technology. ...absorptive capacity for the database, ties with the technology's user/developer community-of-practice, and an open source IT infrastructure that facilitates MySQL utilization explain about 20 per cent of the business value of the open source technology. These findings should help organizations realize the numerous potential benefits of open source technologies".

High Impact OSS{ AUDA^OEF~TAUT}=6					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Journal of the Association for Information Systems	2010	Sojer, Manuel Henkel, Joachim	11/12/868-901	Code Reuse in Open Source Software Development: Quantitative Evidence, Drivers, and Impediments	"[AIM:] how existing OSS code is reused and serves as an input to further OSS development. [METHODS:] ...a survey with 686 responses from OSS developers ...[using] multivariate analyses of developers' code reuse behavior [FINDINGS:] developers with larger personal networks within the OSS community and those who have experience in a greater number of OSS projects reuse more, presumably because both network size and a broad project experience facilitate local search for reusable artifacts. Moreover, we find that a development paradigm that calls for releasing an initial functioning version of the software early-as the "credible promise" in OSS-leads to increased reuse. Finally, we identify developers' interest in tackling difficult technical challenges as detrimental to efficient reuse-based innovation. Beyond OSS, we discuss the relevance of our findings for companies developing software and for the receiving side of open innovation processes, in general.
MIS Quarterly	2013	Barrett, M. Heracleous, L. Walsham, G.	37/1/201-220	A Rhetorical Approach To It Diffusion: Re-conceptualizing The Ideology-Framing Relationship In Computerization Movements	"[AIM: To] propose 'rhetoric' as a valuable yet underdeveloped alternative paradigm for examining IT diffusion. [METHOD:] Building on recent developments of computerization movements theory, our rhetorical approach proposes that two central elements of the theory, framing and ideology, rather than being treated as separate can be usefully integrated. [FINDINGS:] IT diffusion can be usefully explored through examining the interrelationship of the deep structures underlying ideology and the type and sequence of rhetorical claims underpinning actors' framing strategies. Our theoretical developments also allow us to better understand competing discourses influencing the diffusion process. These discourses reflect the ideologies and shape the framing strategies of actors in the broader field context. We illuminate our theoretical approach by drawing on the history of the diffusion of free and open source software."

Mid Impact Articles Occupying OSS{AUDA^OEF~TAUT } Research Space

Mid Impact OSS{ AUDA^OEF~TAUT}=13					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Information & Management	2005	Goode, S.	42/5/669-681	Something for nothing: management rejection of open source software in Australia's top firms	"[AIM: To establish] why have not more firms adopted open source software. [METHODS: survey of IT managers in top Australian companies analysed using Inhibitor Determination Methodology (IDM) FINDINGS:] managers rejected open source software because they could not see that it had any relevance to their operations, perceived a lack of reliable ongoing technical support of it and also appeared to see substantial learning costs or had adopted other software that they believed to be incompatible with open source software".
Journal of Strategic Information Systems	2007	von Krogh, Georg Spaeth, Sebastian	16/3/236-253	The open source software phenomenon: Characteristics that promote research	"[AIM: To] show that research in many different fields and disciplines of the social sciences have shed light on the [OSS] phenomenon. [METHOD: Via selective literature review it is argued] that five characteristics make the phenomenon particularly attractive to examination from various fields and disciplines using a plethora of research methods: (1) impact: open source software has an extensive impact on the economy and society; (2) theoretical tension: the phenomenon deviates sharply from the predictions and explanations of existing theory in different fields; (3) transparency: open source software has offered researchers an unprecedented access to data; (4) communal reflexivity: the community of open source software developers frequently engage in a dialog on its functioning (it also has its own research community); (5) proximity: the innovation process in open source software resembles knowledge production in science (in many instances, open source software is an output of research processes). These five characteristics also promote a trans-disciplinary research dialog. [FINDINGS:] Based on the experience of open source software research, we propose that phenomena-driven trans-disciplinary research provides an excellent context to promote greater dialog between disciplines and fields. Moreover, we propose that the recent diffusion of the open source software model of innovation to other areas than software calls for new research and that the field of information systems has an important role to play in this future research agenda."

Mid Impact OSS{ AUDA^OEF~TAUT}=13					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Journal of Strategic Information Systems	2009	von Krogh, Georg	18/3/119-129	Individualist and collectivist perspectives on knowledge in organizations: Implications for information systems research	"[AIM: To combine] collectivist perspective [which] assumes the locus of knowledge is collective [with individualist perspectives of knowledge]. [METHOD: Via literature review] selected contributions on the locus of knowledge, presents an argument for a combined collectivist and individualist perspective, and outlines future directions for information systems research. Drawing on two significant examples [i.e. OSS], [it is argued] that information systems research has a strategic role to play in greatly advancing this combined perspective."
Information Systems Journal	2010	Lundell, Bjorn Lings, Brian Lindqvist, Edvin	20/6/519-535	Open source in Swedish companies: where are we?	"[AIM:] report on a study of the perceptions of [OSS] and the uptake of OS products and development models in Swedish companies... [The] goal was to investigate the extent to which OS has influenced business thinking, as seen from the standpoint of stakeholders... [METHOD:] purposeful sampling of companies that have an expressed interest in [OSS] and the survey was conducted using a set of pre-prepared questions. [FINDINGS] We found that uptake is much higher than reported in earlier studies, but as with previous studies, activity is still concentrated in small and medium-sized enterprises (SMEs). There is increased evidence of interest beyond the simple use of OS components at the infrastructure level. Further, a significant proportion of the companies studied are supporting the OS community as well as benefiting from it. Support includes participation in existing projects and the release of new software under OS licenses.
Journal of Information Technology	2011	Poba-Nzaou, Placide Raymond, Louis	26/3/170-192	Managing ERP system risk in SMEs: a multiple case study	"[AIM:] how do SMEs actually manage the risk of ERP implementation during the ERP adoption process? The research objectives are (1) to identify and describe the influence of the SMEs' context on their implementation risk exposure, and (2) to understand whether and how, within the adoption process... [METHOD:] In order to do so, four case studies of SMEs having implemented an ERP system were undertaken. The study shows that to manage risk at the adoption stage, SMEs can proceed in a rather intuitive, informal and unstructured manner, that is explicitly based however upon an architecture of basic principles, policies and practices. ... [FINDINGS:] SMEs actually manage the risk of implementing an ERP system supplied by an ERP vendor, with open source software, or through in-house development."

Mid Impact OSS{ AUDA^OEF~TAUT}=13					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Industrial Management & Data Systems	2012	Lee, S. M. Lee, S. H.	112/7/1065-1084	Success factors of open-source enterprise information systems development	"[AIM:] To identify the success factors of open-source software in the enterprise level. [METHODS:] ...the application of the information systems (IS) success model in the literature to enterprise information systems (EIS). The paper presents a simplified open-source EIS success model by removing several constructs in the existing open-source software models. ...a survey questionnaire was developed, based on previous studies dealing with IS success models and adapting them to the open-source EIS context. The research instrument contained 30 items that represent seven constructs in the research model. Data were collected from 250 open-source enterprise software end-users. Due to its confirmatory nature, this study applied the structural equation model. [FINDINGS:] The results of the study indicate that only community service quality has a positive direct effect on open-source EIS use, while information quality, EIS quality, and user satisfaction do not. Open-source EIS quality has a direct positive effect on user satisfaction, which in turn has a positive effect on individual net benefits, which also positively affects organizational net benefits. ...There is a paucity of empirical studies in open-source EIS applications. The paper extends the traditional IS success model to the open-source EIS context by collecting and analyzing data from 150 real-world open-source EIS users."

Mid Impact OSS{ AUDA^OEF~TAUT}=13					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Information and Software Technology	2012	Marsan, J. Pare, G. Wybo, M. D.	54/12/1308-1316	Has open source software been institutionalized in organizations or not?	"[AIM:] This paper evaluates the extent of OSS institutionalization in organizations. A practice or innovation is said to be institutionalized when it is taken-for-granted and its use becomes the norm. [METHOD:] ...Using the rhetorical theory of diffusion of innovations in tandem with the concept of organizing vision, we provide a deep understanding of the institutionalization of OSS by showing that it has not only diffused among organizations, but is also taken-for-granted in thought and social action... Drawing on institutional theory, the underlying concept of organizing vision and the rhetorical theory of diffusion of innovations, we [analyse] OSS institutionalization through the observation of the evolution of the public discourse about OSS and, simultaneously, the observation of the rate of adoption or diffusion of OSS in organizations. [FINDINGS:] OSS has become institutionalized for many back-end applications and is gradually becoming institutionalized for some front-end applications, mainly in small and medium enterprises but also in organizations in the financial, publishing, education, government and public sectors. The positive tone and prominence of the public discourse on OSS have an important role to play in its institutionalization. Conclusion: The institutionalization of OSS in organizations cannot be underestimated by IT and business executives as well as key players in the IT industry. Future research efforts should be pursued and directed toward the institutionalization of particular OSS applications in a variety of industries and geographic regions."
Decision Support Systems	2013	Li, J. P. Chen, R. Lee, J. Rao, H. R.	55/1/1-11	A case study of private-public collaboration for humanitarian free and open source disaster management software deployment	[AIM:] this study identifies the key issues in collaborative deployment of FOSS for humanitarian relief operations. [METHOD:] ...Drawing upon the Technology-Organization-Environment (TOE) framework,...[this article] elaborates the key research issues by adopting a case study approach in which qualitative data were gathered from key informants from both private and public sectors. [FINDINGS:] The results suggest that task-technology fit, expertise management, and inter-organizational relationship management play critical roles in humanitarian FOSS deployment.

Mid Impact OSS{ AUDA^OEF~TAUT}=13					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Journal of Computer Information Systems	2013	Li, Y. Tan, C. H. Yang, X.	54/1/42-52	OSS ADOPTION: ORGANIZATIONAL INVESTMENT IN INTERNAL HUMAN CAPITAL	"[AIM: To] propose and validate two antecedents of organizational investment in internal human capital in the context of OSS adoption. [METHOD:]Survey data collected from 114 senior Information Technology (IT) managers and professionals indicates that these two factors are positively associated with the investment in cultivating internal OSS human capital. [FINDINGS: The antecedents] ...are (1) firm-specificity of OSS human capital, which denotes the extent to which the internal OSS human capital is strongly tied to the organization and cannot be equally well applied in other organizations, and (2) learning-related scale, which reflects the extent to which the organizational cost of learning OSS can be spread by applying the knowledge gained to other projects and business functions within the organization."
Journal of Strategic Information Systems	2013	Santos, C. Kuk, G. Kon, F. Pearson, J.	22/1/26-45	The attraction of contributors in free and open source software projects	"[AIM: To] develop a theoretical model to explore the contextual and causal factors of project attractiveness in inducing activities such as source code contribution, software maintenance, and usage. [METHOD:] [tested] model with data derived from more than 4000 projects spanning 4 years. [FINDINGS:] ...projects' set of conditions such as license restrictiveness and their available resources provide the context that directly influence the amount of work activities observed in the projects..."
Information Systems Management	2014	Lee, Young-Chan Tang, Hanh N. Sugumaran, Vijayan	31/1/2-20	Open Source CRM Software Selection using the Analytic Hierarchy Process	"[AIM: To develop] an efficient decision making framework to select the best open source CRM software... [METHOD: Using] Analytic Hierarchy Process (AHP) from not only the functionality aspect, but also from the organizational perspective. [FINDINGS:] This framework would be useful for managers who intend to adopt open source CRM software for their organization."

Selected OSS Research

Selected OSS Research=17 Articles					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Information Systems Research	2011	Mehra, Amit Dewan, Rajiv Freimer, Marshall	22/1/22-38	Firms as Incubators of Open-Source Software	"[AIM: To] examine this relationship ...[between programmer's allocation of effort to OSS and PS projects] [METHOD:] using a variant of the principal/agent model. [FINDINGS: Derived and characterized] optimal employment contracts and show that firms either [a] offer a bonus for only one of the two projects or [b] do not offer any bonuses. However, if attractive alternate employment opportunities are available, they change their strategy and may offer bonuses for both projects simultaneously."
Software, IEEE	2008	Ven, K. Verelst, J. Mannaert, H.	25/3/54	Should You Adopt Open Source Software?	"[AIM:] Should [organisations] adopt OSS? [METHODS: A selective literature review of] ...books, research papers, and articles highlighting OSS's advantages and disadvantages. [FINDINGS:] Reasons for adopting OSS vary from the pragmatic to the ideological. Organizations must consider the advantages and disadvantages of open source software before adopting it".
Pacific Asia Conference on Information Systems 2006, Sections 1-8	2006	Mosoval, F. Gardiner, J. Healey, P. Prestedge, A. Johnston, K. Pacis,	//1404-1419	The State of Open Source Software (OSS) In South Africa	"[AIM:] This paper explores the state of Open Source Software (OSS) in South Africa. [METHODS: Via survey and analysis through IS Success Model] the use of OSS in the business and government environment, as well as the supply and demand of OSS professionals in the South African environment are investigated. [FINDINGS:] …provide[s] businesses with an objective tool with which to help them evaluate OSS in their businesses.

Selected OSS Research=17 Articles					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
43rd Hawaii International Conference on Systems Sciences Vols 1-5	2010	Allen, J. P. Ieee,	//2877-2886	Open Source Deployment at the City and County of San Francisco: From Cost Reduction to Rapid Innovation	"[METHODS:] ...This case study reports on early experiences with deploying innovative new business applications using open source software at the City and County of San Francisco. [AIM:] While open source adoption research has focused on infrastructure and cost reduction, will the larger organizational impact of open source come from rapid innovation that cuts through resource constraints and complex IT management politics? [FINDINGS:] ...evidence from this case study suggests that systems based on open source platforms are perceived as being developed and deployed in record time, at little cost, while increasing the skills and importance of locally-employed IT talent By examining the early stages of three projects that have pleasantly surprised users, management. and technical staff we will suggest how open source enterprise deployments might become a significant force in organizational IT."
STANDARDS EDGE: UNIFIER OR DIVIDER?, Sherrie Bolin, ed., p. 87, Sheridan Books, 2006	2006	Casson, Tony Ryan, Patrick S.	//	Open Standards, Open Source Adoption in the Public Sector, and Their Relationship to Microsoft s Market Dominance	"[AIMS:] This paper examines (1) recent decisions to implement open standards and open source software, (2) Microsoft's current response to these decisions, and (3) the possible effect of these decisions on Microsoft's market dominance. [METHOD: Via observation] ...this paper compares and contrasts the Microsoft Open XML standard with the OASIS OpenDocument standard. It also considers some recent government announcements to adopt open source solutions, including OpenDocument. Furthermore, the paper analyses Microsoft's previous approach to open standards, its refusal to support OpenDocument in favour of its own Open XML format, and its recent decision to submit Open XML to a standards body for certification. [FINDINGS:] ...while Microsoft will likely continue to maintain its market dominance, the open source and open document movements will benefit consumers and create a more competitive environment.
Innovation and Knowledge Management in Business Globalization: Theory & Practice, Vols 1 and 2	2008	Haider, Abrar	//	Issues of Open Source Software Uptake in Australian Government Agencies	"[AIM: To investigate] ...issues around open source software uptake in government agencies ...if the adoption of OSS is to be encouraged then these issues have to be addressed. [METHOD/FINDINGS: Through qualitative data gathered via key informant interview] this paper presents an account of these issues as identified by the government agencies from Australia and New Zealand.

Selected OSS Research=17 Articles					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
2005 International Symposium on Empirical Software Engineering	2005	Glynn, E. Fitzgerald, B. Exton, C. Ieee,	//	Commercial adoption of open source software: An empirical study	"[AIM: To investigate the] many complex and novel issues that surround the use of OSS [and the] the process of OSS adoption... [METHODS:] We investigated this issue using a framework derived from innovation adoption theory which was then validated in an organisation which had embarked on a large-scale of adoption of OSS. The framework comprised four macro-factors - external environment, organisational context, technological context and individual factors. We then investigated these factors in a large-scale survey. [FINDINGS: A] significant penetration of OSS with general deployment in two industry sectors consultancy/sotware house and service/communication - and more limited deployment in government/public sector. However, the existence of a coherent and planned IT infrastructure based on proprietary; software served to impede adoption of OSS. Finally, individual-relevant factors such as support for the general OSS ideology and committed personal championship of OSS were found to be significant."
Journal of Database Management	2008	Ven, Kris Verelst, Jan	19/2/58-72	The impact of ideology on the organizational adoption of open source software	"[AIM:] ...investigated the organisational [OSS] adoption decision in Belgian organizations. [FINDINGS:] ...most organizations are pragmatic in their decision making. However, we have found evidence that suggests that the influence of ideology should not be completely disregarded in small organizations.
Journal of Database Management	2008	Brydon, Michael Vining, Aidan R.	19/2/73-94	Adoption, improvement, and disruption: Predicting the impact of open source applications in enterprise software markets	"[AIM:] Is free and open source software (FOSS) likely to disrupt markets for commercial enterprise software? [METHODS:] ...develop[ed] a two-stage model of open source disruption in enterprise software markets that emphasizes a virtuous cycle of adoption and lead-user improvement of the software. The two stages are an initial incubation stage (the I-Stage) and a subsequent snowball stage (the S-Stage). Case studies of several FOSS projects demonstrate the model ex post predictive value. [FINDINGS:] ..the model [was applied] to SugarCRM, an emerging open source CRM application, to make ex ante predictions regarding its potential to disrupt commercial CRM incumbents... [Out of the potential disruptive products in the market] an [OSS] CRM program, such as SugarCRM, is more likely."

Selected OSS Research=17 Articles					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Communications of the ACM	2010	Nagy, D. Yassin, A. M. Bhattacherjee, A.	53/3/148-151	Organizational Adoption of Open Source Software: Barriers and Remedies	"[AIM: To examine] ...the barriers (“hidden costs”) of adopting open source software. Open source software has created considerable excitement in the business world over the last decade... [METHODS: via comparison of secondary data of the market share of various PS and OSS alternatives, and observation of certain barriers to OSS adoption]. [FINDINGS:] ...the barriers confronting open source software adoption and potential ways of overcoming these barriers are less known. This article described five major barriers for adopting such software, along with potential remedies for each barrier."
Yale Law Journal	2002	Benkler, Y.	112/4/369+	Coase's penguin, or, Linux and The Nature of the Firm	"[AIMS: To explain] why free software is only one example of a much broader social-economic phenomenon emerging in the digitally networked. environment, a third mode of production [other than firm-based or market-based] that the author calls "commons-based peer production." [METHOD: Observation of] detailed examples, such as Wikipedia, Slashdot the Open Directory Project, and Google. The Article uses these examples to reveal fundamental characteristics of commons-based peer production that distinguish it from the property- and contract-based modes of firms and markets. [FINDINGS:] The central distinguishing characteristic. is that groups of individuals successfully collaborate on large-scale projects following a diverse cluster of motivational drives and social signals rather than market prices or managerial commands. The Article then explains why this mode has systematic advantages over markets and managerial hierarchies in the digitally networked environment when the object of production is information or culture...

Selected OSS Research=17 Articles					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Information and Software Technology	2010	Hauge, Oyvind Ayala, Claudia Conradi, Reidar	51/11/1133-1154	Adoption of open source software in software-intensive organizations - A systematic literature review	"[AIM:] This paper seeks to identify how organisations adopt OSS, classify the literature according to these ways of adopting OSS, and with a focus on software development evaluate the research on adoption of OSS in organizations. [METHOD:] Based on the systematic literature review method we reviewed publications from 24 journals and seven conference and workshop proceedings, published between 1998 and 2008. From a population of 24,289 papers, we identified 112 papers that provide empirical evidence on how organizations actually adopt OSS. [RESULTS:] We show that adopting OSS involves more than simply using OSS products. We moreover provide a classification framework consisting of six distinctly different ways in which organisations adopt OSS. This framework is used to illustrate some of the opportunities and challenges organisations meet when approaching OSS, to show that OSS can be adopted successfully in different ways, and to organize and review existing research. We find that existing research on OSS adoption does not sufficiently describe the context of the organizations studied, and it fails to benefit fully from related research fields. While existing research covers a large number of topics, it contains very few closely related studies..."
Journal of Medical Systems	2009	Pare, Guy Wybo, Michael D. Delannoy, Charles	33/1/1-7	Barriers to Open Source Software Adoption in Quebec's Health Care Organizations	"[AIM:] ...to identify the principal impediments to adoption of open source software in the Quebec health sector. ...[METHODS:] ... conducted in-depth interviews with 15 CIOs [FINDINGS:] ...key factors for not adopting an open source solution were closely linked to the orientations of ministry level policy makers and a seeming lack of information on the part of operational level IT managers concerning commercially oriented open source providers. We use the case of recent changes in the structure of Quebec's health care organizations and a change in the commercial policies of a key vendor to illustrate our conclusions regarding barriers to adoption of open source products.

Selected OSS Research=17 Articles					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Internet Research	2009	Toral, Sergio L. Rocio Martinez-Torres, M. Barrero, Federico Cortes, Francisco	19/4/378-392	An empirical study of the driving forces behind online communities	"[AIMS:] ...this paper is focused on the determinants of success of online communities. [METHODS:] ...these determinants are analysed from the social network analysis perspective. Several constructs related to the community organization as a social network are proposed and their interrelations are hypothesized. in a general research framework. The obtained results test the proposed model providing the most relevant antecedents of the project success... A case study based on Linux ports to non-conventional processor and environments is used to test the proposed model. Structural equation modeling analysis is used to validate the structural proposed model. [FINDINGS:] The main antecedents of online communities' success, quantifying the strength of the relation through the standardized path coefficients…"
Computers & Education	2011	van Rooij, Shahron Williams	57/1/1171-1183	Higher education sub-cultures and open source adoption	"[AIMS:] Successful adoption of new teaching and learning technologies in higher education requires the consensus of two sub-cultures, namely the technologist sub-culture and the academic sub-culture. [METHODS:] This paper examines trends in adoption of open source software (OSS) for teaching and learning by comparing the results of a 2009 survey of 285 Chief Academic Officers and Chief Information Officers with the 2006 administration of the same survey. [FINDINGS:] ... while the key drivers of OSS adoption continue to differ for the academic and technologist sub-cultures, both sub-cultures converge in deeming total cost of ownership as the most important metric for making a go/no go adoption decision."

Selected OSS Research=17 Articles					
Publication	**Year**	**Author(s)**	**Vol/No/Pages**	**Article Title**	**Aims/Method/Findings**
Wcecs 2009: World Congress on Engineering and Computer Science, Vols I and Ii	2009	Ward, David J. Tao, Eric Y.	//1044-1049	Open Source Software Use in Municipal Government: Is full immersion possible?	"[AIM: To consider] if it is possible from an organizational perspective for small to medium-sized cities to provide services and conduct business using only open source software (OSS). [METHODS:] We examine characteristics of municipal government that may influence the adoption of OSS for the delivery of services and to conduct city business. Three characteristics are considered to develop an understanding of city behavior with respect to OSS: capability, discipline, and cultural affinity. Each of these general characteristics contributes to the successful adoption and deployment of OSS by cities. Our goal was to determine the organizational characteristics that promote the adoption of OSS. We conducted a survey to support this study resulting in 3316 responses representing 1286 cities in the Unites States and Canada. [FINDINGS:] ...most cities do not have the requisite characteristics to successfully adopt OSS on a comprehensive scale and most cities not currently using OSS have not future plans for OSS.
MISQ Special Issue Workshop: Standard Making A Critical Research Frontier for Information Systems	2003	Dedrick, J. West, J.	//	Why Firms Adopt Open Source Platforms: Grounded Theory of Innovation and Standards Adoption.	"[AIM: To consider] factors such as the nature of the technology, the organizational and environmental context in which adoption decisions are made, and the processes by which users adopt and implement new technologies... [METHODS:] We use a series of interviews with MIS managers to develop a grounded theory of open source platform adoption. [FINDINGS: Are placed] within the contexts of diffusion of innovation and economics of standards theories.

Appendix K: Potential Driving and Inhibiting Factors Drawn from the Literature Review

Attitudinal (A) Factors

Driving adoption

A review of generic IS adoption and usage research, which is specific to OSS provided a wide range of factors. These factors can be perceived as attitudes that could potentially drive or inhibit organisational OSS adoption by respondents, which are described in the following sections.

Productivity and OSS

IS research has argued that productivity can be considered a driving factor in terms of OSS adoption, particularly for organisations who employ programmers and developers (Mehra et al., 2011). In addition, other IS research has criticised existing studies for failing to investigate the links between technology and organisational outcomes, such as productivity (Venkatesh et al., 2003). Therefore, this research will seek to address this gap by investigating whether productivity is a significant factor in organisational OSS adoption.

Category Killer

OSS research has described certain OSS projects as, "Category Killers in horizontal domains," such as, "Linux and Apache" (Ven et al., 2008), which are in the Operating System and Network Operating System NAPCS category (USCB, 2003). That is to say that the particular OSS project is considered so mature and dominant in its category so as to make the proposition of alternatives unlikely. Other OSS research has concurred that, "Successful [OSS] examples are typically general purpose horizontal infrastructure [or NAPCS systems category] software" (Fitzgerald and Agerfalk, 2005).

Therefore, this research will investigate whether this factor is significant a range of NAPCS categories.

Greater Security

OSS research has claimed that greater security is a driver for organisational OSS adoption (Gallego et al., 2007). However, other OSS research has argued that there are claims that OSS is more secure and counter claims that PS possessed, "commercial quality security" attributes (Mosoval et al., 2006). Contrastingly, further OSS research has cited a well-known OSS design principle namely, "Many eyeballs, make all bugs shallow," and claimed that OSS is, "often associated with the prestige of unbreakable products" (Gwebu and Wang, 2011). Similarly, further OSS research has claimed that access to source code enhances security via trust, in that, "[OSS] was less likely to contain hidden features and that bugs in the software would be quickly fixed" (Ven et al., 2008). Therefore, this research will investigate whether attitudes toward security is a significant factor in the organisational OSS adoption.

Reduced Cost

OSS research has cited reduced cost (primarily through the avoidance of PS license fees) as a driver in organisational OSS adoption (Gwebu and Wang, 2011). For example, in the application software category (i.e. ERP), reduced cost has been claimed as a driving factor in organisational OSS adoption (Bueno and Gallego, 2010). Other research has argued that reduced cost, through lower development costs, is an important factor in the adoption of OSS (Vitharana et al., 2010). Other research has linked OSS, and its adherence to open standards, with the question of software affordability (Casson and Ryan, 2006). In contrast, other OSS research has questioned whether OSS offers net cost savings, when other considerations are taken into account, such as data migration costs, switching costs, retraining and so forth (Ven et al., 2008). Therefore this research will seek to understand if attitudes toward reduced cost are significant with respect to organisational OSS adoption.

Quality

IS research has argued that attitudes toward quality is a significant factor in the adoption of innovation in organisations (Jeyaraj et al., 2006). Similarly, in OSS research, it has been argued that, "High OSS quality will result in a high level of user satisfaction which will prompt users to spread positive information about the OSS" (Whitmore et al., 2009). Other OSS research has pointed out that OSS proponents have argued, "making source code available lets everyone peer review the code, resulting in higher quality software" (Ven et al., 2008). Additionally, OSS research in the development of software has cited higher quality as an important factor in adopting OSS (Vitharana et al., 2010). However, other OSS research has questioned OSS quality claims, "… based on analysis of the actual code, [research has] questioned the assumption that OSS products are automatically of high quality" (Glynn et al., 2005). Therefore, this research will seek to establish whether attitudes toward quality are significant in terms of organisational OSS adoption.

Flexibility

A number of OSS research studies have reported that flexibility is an important driving factor in the adoption of OSS (Bueno and Gallego, 2010, Gallego et al., 2008, Gwebu and Wang, 2011, Haider, 2008) and a core freedom associated with the principles of the FSF and the OSI (Lundell et al., 2010a). Other OSS research has found that the ability to customise OSS was also an important factor for some organisations (Ven et al., 2008). Furthermore, OSS research in field of software development has cited flexibility has a key factor in the adoption of OSS (Vitharana et al., 2010). Therefore, this research will establish whether attitudes toward flexibility are significant in terms of organisational OSS adoption.

Technological Disruption

OSS research has argued that, "Simply being a low-price alternative to an existing technology is typically insufficient to disrupt an existing market. Disruption requires that the new technology improve dramatically overtime along attributes valued by mainstream customers, while still maintaining its appeal to initial niche adopters" (Brydon and Vining, 2008). The same research questions whether the OSS development model satisfactorily fulfils this requirement (ibid). Other OSS research has argued that OSS development has successfully evolved into a, "mainstream and commercially viable form" incorporating corporations who contribute to its development (Fitzgerald, 2006b). Therefore, this research will seek to investigate whether attitude toward OSS being a "disruptive technology" is significant in terms of OSS adoption.

Relative Advantage

As previously discussed, OSS research has described DoI as being foundational to much adoption and usage research, and has described technology characteristics; such as, "relative advantage…", as key influencers in adoption decisions (Dedrick and West, 2003). IS research has defined relative advantage as, "The degree to which an innovation is perceived as being better than its precursor", and has argued that it is an important predictor in an individual's intention to adoption an innovation (Jeyaraj et al., 2006). The concept was originally derived from DoI theoretical constructs (Rogers, 2003). Therefore, this research will investigate whether relative advantage is a significant factor in organisational OSS adoption.

Observability

IS research has defined observability as, "The degree to which using an innovation generates results that are observable and can be communicated to others" (Jeyaraj et al., 2006) and original DoI research has indicated that it is a significant factor in the adoption of technology (Rogers, 2003). Other IS research has indicated that observability should be investigated as an important factor in the adoption of innovation (Adams et al., 1992). Therefore, this research will seek to establish whether observability (i.e. the ability of OSS to generate observable benefits) is significant in terms of organisational OSS adoption.

Compatibility

IS research has defined compatibility as, "The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters" (Jeyaraj et al., 2006) and original DoI research has indicated that it is a significant factor in the adoption of technology (Rogers, 2003). However, this research has also identified other factors which appear to overlap this definition in the organisational context (i.e. Standards specifying OSS or proprietary, past adoption and ideological compatibility). Therefore, this research will not test this factor for significance in organisational OSS adoption.

Job Performance (i.e. Perceived Usefulness) and OSS

IS research has claimed that perceived usefulness is an important factor in the adoption of innovation (Jeyaraj et al., 2006) and the acceptance of technology (Davis, 1989). Furthermore, OSS research has argued that perceived usefulness is important in the context of OSS adoption (Gwebu and Wang, 2011, Bueno and Gallego, 2010). Similarly, OSS research has argued that organisational adoption research is flawed unless users themselves elect to use the software (Gwebu and Wang, 2011). Therefore, this research will investigate whether attitude toward perceived usefulness is a significant factor of organisational OSS adoption.

Transparency and OSS

IS research has argued that transparency is an important factor in terms of policy reasons for the adoption of open standards and OSS (Casson and Ryan, 2006). OSS research has also suggested that transparency could be a key factor in OSS adoption, via a sense of ownership, specifically, "openness and transparency, [OSS] might offer manufacturers and consumers the potential for an equal say in the software being built" (Vitharana et al., 2010). The same research reported that participants in OSS-related projects reported that it was, "a lot easier to have visibility into what component teams are doing" (ibid). Therefore, this research will investigate whether attitudes toward transparency are significant in terms of organisational OSS adoption.

Perpetuity

IS research has linked OSS and open standards with the need to provide longevity of data and formats (i.e. perpetuity) in public sector organisations (Casson and Ryan, 2006). Other OSS research has also argued that OSS has classic strengths in terms of longevity (Lundell et al., 2010b). Alternatively, other OSS research has argued that seeking vendors with longevity, as opposed to the perceived questionable future of some OSS projects, is of most importance in adopting suitable technology (Pare et al., 2009b). Therefore, this research will investigate whether perpetuity is a significant factor in terms of organisational OSS adoption.

Freedom

OSS research has reported that freedom to modify OSS can be an important factor for those who adopt OSS (Gallego et al., 2007, Ven et al., 2008, Vitharana et al., 2010). As previously discussed, the legal mechanisms which facilitate the freedom to modify (Lundell et al., 2010a) are considered as important as the practical and technical abilities. Therefore, this research will investigate whether attitudes toward the ability to modify (i.e. freedom to modify) is significant in terms of organisational OSS adoption.

Speed

OSS research has argued that rapid deployment (i.e. speed) is an important factor when considering OSS adoption and has stated, "[OSS] platforms are perceived as being developed and deployed in record time" (Allen and Ieee, 2010). However, as previously discussed, other OSS research has questioned whether OSS development can be considered rapid compared to proprietary alternatives (Brydon and Vining, 2008). Therefore, this research will seek to establish whether attitude toward speed is a significant factor in terms of organisational OSS adoption.

Knowledge Creation and Creativity & Innovation

In addition to quality, cost and flexibility, OSS research has claimed that OSS offers other advantages, "OSS, when compared to closed source development, has manifested in lower development costs, higher quality, greater freedom for participants, enhanced knowledge creation, and greater creativity and innovation" (Vitharana et al., 2010). Therefore, this research will seek to establish whether attitudes toward (a) knowledge creation and (b) creativity & innovation are significant in terms of organisational OSS adoption.

Reduced Vendor Lock-in

OSS research has claimed that reduced vendor lock-in is an important reason for the adoption of OSS (Gwebu and Wang, 2011) . Specifically, OSS research has argued, "Organisations frequently adopt OSS to reduce vendor lock-in and become less dependent on their software vendors" (Ven et al., 2008). However, other OSS research has pointed out that corporate plans for differentiation, market domination and lock-in are legitimate strategies for suppliers (Brydon and Vining, 2008). Therefore, this research will seek to establish whether attitudes with respect to vendor lock-in are significant in terms of organisational OSS adoption.

Ideological Compatibility

OSS research has suggested that ideology can be an important factor in OSS adoption and has stated that, "most organisations are pragmatic in their decision making. However, we have found evidence that suggests that the influence of ideology should not be completely disregarded in small organisations" (Ven and Verelst, 2008). Similarly, other OSS research found that, "Personal support for OSS ideology was also found to be an equally important variable" (Glynn et al., 2005). However, further OSS research has found that, "adherence to some ideological components was beneficial to the effectiveness of the team in terms of attracting and retaining input, but detrimental to the output of the team" (Stewart and Gosain, 2006). Therefore, this research will seek to establish whether attitude toward ideological compatibility is significant in the context of organisational OSS adoption.

Inhibiting Adoption

IS research has claimed that there is a paucity of research into factors that inhibit adoption of technology in general, and OSS in particular (Goode, 2005). Other OSS research has indicated that various inhibiting factors can produce highly significant blocks or absolute barriers to OSS adoption, and have stated, "The stated objective of this contract was to ensure that all installed copies of the package were legal. However the contract also abolished the preferential pricing enjoyed to this point…, a change that resulted in a 400% increase in the per license fee" (Pare et al., 2009a). Despite this extraordinary price increase, the same research reported that respondents did not anticipate switching to OSS alternatives (ibid). Therefore, this research will seek to elicit the salient factors which inhibit, as well as those which drive, organisational OSS adoption.

Unsustainable Business Model

OSS research has claimed that an innovative and successful OSS business model has developed in recent years (Fitzgerald, 2006b). Furthermore, other IS research has claimed, "the open source sector of the software industry is in fact witnessing the emergence of a number of viable business models" (Perr et al., 2011). However, as previously indicated, other OSS research has questioned the sustainability of such models (Brydon and Vining, 2008). Furthermore, other OSS research points to a phenomenon known as "the tragedy of the commons", which highlights two fundamental flaws in OSS-type innovations, "First, no one will invest in a project if they cannot appropriate its benefits. That is, motivation will lack. Second, no one has the power to organize collaboration in the use of the resource. That is, organization will lack and collaboration will fail" (Benkler, 2002). Therefore, this research will investigate whether attitudes towards unsustainable business models are significant in terms of organisational OSS adoption.

Perceived Inferior

Further to the description of disruptive technology, OSS research has argued that technology which partially fulfils mainstream requirements and does not develop rapidly is simply, "plain inferior" (Brydon and Vining, 2008). Furthermore, other OSS research has found respondents questioning the quality of the OSS project, who stated, "It's free for a reason" (Goode, 2005). Similarly, other IS research has stated the perception that, "… goods available for free [such as OSS] are probably of inferior quality than those that are paid for, such as proprietary software" (Nagy et al., 2010). Therefore, this research will investigate whether attitude toward inferiority is significant in the context of organisational OSS adoption.

Reliability

OSS research has claimed that OSS offers advantages in terms of reliability (Gwebu and Wang, 2011). Other OSS research has drawn such claims in to question, stating that, "Making general comparisons in reliability between OSS and proprietary software is futile. Both cover a range of software, from extremely stable to rather unstable" (Ven et al., 2008). Therefore, this research will investigate whether attitude toward reliability is significant in the context of organisational OSS adoption.

Value of Proprietary Skills

OSS research has identified that end-user resistance to OSS adoption can be significant, "One of the key complaints from the administrative staff and users who moved to an OSS platform was that they feared being de-skilled if they didn't have skills in popular proprietary applications. In fact, users readily admitted that they would have preferred not to have switched from the proprietary desktop systems to OSS" (Glynn et al., 2005). Therefore, this research will seek to investigate whether attitude to relative value of proprietary versus OSS skills is significant in the context of organisational OSS adoption.

OSS Project Failure

OSS research has claimed that many OSS projects fail, in so much as, "the majority of OSS projects struggle to attract contributors" (Hauge et al., 2010). Alternatively, more successful OSS projects may experience "forking" a process by which, "Because [OSS] is developed by independent developers or groups of developers, there is always a possibility that each person or group may create their own version of software. Starting with the same source code, if different groups do not coordinate their efforts, the new features and functionality they add may not be interoperable with each other or exhibit equivalent functionality" (Nagy et al., 2010). Although this behaviour is not considered failure, it may complicate adoption decisions (ibid). Therefore, this research will seek to identify whether attitude toward project failure is significant in the context of OSS organisational adoption.

Questionable Return on Investment (RoI)

OSS research has claimed that financial factors which require understanding are, "(i) Assessment of value for money of OSS, (ii) Assessment of economic impacts of OSS, (iii) Assessment of total costs of ownership and (iv) Assessment of total costs of migration and transition" (Haider, 2008). Furthermore, other OSS research has identified that using un-edited OSS attracts additional costs in terms of, "ongoing maintenance, repairs, upgrades, and training", and using edited or customised OSS attracts even further costs, "requirements collection and analysis, developing specifications, coding, quality assurance, and version and release control" (Pare et al., 2009a). However, OSS research has claimed that Total Cost of Ownership (TCO) studies of OSS adoption are inconclusive, "Various studies have compared the TCO of proprietary software with that of OSS, and many of these studies contradict each other" (Ven et al., 2008). Therefore, this research will seek to investigate whether attitude toward questionable RoI is a significant factor in the context of organisational OSS adoption.

OSS Marketing Model

OSS research has pointed out that some enterprise versions of OSS are simply not free, for example, "…when using software from a vendor that uses a dual-licensing business model (for example, [MySQL). Such vendors generally release their software under the terms of the GNU [GNU is Not Unix) general public license [GPL]. However, if an organization develops an application that incorporates software licensed under the GPL and starts to distribute it (for example, an application that uses MySQL as a database), the organization must publish that application's source code. Dual-licensing firms sell a commercial license for the same OSS product that doesn't require the application's source code to be licensed under the GNU GPL. The customer pays for the right to keep its intellectual property private" (Ven et al., 2008). The same research implies that the OSS license model has been used as little more than a marketing tool for more traditional intellectual property frameworks (ibid). Therefore, this research will investigate whether attitude toward using OSS as a marketing model is a significant factor in the context of organisational OSS adoption.

The factors considered to be A construct are listed in the table below.

Table 0.6: Literature-based Potential Driving and Inhibiting Factors Associated with Attitude and OSS Adoption

Proposed Independent Variable	High Impact Research	Mid Impact Research	Third Tier Research
Behavioural Beliefs Driving Adoption			
Q17 Productivity	(Mehra et al., 2011, Venkatesh et al., 2003)		
Q18 Category Killer			Ven et al. 2008
Q20a Greater Security		Gwebu and Wang 2011;	Mosoval et al. 2006 Ven et al. 2008
Q20b Reduced Cost	Vitharana et al, 2010	Gwebu and Wang 2011; Nagy et al. 2010	Allen and Ieee 2010, Bueno and Gallego 2010, Casson and Ryan 2006, Ven et al. 2008
Q20c Quality	Vitharana et al, 2010	Gwebu and Wang 2011, Jeyaraj et al. 2006	Haider 2008; Ven et al. 2008; Whitmore et al. 2009
Q20d Flexibility		Gwebu and Wang 2011, Lundell et al. 2010a	Bueno and Gallego 2010, Gallego et al. 2008, Haider 2008, Ven et al. 2008
Q20e Technological Disruption			(Brydon and Vining, 2008)
Q20f Relative Advantage			(Jeyaraj et al., 2006, Rogers, 2003)
Q20g Perceived usefulness (i.e. job performance)		Gwebu and Wang 2011; Jeyaraj et al. 2006	(Jeyaraj et al., 2006, Davis, 1989, Bueno and Gallego, 2010, Gwebu and Wang, 2011)
Q20h Transparency (i.e. understanding of the project)	Vitharana et al, 2010		Casson and Ryan 2006; Haider 2008
Q20i Perpetuity (i.e. longevity of data and formats)			(Casson and Ryan, 2006)
Q20j Freedom (i.e. to modify & adapt)	Vitharana et al, 2010	Lundell et al. 2010a	Bueno and Gallego 2010; Glynn et al. 2005;; Mosoval et al. 2006; Ven et al. 2008;
Q20k Speed (i.e. rapid deployment)			(Allen and Ieee, 2010)
Q20l Knowledge creation	(Vitharana et al., 2010)		
Q20m Creativity and innovation	(Vitharana et al., 2010)		
Q20n Reduced Vendor Lock-in	Chengalur-Smith et al 2010	Gwebu and Wang 2011	Ven et al. 2008, Brydon and Vining 2008;
Q20o Observability (ability to observe benefits)			(Rogers, 2003, Jeyaraj et al., 2006)
Q20p Ideological Compatibility	Vitharana et al, 2010	Jeyaraj et al. 2006	Glynn et al. 2005; Rogers 2003; Ven and Verelst 2008;
Behavioural Beliefs Inhibiting Adoption			

Proposed Independent Variable	High Impact Research	Mid Impact Research	Third Tier Research
Q21a Unsustainable Business Model			(Brydon and Vining, 2008, Benkler, 2002)
Q21b Perceived Inferior (compared to proprietary)			(Glynn et al., 2005, Nagy et al., 2010)
Q21c Perceived as no more reliable than proprietary			(Ven et al., 2008)
Q21d Proprietary Skills (deemed more valuable)			(Glynn et al., 2005)
Q21e OSS project failures (insufficient contributors)			(Hauge et al., 2010)
Q21f Questionable return on investment		Goode 2005	(Ven et al., 2008, Haider, 2008, Pare et al., 2009b, Nagy et al., 2010, Goode, 2005)
Q21g Use of OSS as a marketing model			(Ven et al., 2008)

Subjective Norm (SN)

Behaviour of Others

Others' Reported Adoption of OSS

IS research has claimed that the success of OSS communities is partially a function of a driving force known as network cohesion, described as, "attracting and retaining a critical mass of users" (Toral et al., 2009). Other IS research has reported that peer group behaviour is an important factor in OSS adoption, and stated, "One firm argued that they had not adopted because other nearby firms had rejected [OSS]. This suggests that, for at least some managers, peer information networks are significant" (Goode, 2005). Therefore, this research will seek to establish whether the OSS adoption behaviour of others is a significant factor in the context of organisational OSS adoption.

Others' Reported OSS Success Stories

OSS research has made a distinction between infrastructure software (i.e. NAPCS Systems Software) and enterprise application software (i.e. NAPCS Application Software) and has suggested that OSS success stories are far more prevalent in the former rather than the latter (Brydon and Vining, 2008). Furthermore, OSS research has claimed that, within the more successful Systems Software category, OSS diffusion has taken place in waves, for example, from Operating System, middleware to database software (Chengalur-Smith et al., 2010). In addition, other OSS research has emphasised the role of factors external to organisations and has cited, "the existence of high-profile successful exemplars of OSS adoption" as key to organisational OSS adoption (Glynn et al., 2005). Conversely, the same research has reported, "The lack of a successful exemplar of OSS adoption in the respondent industry sector also appeared to an important inhibitor" (ibid). Therefore, this research will seek to establish whether reports of the OSS success stories of others is an significant factor in the context of organisational OSS adoption.

Others Reported as OSS Code Contributors

IS research has concluded that the success of OSS communities is primarily a function of a driving force known as network structure, described as the, "number of actively contributing users versus the number of passive users" (Toral et al., 2009). The same research has inferred that, compared to the number of passive users, the actual number of active contributors is the most important factor in the success of OSS communities (ibid). Therefore, this research will investigate whether others reported as OSS code contributors is a significant factor in the context of organisational OSS adoption.

Influence of Others

Personal Identification

OSS research has identified social identification (SI) with the OSS community as an important factor in OSS adoption, and has described OSS SI as, "… the degree to which the user construes himself or herself to be a member—that is, as 'belonging' to the OSS community" (Gwebu and Wang, 2011). Therefore, this research will seek to establish whether personal identification with the OSS community is a significant factor in the context of organisational OSS adoption.

Strong Network Effects

OSS research has defined network effects as, "the principle that an [innovation] is increased in value as the number of individuals by whom it is used increases", and that, "[network effects] has been applied as a lens through which to view OSS success. Numerous studies have characterized network effects as a critical factor in the diffusion of software in general and OSS in particular" (Whitmore et al., 2009). Furthermore, other OSS research has argued that different software categories can experience low or high network effects (Sen, 2007). Low network effects typically apply to: "Desktop stand-alone single-user applications (e.g. PC diagnostic tools, single-player PC games, personal firewalls, CD writers, Web browsers such as Firefox and Explorer, e-mail clients such as Thunderbird and Outlook)", and, "Infrastructure software based on universally accepted standards and protocols (e.g. Web servers such as Apache and IIS, DNS servers such as BIND, and e-mail servers)" (ibid). Weak network effects typically apply to: Firstly, "Desktop office productivity software (e.g. MS Office)", secondly, "Database servers (e.g. Oracle, MySQL)", thirdly, "Network operating systems (e.g. Windows 2000, Red Hat Linux, Novell Netware)", and finally, "Desktop operating systems (e.g. Windows XP, SUSE Linux 9)" (ibid). Therefore, this research will seek to establish whether network effects are significant in the context of organisational OSS adoption.

Internal Politics

OSS research has suggested that OSS adoption has the potential to avoid, "… complex IT management politics" (Allen and Ieee, 2010). However, other OSS research has suggested that, "Investigation into political barriers and top management [support] for OSS" should be encouraged in order to successfully deploy OSS projects (Haider, 2008). Furthermore, other OSS research has claimed that there are very few studies that take political factors into consideration and stated that, "internal pressure emanated from [senior] level decision makers who had projects with commercial software vendors and communicated that those projects would be at risk if the delivery organizations moved to OSS products" (Pare et al., 2009b). Therefore, this research will seek to establish whether internal politics are significant in the context of

External Politics

IS research has argued that external pressure is one of the most significant factors in organisational adoption of innovation (Jeyaraj et al., 2006). Furthermore, OSS research has cited potent political forces from within the IT software industry, "[The organisation] is highly politicized. ... Vendors know that ... and are constantly applying political pressure. You have to choose your battles if you want to win the war. You can't fight against everyone. The [organisation] has decided not to fight against the big vendors. As such it is not in a position to be an organisation that promotes [OSS]" (Pare et al., 2009a). The same research, studying a public sector organisation, cited external pressures from taxpayers and voters, who did not want funds to be spent on development projects (ibid).

Therefore this research will investigate whether external politics is a significant factor in the context of organisational OSS adoption.

Organisational Culture

OSS research has argued, that despite best efforts to organise in a collaborative manner, certain organisations are unable to exploit the collaborative nature of OSS, and has stated, “a traditionally competitive culture negate some of the benefits of using open source licensed products” (Pare et al., 2009a). Furthermore, other OSS research has indicated that driving factors can differ significantly across sub-cultures (i.e. technologists versus others) (van Rooij, 2011). In addition, other OSS research has reported that cultural affinity is an important factor in organisation OSS adoption (Ward and Tao, 2009). Therefore, this research will seek to establish whether organisational culture is a significant factor in the context of organisational OSS adoption.

Champion or Sponsor

IS research has established that individual roles in organisational adoption (e.g. a champion or sponsor) are an important factor which requires further research (Jeyaraj et al., 2006). In addition, OSS research has found that organisational sponsorship was a key factor in the success of OSS projects, and stated, “Overall, sponsorship generally had a positive effect on the [OSS] projects” (Stewart et al., 2006). Other OSS research has found that the, “Existence of a committed and respected OSS champion in-house” is a significant factor in OSS adoption (Glynn et al., 2005). Furthermore, other OSS research reported one respondent who stated, “Our requirements as determined by head office are minimal for [OSS]”, and stated that, “The role of the ‘technology champion’ may prove important in the adoption of [OSS]” (Goode, 2005). Therefore, this research will investigate whether a champion or sponsor is a significant factor in the context of organisational OSS adoption.

Localism

OSS research has established that utilising local resources is desirable to the country concerned, and has stated, “The South African governments move to OSS and the associated cost savings will create an opportunity to develop a local skills base within South Africa” (Mosoval et al., 2006). Similarly, other OSS research has found that, at the local government level in the US, “IS/IT departments today are under severe cost-cutting pressure, with frustrated users and a technical staff subject to the constant threat of outsourcing and layoffs”, and has reported that, “this case study suggests that systems based on [OSS] are perceived as … increasing the skills and importance of locally-employed IT talent” (Allen and Ieee, 2010). Furthermore, OSS research has argued that, “Ours may be a global economy, but governments still have an obligation to encourage the growth of their own economies from the national down to the municipal [local] level” (Casson and Ryan, 2006). Therefore, this research will seek to establish whether localism is a significant factor in the context of organisational OSS adoption.

Lack of a Legally Responsible Third Party

OSS research has identified the lack of a legally responsible third party in the case of OSS, and has stated that, “OSS … does not offer the traditional legal comforts of vendor-guaranteed hotline telephone support and written maintenance contracts” (Glynn et al., 2005). Similarly, other OSS research has reported that lack of support is a key issue, and stated, “Managers appeared concerned that, if no equivalent to commercial support existed, they would risk having to support their software applications with their own resources” (Goode, 2005). In the same research, one respondent stated, “We really don’t know anything about [the OSS community] and don’t want to know. We want someone we can sue when things go to the wall” (ibid). Therefore, this research will investigate whether the lack of a legally responsible third party is a significant factor in the context of organisational OSS adoption.

Influence of Others' Expectations

Friends and Acquaintances

Research with respect to TPB proposed that friends and acquaintances were considered as a factor when considering planned behaviour (Ajzen and Madden, 1986). IS research has claimed that friends can also be an important factor for potential adopters of technology (Karahanna et al., 1999). However, the same research argued that friends were not a significant factor so far as continued usage (i.e. adopters) is concerned (ibid). Therefore, this research will seek to establish whether the influence of friends and acquaintances is an important factor in the context of organisational OSS adoption.

OSS Contributors

As previously discussed, whether or not others are reported as code contributors is considered as an important factor (Toral et al., 2009). However, logically this also raises the question of whether that group of individuals have influence on the actual decision to adopt OSS. For instance, other OSS research has argued, "Ties to open source communities-of-practice may enable co-creation of value, whereby in-house IT staff and external users and developers work jointly to maximize benefits from the same technology" (Chengalur-Smith et al., 2010). Therefore, this research will investigate whether OSS contributors have influence in the context of organsational OSS adoption.

Colleagues in Line of Business

OSS research has claimed that colleagues who work in line of business (i.e. areas other than IT department) is an important group in OSS adoption and has stated that, "There is a common perception among many [business]managers that OSS is an immature technology and not yet ready for commercial use" (Nagy et al., 2010). Similarly, other OSS research has claimed, "Most respondents, who had analysed and rejected OSS, had perceived little relevance of it to their business, and could not see any benefits to using it" (Goode, 2005). The same research found that lack of relevance was a significant inhibitor (ibid). This could be a function of business users not being in contact with successful OSS projects in the more successful NAPCS Systems Software category (Brydon and Vining, 2008). Therefore, this research will seek to establish whether colleagues who work in a line of business, are a significant group in terms of organisational OSS adoption.

Colleagues in IT Department

IS research has claimed that the size of the IT department can be partially important in the adoption of innovation (Jeyaraj et al., 2006). However, OSS research has identified that in certain sectors IT management are more conservative than others and stated that, "CIOs [Chief Information Officers] in the health care sector are more conservative than their counterparts in other industries", and quoted a respondent who stated, "[commercial software] is a lot less trouble, I pay the money, I don't have a technician, I just call the vendor" (Pare et al., 2009a). Therefore, this research will seek to establish whether the influence of the IT department is a significant factor in the context of organisational OSS adoption.

Top Management

IS research has claimed that top management support is the strongest predictor in the adoption of innovation (Jeyaraj et al., 2006). Furthermore, IS research has argued that top management support affects the quality of implementation and stated that, "companies with a high level of top management support have more advanced [systems]" (Ngai et al., 2008). In addition, OSS research has called for more research into the influence of top management in the adoption of OSS (Bueno and Gallego, 2010). Therefore, this research will seek to establish whether the influence of top management support is a significant factor in the context of organisational OSS adoption.

Competitors

IS research has identified intensity and extent of competition as a potential predictor of adoption of an innovation (Jeyaraj et al., 2006). OSS research has claimed that OSS has had a radical effect on the IT software industry and stated that it is used, "as a commercial weapon to attack competitors, as a commercial strategy to acquire new market shares, or as a powerful means to disseminate innovation and research results" (Gallego et al., 2008). Therefore, this research will seek to establish whether the influence of competitors is a significant factor in the context of organisational OSS adoption..

Third Party Partners

IS research has established that external pressure (e.g. imposition by partners) is one of the best predictors of IT adoption (Jeyaraj et al., 2006). Furthermore, OSS research has found that the cohesion and structure of networks is important to the success of OSS communities (Toral et al., 2009). In addition, OSS research has argued that an organisation's ability to, "access a value network of 'complementors' is crucial for effective value creation and capture [of OSS]" (Morgan et al., 2012). Therefore, this research will seek to establish if the influence of third party partners is a significant factor in the context of organisational OSS adoption.

Suppliers

OSS research has claimed that the IT software industry is loyal to its incumbent suppliers, that there is little research in this area, and stated that, "… [existing research does not reflect] the effect of customer loyalty to Microsoft. It seems that prior studies have not encountered conditions where a single dominant software provider faces competition from a compatible, comparable and ostensibly cheaper product [i.e. OSS], yet adopters still prefer the incumbent provider [i.e. Microsoft]" (Goode, 2005). Therefore, this research will investigate whether the influence of suppliers is significant in the context of organisational OSS adoption.

Customers

IS research has found that customer support for adoption of innovation can be a significant factor (Jeyaraj et al., 2006). Other IS research has postulated for a special case of organisational adoption, known as inter-organisational IS (IOIS) adoption in which customer influence is key, and has stated, "there is a need for 'alignment' between the vision of one powerful customer and several 'obedient' suppliers that subsequently influences the structure and functionality of the IOIS" (Lyytinen and Damsgaard, 2011). Furthermore, OSS research has identified that certain customers have adopted accreditation criteria which can effectively exclude OSS, and quoted a respondent who stated, "Vendors have to demonstrate that their solutions are capable of functioning on our existing network infrastructure ... so for [OSS] this gets to be a bit complicated" (Pare et al., 2009a). Therefore, this research will seek to establish whether influence of customers is a significant factor in the context of organisational OSS adoption..

Government (i.e. central/federal or local)

OSS research has established that there are government organisations that have been successful in adopting not only NAPCS Systems Software category of OSS, but also certain Applications Software category of OSS (Marsan et al., 2012). Other OSS research has identified that there are certain benefits to government organisations for deploying OSS, and stated that there are, "potential benefits for government agencies in terms of electronic service provision to general public" (Haider, 2008). Furthermore, other IS research suggests that motivations within government may be more ideological than their private sectors counterparts, and stated that they are, "driven more by democratic values such as independence and self-determination than by a desire to cut costs or save money" (Cassell, 2008). Therefore, this research will seek to establish whether influence of government organisations is a significant factor in the context of organisational OSS adoption.

The Media (i.e. broadcast, trade or web)

IS research has claimed that OSS has attracted significant media attention (Fitzgerald and Agerfalk, 2005). Furthermore, OSS research has suggested that, "Information [provided via the media] can influence the normative beliefs of decision-makers associated with OSS use" (Macredie and Mijinyawa, 2011). Therefore, this research will seek to establish whether the media is a significant influencing factor in the context of organisational OSS adoption.

The General Public

OSS research has reported that the influence of the general public could prove an important factor, and quoted a respondent who said, "There was a period of time when we did take some development initiatives but certain political forces [representing the general public] immediately expressed their opposition to any software development taking place in the [organisation]. The result is that we don't even think about doing it anymore" (Pare et al., 2009a). Therefore, this research will investigate the influence of the general public in the context of OSS adoption.

The factors considered to be SN are summarised in the table below.

Table 0.7: Literature-based Potential Driving and Inhibiting Factors Associated with Subjective Norm and OSS Adoption

Proposed Independent Variable	High Impact Research	Mid Impact Research	Third Tier Research
Subjective Norm			
Behaviour of Others			
Q23a Others' OSS adoption (reported)		Goode 2005	(Toral et al., 2009, Goode, 2005)
Q23b OSS Success Stories (reported)			(Brydon and Vining, 2008, Glynn et al., 2005)
Q23c OSS Code Contributors (reported)			(Toral et al., 2009)
Influence of Others			
Q24a Personal Identification		(Gwebu and Wang, 2011)	
Q24b Strong Network Effects	Sen, 2007		Whitmore et al. 2009
Q24c Internal Politics			(Allen and Ieee, 2010, Pare et al., 2009b, Glynn et al., 2005, Haider, 2008)
Q24d External Politics		Jeyaraj et al. 2006	(Allen and Ieee, 2010, Jeyaraj et al., 2006, Pare et al., 2009b, Glynn et al., 2005)
Q24e Organisational Culture			(Pare et al., 2009b, van Rooij, 2011, Ward and Tao, 2009)
Q24f Champion or Sponsor		Goode 2005; Jeyaraj et al. 2006	(Glynn et al., 2005, Jeyaraj et al., 2006, Goode, 2005)
Q24g Localism			(Casson and Ryan, 2006, Mosoval et al., 2006, Allen and Ieee, 2010)
Q24h Lack of Legally Responsible Third Party		Goode 2005	(Glynn et al., 2005, Ven and Verelst, 2009, Pare et al., 2009b, Mosoval et al., 2006, Goode, 2005)
Influence of Others' Expectations			
Q25a Friends and Acquaintances	Karahanna et al, 1999		Ajzen and Madden 1986
Q25b OSS Contributors	Chengalur-Smith et al, 2010		Toral et al. 2009
Q25c Colleagues (i.e. line of business)			(Nagy et al., 2010, Bueno and Gallego,

Proposed Independent Variable	High Impact Research	Mid Impact Research	Third Tier Research
			2010)
Q25d Colleagues (i.e. IT department)	Karahanna et al, 1999	Jeyaraj et al. 2006	Glynn et al. 2005, Pare et al. 2009a
Q25e Top Management	Karahanna et al, 1999		Bueno and Gallego 2010
Q25f Competitors			(Gallego et al., 2008)
Q25g Third Party Partners		(Jeyaraj et al., 2006)	
Q25h Suppliers		(Jeyaraj et al., 2006)	
Q25i Customers		(Jeyaraj et al., 2006)	
Q25j Government (i.e. central, federal or local)		(Jeyaraj et al., 2006)	
Q25k The Media (i.e. broadcast, trade, web)	(Macredie and Mijinyawa, 2011)	(Jeyaraj et al., 2006)	
Q25l The General Public		(Jeyaraj et al., 2006)	

Perceived Behavioural Control (PBC)

Organisational Factors

Ease of Implementation

IS research has established ease of use as an important factor to the adoption of technology (Davis, 1989). Similarly, OSS research has found ease of use to be an important factor in OSS adoption (Gwebu and Wang, 2011). Therefore, this research will seek to identify whether ease of implementation is a significant factor in the context of organisational OSS adoption.

Respondent's Decision

IS research has established self-efficacy as an important predictor of individual adoption, and defined it as, "Judgment of one's ability to use a technology to accomplish a particular job or task" (Jeyaraj et al., 2006). For the purposes of OSS adoption, OSS research has re-defined it as, "identifies and explains the personal/internal ability or confidence that an individual has to use an OSS successfully" (Macredie and Mijinyawa, 2011). Therefore, this research will seek to establish whether the decision to deploy OSS technology is the respondent's in the context of organisational OSS adoption.

Set of Standards (specifying OSS)

IS research has established the importance of adopting standards, and stated, "Adopting a winning standard enables users to benefit from a sustained stream of producer investment in the technology and access to a large supply of complementary assets [e.g. Microsoft Windows]", and in the alternative, "…adopters of a losing standard face the choice of having to switch to the winning standard or living with a much smaller supply of complementary assets and smaller levels of producer investment [e.g. IBM OS/2 operating system]" (Dedrick and West, 2003). In addition, OSS research has claimed that, "an employee may use OSS because that is required by the corporate policy and he does not want to disobey the corporate rules" (Li et al., 2011). Therefore, this research will seek to identify whether standards (specifying OSS) is significant in the context of organisational OSS adoption.

Professionalism of the IT Department (Generic)

IS research has identified professionalism of the IT department as an important factor for predicting adoption of technology, has called for more research and defined it as, "Education, expertise, skills, and related knowledge of IS employees" (Jeyaraj et al., 2006). Therefore, this research will seek to establish if generic professionalism of the IT department is significant in the context of organisational OSS adoption.

OSS Resources, Expertise and Familiarity (Specifically)

OSS research has identified familiarity as an important factor in OSS adoption, and has stated, "The introduction of change or an unfamiliar process into an organisation, results in the likelihood of employee resistance", and furthermore, "One of the biggest obstacles in adopting OSS is lack of familiarity, as the unknown often breeds resistance" (Mosoval et al., 2006). In addition, OSS research has identified three areas of expertise relevant to OSS adoption, "[1] evaluating the implications of the terms and conditions of the [OSS] license under which the product is distributed, [2} analysing and evaluating the costs and benefits of opening the code and conducting development activities, and [3] ensuring the support and maintenance of a product once it is implemented" (Pare et al., 2009a). Other OSS research has questioned whether OSS-skilled resources are readily available and at what relative cost, "[the issue of] availability of appropriately-skilled, OSS-literate personnel. At present, it has been argued, somewhat controversially, that the costs of finding appropriately trained personnel for proprietary applications are lower than for OSS" (Glynn et al., 2005). Therefore, this research will seek to establish if resources, expertise and familiarity (specific to OSS) is a significant factor in the context of organisational OSS adoption.

Training

IS research has found training to be a significant factor in organisational adoption of innovation (Jeyaraj et al., 2006). In addition, OSS research has identified training opportunities as an important issue in the adoption of OSS and stated that, “As formal training and support are often lacking, OSS users have to learn to manoeuvre through interfaces and functionalities, troubleshoot when necessary, and follow the support and documentation materials by themselves” (Gwebu and Wang, 2011). Other OSS research has called for more studies to include factors such as training (Bueno and Gallego, 2010). In addition, OSS research has argued that the time and cost of re-training could be an inhibiting factor (Pare et al., 2009b). Furthermore, OSS research has reported that training institutes have enhanced their OSS training courses in preparation for increased demand (Mosoval et al., 2006). Therefore, this research will seek to establish whether training is a significant factor in the context of organisational OSS adoption.

Time

OSS research has reported a significant minority of respondents who cited a lack of time as an important factor in OSS adoption, and quoted a participant who stated, “It would take too much time to change everything over if we went [with OSS adoption]” (Goode, 2005). Other OSS research also obliquely referred to lack of time as an important factor, through references to lack of resources (Pare et al., 2009a). Therefore, this research will seek to establish whether time is a significant factor in the context of organisational OSS adoption.

OSS Installed Base

TPB research has shown that past behaviour can be an important factor in establishing future adoption behaviour (Ajzen, 1991). OSS research has argued that there are important incentives to leveraging an OSS installed base, and stated that, “The existing base of OSS with reasonable quality control and distribution can potentially save millions of dollars to [organisations]” (Haider, 2008). Therefore, this research will seek to establish whether an OSS installed base is significant in the context of organisational OSS adoption..

Inertia

IS research has shown that structural inertia, particularly in large organisations, can be a barrier in adoption of innovation (Zhu et al., 2006, Zhu et al., 2004). Furthermore, OSS research has argued that a stable existing architecture is an important factor in OSS adoption, and has stated that, "the existence of a coherent, stable and planned existing technological architecture could [militate] against the adoption of OSS" (Glynn et al., 2005). Therefore, this research will seek to investigate whether inertia (i.e. ambivalence or satisfaction with status quo) is an important factor in the context of organisational OSS adoption.

Conservative (or Risk-averse) Management

IS research has argued that certain stakeholders, including management, may oppose adoption of innovation for variety of reasons related to risk (Cavusoglu et al., 2010). OSS research has shown that risk-averse management is an important factor in OSS adoption, and stated, "This conservatism manifests itself in attitudes toward the daily challenges in running an IT infrastructure", and quoted one respondent who said, "… we still have [Microsoft Windows] NT servers on the network. The stuff works, and when it works, you don't mess with it", and another who said, "[in our sector] we have to work on what's broken, not what's working" (Pare et al., 2009a). Other OSS research has concluded, via the unknown costs of OSS implementation, that risk is an important factor in OSS adoption, and stated, "In terms of acquisition risk, this hidden cost raises the perceived probability and severity of an adverse outcome… … it is not acquisition cost per se that deters adoption in conventional environments, but rather risk" (Goode, 2005). Therefore, this research will seek to establish whether conservative (or risk-averse management) is a significant factor in the context of organisational OSS adoption.

Commercial Support

OSS research has claimed that the availability of commercial support is an important factor in OSS adoption, and stated, "Even organisations that have deployed OSS to a large extent-and that are therefore likely to have some experience and familiarity with OSS-rely on commercial support" (Ven and Verelst, 2009). Other OSS research has argued that OSS commercial support services could be more available, "In principle, anyone can offer support for OSS products, which would increase the availability of support services for OSS" (Ven et al., 2008). However, the same research pointed out that in practice this is more complicated, "Unfortunately, the availability of such partners is still limited in some countries. This limits organisations' choices and could make the organisation somewhat dependent on the partner" (ibid). Therefore, this research will seek to establish whether commercial support is a significant factor in the context of organisational OSS adoption.

Trial-ability

DoI research has identified trial-ability as an important factor in adoption of innovation (Rogers, 2003). IS research has defined trial-ability as, "The extent to which adopters perceive that they have an opportunity to experiment with an innovation prior to committing to its usage" (Jeyaraj et al., 2006). Furthermore, OSS research has cited trial-ability as important and stated, "The ability to try out Linux [an OSS operating system] at a very low cost was frequently cited, because the software could be run on existing commodity hardware and could be downloaded for free from numerous websites" (Dedrick and West, 2003). Therefore, this research will seek to establish whether trial-ability is a significant factor in the context of organisational OSS adoption.

Open Source Software (OSS) Factors

Unacceptable License Terms

OSS research has identified unacceptable license terms as an important factor in OSS adoption, and stated, "Many OSS applications are distributed under very restrictive license terms that limit users' ability to commercialize the software [i.e. 'copy-left' provision or BY-NC-ND] or to combine the software with other OSS applications distributed under less restrictive licenses [i.e. ‘viral provision’ or BY-SA]” (Gwebu and Wang, 2011). Furthermore, other OSS research has pointed out a number of challenges in relation to license terms, such as, “Intellectual property (IP) and legal issues (i) Study of IP policy, resolution of IP, and ownership of IP with regards to OSS developed and procured by [the organisation], (ii) Identification of relevant IP knowledge and risks specific to [the organisation] (iii) Study of IP issues with OSS in government agencies” (Haider, 2008). Therefore, this research will seek to establish whether unacceptable license terms are a significant factor in the context of organisational OSS adoption.

Overwhelming Number of Patches and Upgrades

OSS research has argued that the number of patches and upgrades can be an inhibiting factor in OSS adoption and stated, “The frequent releases of patches and software versions could also overwhelm some users and make the maintenance of some OSS applications extremely difficult” (Gwebu and Wang, 2011). Additionally, OSS research has argued that the problem is further complicated when customers operate OSS projects in packages (or stacks) from different vendors, and stated, “If upgrades or security patches become available for one of the OSS components in the stack, the organization must wait until the vendor has integrated these updates in its own stack” (Ven et al., 2008). Therefore, this research will seek to establish whether an overwhelming number of patches and upgrades is a significant factor in the context of organisational OSS adoption..

Lack of Technical Support

OSS research has established that lack of technical support can be an important inhibiting factor in the adoption of OSS for managers in organisations, and stated that, “A lack of conventional and ongoing support [is] a critical factor in their decision not to adopt and perceived a lack of reliable support avenues" (Goode, 2005). The same research cited one respondent who stated, “we think there’s a real lack of tangible support" (ibid). This contradicts other research which points out that, in principle, any organisation can offer technical support (See Commercial Support Sub-section, in previous section). Therefore, this research will seek to establish whether a lack of technical support is a significant factor in the context of organisational OSS adoption.

Complexity

DoI research has argued that complexity can be an important factor in adoption of technology (Rogers, 2003). IS research has defined complexity as, "The degree to which an innovation is perceived as relatively difficult to understand and use" (Jeyaraj et al., 2006). OSS research has argued that complexity is a relevant factor in OSS adoption and stated that, "complexity factors will have a negative influence … towards the use of an OSS. The 'complexity' construct may be used in an exploratory way and is suitable for exploring innovation-related risks and challenges in using an OSS" (Macredie and Mijinyawa, 2011). Therefore, this research has sought to establish whether complexity is a significant factor in the context of organisational OSS adoption.

Proprietary Volume License Agreement

OSS research has argued that purchase arrangements with incumbent software suppliers can pose an inhibiting factor in the adoption of OSS, and has stated that, "…a particular proprietary software application may ironically appear to offer a de facto standard… In some industry sectors, there may be bulk-purchasing agreements with proprietary software vendors" (Glynn et al., 2005). Other OSS research has indicated that existing investment in PS licenses may prevent OSS adoption from even being seriously considered, and has argued, "Since organisational executives demand cost justification for most new technology investments, the sunk cost of existing proprietary systems renders OSS adoption unjustifiable" (Nagy et al., 2010). Furthermore, IS research has argued that organisations may be perceive themselves committed to PS vendors (e.g. Microsoft) (Goode, 2005). Therefore, this research will seek to identify whether the presence of a PS license agreement is a significant factor in the context of organisational OSS adoption.

Lack of Resource (capable of benefiting from OSS)

OSS research has identified that ignoring the availability of source code in OSS, in many ways undermines one of the key advantages of the innovation, and has stated, “Although many OSS advocates have proclaimed [source code availability] advantages, [others] have questioned or cast doubt on them” (Ven et al., 2008). Other OSS research has described the scenario in which source code is available, but few (if any) actually access it or change it as, ”The Berkeley Conundrum” (Fitzgerald and Agerfalk, 2005). Therefore, this research will seek to identify whether access to resources, capable of benefiting from OSS, is a significant factor in the context of organisational OSS adoption.

Switching Costs

OSS research has claimed that the prospect of switching costs is an important factor in the adoption of OSS (Haider, 2008, Ven et al., 2008). Other OSS research has suggested that switching costs in OSS adoption is ill-defined at best, and stated, “studies of [TCO] of OSS have been ambiguous to say the least, training of personnel is one of the biggest cost factors in these studies” (Glynn et al., 2005). Other OSS research has questioned whether proprietary license fee reductions constitute net benefits to adopting organisations, and stated, “the extra time involved in converting systems appeared to offset the initial acquisition benefits", and quoted one respondent who stated, "[OSS] is only free if your time has no value" (Goode, 2005). Furthermore, other OSS research has highlighted the importance of switching costs and categorised them as, “(a) transitory transaction costs [e.g. one off acquisitions], (b) learning costs (e.g. IT worker skills) and (c) contractual costs (e.g. contract termination penalties) deliberately introduced by vendors to build barriers to subsequent competitors” (Dedrick and West, 2003). Therefore, this research will seek to establish whether switching cost is a significant factor in the context of organisational OSS adoption.

Set of Standards (which specify a proprietary alternative)

OSS research has argued that the presence of organisational standards may be an important factor in the adoption of OSS, and stated, "In certain sectors which are highly regulated and where interoperability may be paramount, policies may exist in relation to IT infrastructure. Thus, a particular proprietary software application may … appear to offer a de facto [or de jure] standard… certain standard architectures may exist which software packages in that industry must comply with" (Glynn et al., 2005). Therefore, this research will seek to establish whether a set of proprietary standards is a significant factor in the context of organisational OSS adoption.

Lack of Relevance (lack of demand)

OSS research has argued that the most significant factor for not deploying OSS is a lack of relevance, and stated, "most respondents, who had analysed and rejected open source technology, had perceived little relevance of it to their business, and could not see any benefits to using it", and quoted one respondent who stated, "[OSS is] just not right for us — our users need everything clear cut and obvious. We have a big budget so purchasing is no trouble" (Goode, 2005). Therefore, this research will seek to establish whether lack of relevance is a significant factor in the context of organisational OSS adoption.

Prior Implementation

TPB research has argued that the theory substantially advanced previous theories by including PBC factors (Ajzen, 1991). This is particularly important in the organisational context where various enabling and inhibiting factors, peculiar to the organisation and the behaviour, may be of significance (Benbasat and Barki, 2007). Researchers also include past experience, as well as obstacles and impediments in this category (Ajzen, 1991). Therefore, this research has sought to establish whether Prior Implementation is a significant factor in the context of organisational OSS adoption.

Organisation is an Active OSS User

Similar to Prior Implementation by individuals, at an organisational level, the same argument would suggest that whether or not an organisation is perceived as an active user of OSS could affect organisational adoption behaviour (Benbasat and Barki, 2007, Ajzen 1991). Therefore, this research has sought to establish whether Organisation as an Active OSS User is a significant factor in the context of organisational OSS adoption.

The factors considered to be PBC are summarised in the table below.

Table 0.8: Literature-based Potential Driving and Inhibiting Factors Associated with Perceived Behavioural Control and OSS Adoption

Proposed Independent Variable	**High Impact Research**	**Mid Impact Research**	**Third Tier Research**
Organisational			
Q27 Ease of implementation		(Gwebu and Wang, 2011)	
Q28 Respondent's decision	(Macredie and Mijinyawa, 2011)	Gwebu and Wang 2011; Jeyaraj et al. 2006;	
Q29a Set of Standards (specifying OSS)	(Dedrick and West, 2003)		Casson and Ryan 2006
Q29b Professionalism of the IT Department		(Jeyaraj et al., 2006)	
Q29c OSS resources, expertise and familiarity			(Pare et al., 2009b, Mosoval et al., 2006)
Q29d Training		(Gwebu and Wang, 2011, Bueno and Gallego, 2010)	
Q29e Time		(Goode, 2005)	
Q29f OSS installed Base			(Pare et al., 2009a, Haider, 2008)
Q29g Inertia (satisfaction with status quo)			(Glynn et al., 2005)
Q29h Conservative management (risk averse)			(Pare et al., 2009b)
Q29i Commercial Support			(Ven and Verelst, 2009)
Q29j Trial-ability (ability to demo capability)	(Dedrick and West, 2003)	Jeyaraj et al. 2006)	
Open Source Software			
Q30a Unacceptable license terms			(Gwebu and Wang, 2011, Haider, 2008)
Q30b Overwhelming number of patches and upgrades			(Gwebu and Wang, 2011, Ven et al., 2008)
Q30c Lack of technical support			(Ven et al., 2008)
Q30d Complexity	(Macredie and Mijinyawa, 2011)		
Q30e Proprietary volume license agreement			(Glynn et al., 2005)
Q30f Lack of resource (to benefit from OSS)			(Ven et al., 2008)
Q30g Switching cost	(Dedrick and West, 2003)	Goode 2005	Glynn et al. 2005; Haider 2008; Ven et al. 2008
Q30h Set of Standards (specifying Proprietary alternative)			(Glynn et al., 2005)

Q30i Lack of relevance (lack of demand)		Goode 2005	Mosoval, 2006; Pare , 2009
Q32 Prior Implementation			Ajzen (1991)
Q33 Organisation is an active OSS user			Ajzen (1991)

Appendix L: Pre-test Feedback from Purposive Sample of Pre-sales Engineers

Notes from Feedback from Pre-sales Engineers at author's workplace 4th December 2011

Syntax: Question Number (where appropriate) followed by comment

A participant required some graphical indication of progress (e.g) a "progress bar".

13. "Public Sector" versus "Private Sector" needs to clarified so as not to be confused with "Public limited company"

14 Use ranges for turnover.

23 The concept of localism was not clear in the questionnaire. Speculated that, "The concept of localism simply means preferring to do business with local companies and consultants"

A participant suggested general words of encouragement from one slide to the next

27 Types of media. e.g. Broadcast, Trade Press, Web

28- 29 were described as, " irritatingly similar".

31 Although slightly different this question was frustratingly similar to others already answered. This was developing into a theme and led to some exasperation.

34(f) Network effects was described as a technical concept which was not easily explained in a questionnaire.

34 The question is quite long and the headers move out of view. Suggested breaking up into sections?

34 & 36 Were described as,“ frustratingly similar”.

41 A participant suggested that he would prefer the past rate of adoption and future rate of adoption to be at the same time

50 Past/Future. Suggested combining past behaviour and intention in a single question

Suggested that 59 & 60 were rejected as again, “irritatingly similar”.

Appendix M: Pilot Study Data for OSS Adoption

Table 0.9: Driving/Inhibiting Factors and OSS Adoption Tested for Pilot Study

		Q37d OSS Non-adopters			Q37d OSS Adopters			Fisher Exact Test	Hypergeometric
	Sample (N)	Frequency	Agreed	%	Frequency	Agreed	%	One sided p-value	Probability (p)
Attitude (A)									
Behavioural Beliefs - Driving Adoption									
Productive	33	10	2	20%	23	13	57%	p(a>=13)=0.05799	0.04964
Source Code Value	33	10	1	10%	23	10	43%	p(a>=10)=0.0661	0.05911
Category Killer	33	10	2	20%	23	16	70%	p(a>=16)=0.01164*	0.01064
Security	33	10	8	80%	23	22	96%	p(a>=22)=0.2117	0.18970
Cost	33	10	9	90%	23	23	100%	p(a>=23)=0.3030)	0.30303
Quality	33	10	7	70%	23	22	96%	p(a>=22)=0.07258	0.06745
Flexibility	33	10	8	80%	23	22	96%	p(a>=22)=0.2117	0.18970
Technologically Disruptive	33	10	7	70%	23	23	100%	p(a>=23)=0.02199*	0.02199
Relative Advantage	33	10	7	70%	23	22	96%	p(a>=22)=0.07258	0.06745
Job Performance	33	10	6	60%	23	22	96%	p(a>=22)=0.02141*	0.02035
Transparency	33	10	5	50%	23	20	87%	p(a>=20)=0.03617*	0.03214
Perpetuity	33	10	5	50%	23	21	91%	p(a>=21)=0.01608*	0.01492
Freedom to modify	33	10	7	70%	23	22	96%	p(a>=22)=0.07258	0.06745
Speed	33	10	7	70%	23	21	91%	p(a>=21)=0.1493	0.12792
Knowledge Creation	33	10	6	60%	23	22	96%	p(a>=22)=0.02141*	0.02035
Creativity & Innovation	33	10	7	70%	23	22	96%	p(a>=22)=0.07258	0.06745
Vendor Lock-in	33	10	7	70%	23	22	96%	p(a>=22)=0.07258	0.06745
Observable Results	33	10	6	60%	23	20	87%	p(a>=22)=0.1031	0.08706
Ideological Compatibility	33	10	5	50%	23	19	83%	p(a>=19)=0.0682	0.05786
Behavioural Beliefs - Inhibiting Adoption									
Unsustainable Business Model	33	10	9	90%	23	12	52%	p(a<=12)=0.04192*	0.03811
Second Best Perception	33	10	9	90%	23	19	83%	p(a<=19)=0.5149	0.37310
Reliability (no better than propietary alternatives)	33	10	8	80%	23	16	70%	p(a<=16)=0.6936	0.28605
Preference for building proprietary software skills	33	10	7	70%	23	15	65%	p(a<=15)=0.5601	0.30401
Most OSS project fail to attract participants	33	10	8	80%	23	15	65%	p(a<=15)=0.3390	0.23837
Inferior	33	10	9	90%	23	13	57%	p(a<=13)=0.06610	0.05911
Hidden costs and questionable returns	33	10	9	90%	23	20	87%	p(a<=20)=0.6492	0.43280
OSS commercial contracts not free (of charge)	33	10	8	80%	23	15	65%	p(a<=15)=0.3390	0.23837
Subjective Norm (SN)									
Behaviour of Others (SN-BO)									
Reported that others have adopted OSS	23	5	4	80%	18	18	100%	p(a>=18)=0.2174	0.21739
Reported others success stories	24	6	2	33%	18	16	89%	p(a>=16)=0.01786*	0.01705
Reported others contributing code to OSS projects	23	5	0	0%	18	11	61%	p(a>=11)=0.02354*	0.02354
Influence of Others (SN-IO)									
Personal Identification with OSS Community	33	10	0	0%	23	6	26%	p(a>=6)=0.09114	0.09114
Network Effects	33	10	2	20%	23	11	48%	p(a>=11)=0.1317	0.10615
Internal Politics	33	10	0	0%	23	6	26%	p(a>=6)=0.09114	0.09114
External Politics	33	10	1	10%	23	5	22%	p(a>=5)=0.3950	0.30381
Organisational Culture	33	10	0	0%	23	7	30%	p(a>=7)=0.5739	0.05739
Champion or Sponsor	33	10	2	20%	23	10	43%	p(a>=10)=0.1870	0.14510
Commitment to local consultants/suppliers	33	10	2	20%	23	8	35%	p(a>=8)=0.3390	0.23837
Lack of legally responsible third party	33	10	7	70%	23	12	52%	p(a>=12)=0.9107	0.19815
Influence of Others Expectations (SN-IOE)									
Friends and Acquaintances	33	10	1	10%	23	7	30%	p(a>=7)=0.2119	0.17657
OSS Contributors	33	10	2	20%	23	13	57%	p(a>=13)=0.05799	0.04964
Colleagues (in line of business)	33	10	1	10%	23	11	48%	p(a>=11)=0.04192*	0.03811
IT Colleagues	33	10	2	20%	23	17	74%	p(a>=17)=0.005970**	0.00555
Top Management	33	10	2	20%	23	8	35%	p(a>=8)=0.3390	0.23837
Competitors	33	10	0	0%	23	3	13%	p(a>=3)=0.3246	0.32460
Third Party Partners	33	10	1	10%	23	3	13%	p(a>=3)=0.6492	0.43280
Suppliers	33	10	1	10%	23	2	9%	p(a>=2)=0.7883	0.46371
Customers	33	10	1	10%	23	4	17%	p(a>=4)=0.5149	0.37310
Government	33	10	3	30%	23	7	30%	p(a>=7)=0.6569	0.31783
The Media	33	10	1	10%	23	5	22%	p(a>=5)=0.3950	0.30381
The General Public	33	10	2	20%	23	0	0%	p(a<=0)=0.08523	0.08523
Perceived Behavioural Control (PBC)									
Self-efficacy (PBC-SE)									
Easy to implement	36	13	1	8%	23	12	52%	p(a>=12)=0.008102**	0.00761
Respondent's decision to adopt	33	10	6	60%	23	9	39%	p(a>=9)=0.9316	0.16546
Organisational (PBC-O)									
Volume Licenses for Proprietary Alternatives Inhibiting	33	10	3	30%	23	11	48%	p(a>=11)=0.2874	0.19815
Lack of resources or knowledge inhibiting	33	10	8	80%	23	15	65%	p(a>=15)=0.3390	0.23837
Switching costs inhibiting	33	10	7	70%	23	17	74%	p(a>=17)=0.5656	0.31409
Standards Specifying Proprietary Software (Inhibiting OSS)	33	10	6	60%	23	15	65%	p(a>=15)=0.5366	0.29019
Standards Specifying OSS	33	10	2	20%	23	6	26%	p(a>=6)=0.5391	0.32718
Professionalism of IT Department	33	10	1	10%	23	7	30%	p(a>=7)=0.2119	0.17657
Lack of Training (inhibiting OSS)	33	10	7	70%	23	16	70%	p(a>=16)=0.6610	0.31783
Lack of Expertise and Familiarity (inhibiting OSS)	33	10	7	70%	23	15	65%	p(a>=15)=0.7439	0.30401
Lack of time (inhibiting OSS)	33	10	7	70%	23	16	70%	p(a>=16)=0.6610	0.31783
Lack of Relevance (i.e. Demand or opportunity) inhibiting oSS	33	10	7	70%	23	9	39%	p(a>=9)=0.9789	0.08404
Internal OSS Installed Base	33	10	1	10%	23	10	43%	p(a>=10)=0.06610	0.05911
Inertia or Satisfaction with existing systems (inhibiting OSS)	33	10	4	40%	23	14	61%	p(a>=14)=0.2338	0.16546
Conservative or risk averse management (inhibiting OSS)	33	10	7	70%	23	13	57%	p(a>=13)=0.8683	0.23953
Open Source Software (PBC-OSS)									
OSS Unnacceptable license terms (e.g. Viral nature)	33	10	3	30%	23	6	26%	p(a>=6)=0.7485	0.31409
Overwhelming and unnecessary number of patches	33	10	6	60%	23	10	43%	p(a>=10)=0.8949	0.20591
Lack of Technical Support	33	10	8	80%	23	15	65%	p(a>=15)=0.8994	0.23837
Complexity or lack of productisation	33	10	6	60%	23	17	74%	p(a>=17)=0.3431	0.22903
Availability of commercial support (inhibiting - OSS)	33	10	7	70%	23	10	43%	p(a>=10)=0.9641	0.11766
Trialability (i.e. The ability to demo capability)	33	10	3	30%	23	11	48%	p(a>=11)=0.2874	0.19815
Prior implementation of OSS in organisation	33	10	1	10%	23	14	61%	p(a>=14)=0.008352**	0.00788
Organisation is Active user of OSS	33	10	0	0%	23	6	26%	p(a>=6)=0.09114	0.09114
General OSS Adoption is Approval or Post-approval	27	9	1	11%	18	10	56%	p(a>=10)=0.03265*	0.03021
*p value<0.05									
**p value<0.01									

Appendix N: Pilot Study Data for Intention to Adopt OSS

Table 0.10: Driving/Inhibiting Factors and Intention to Adopt OSS Tested for Pilot Study

		Q37c OSS No intention			Q37c OSS intention			Fisher Exact Test	Hypergeometric
	Sample (N)	Frequency	Agreed	%	Frequency	Agreed	%	One sided p-value	Probability (p)
Attitude (A)									
Behavioural Beliefs - Driving Adoption									
Productive	32	8	2	25%	24	13	54%		0.123545
Source Code Value	32	8	1	13%	24	10	42%		0.121605
Category Killer	32	8	0	0%	24	18	75%	p(a>=18)=0.0002855***	0.000286
Security	32	8	6	75%	24	23	96%		0.135484
Cost	32	8	7	88%	24	24	100%		0.250000
Quality	32	8	6	75%	24	22	92%		0.214905
Flexibility	32	8	6	75%	24	23	96%		0.135484
Technologically Disruptive	32	8	5	63%	24	24	100%	p(a>=24)=0.01199*	0.011290
Relative Advantage	32	8	6	75%	24	22	92%		0.214905
Job Performance	32	8	5	63%	24	22	92%		0.076752
Transparency	32	8	4	50%	24	20	83%		0.070717
Perpetuity	32	8	4	50%	24	21	88%	p(a>=21)=0.04689*	0.042093
Freedom to modify	32	8	5	63%	24	23	96%	p(a>=23)=0.03932*	0.037375
Speed	32	8	4	50%	24	23	96%	p(a>=23)=0.008621**	0.008343
Knowledge Creation	32	8	4	50%	24	23	96%	p(a>=22)=0.02141*	0.008343
Creativity & Innovation	32	8	5	63%	24	23	96%	p(a>=23)=0.03932*	0.037375
Vendor Lock-in	32	8	4	50%	24	23	96%	p(a>=23)=0.008621*	0.008343
Observable Results	32	8	5	63%	24	20	83%		0.176792
Ideological Compatibility	32	8	5	63%	24	18	75%		0.268724
Behavioural Beliefs - Inhibiting Adoption									
Unsustainable Business Model	32	8	7	88%	24	13	54%		0.088440
Second Best Perception	32	8	7	88%	24	20	83%		0.422136
Reliability (no better than propietary alternatives)	32	8	7	88%	24	16	67%		0.209769
Preference for building proprietary software skills	32	8	5	63%	24	16	67%		0.319214
Most OSS project fail to attract participants	32	8	7	88%	24	14	58%		0.121605
Inferior	32	8	7	88%	24	14	58%		0.121605
Hidden costs and questionable returns	32	8	7	88%	24	21	88%		0.450278
OSS commercial contracts not free (of charge)	32	8	6	75%	24	16	67%		0.319214
Subjective Norm (SN)									
Behaviour of Others (SN-BO)									
Reported that others have adopted OSS	23	4	3	75%	19	19	100%		0.173913
Reported others success stories	24	4	1	25%	20	17	85%	p(a>=17)=0.03529*	0.033879
Reported others contributing code to OSS projects	23	3	0	0%	20	11	55%		0.124224
Influence of Others (SN-IO)									
Personal Identification with OSS Community	32	8	0	0%	24	6	25%		0.148529
Network Effects	32	8	1	13%	24	12	50%		0.062277
Internal Politics	32	8	0	0%	24	6	25%		0.148529
External Politics	32	8	1	13%	24	5	21%		0.375232
Organisational Culture	32	8	0	0%	24	7	29%		0.102828
Champion or Sponsor	32	8	1	13%	24	11	46%		0.088440
Commitment to local consultants/suppliers	33	8	2	25%	24	8	33%		0.286049
Lack of legally responsible third party	32	8	6	75%	24	12	50%		0.160608
Influence of Others Expectations (SN-IOE)									
Friends and Acquaintances	32	8	1	13%	24	7	29%		0.263239
OSS Contributors	32	8	0	0%	24	15	63%	p(a>=15)=0.002311**	0.002311
Colleagues (in line of business)	32	8	2	25%	24	9	38%		0.283745
IT Colleagues	32	8	2	25%	24	16	67%	p(a>=16)=0.04984*	0.043682
Top Management	32	8	2	25%	24	8	33%		0.319214
Competitors	32	8	0	0%	24	3	13%		0.408065
Third Party Partners	32	8	0	0%	24	4	17%		0.295495
Suppliers	32	8	0	0%	24	3	13%		0.408065
Customers	32	8	1	13%	24	4	17%		0.422136
Government	32	8	1	13%	24	8	33%		0.209769
The Media	32	8	0	0%	24	5	21%		0.211068
The General Public	32	8	2	25%	24	0	0%		0.056452
Perceived Behavioural Control (PBC)									
Self-efficacy (PBC-SE)									
Easy to implement	33	9	0	0%	24	13	54%	p(a>=13)=0.004355**	0.004355
Respondent's decision to adopt	32	8	4	50%	24	11	46%		0.308862
Organisational (PBC-O)									
Volume Licenses for Proprietary Alternatives Inhibiting	32	8	1	13%	24	13	54%	p(a>=13)=0.04652*	0.042358
Lack of resources or knowledge inhibiting	32	8	6	75%	24	16	67%		0.319214
Switching costs inhibiting	32	8	6	75%	24	17	71%		0.345502
Standards Specifying Proprietary Software (Inhibiting OSS)	32	8	5	63%	24	15	63%		0.324281
Standards Specifying OSS	32	8	5	63%	24	5	21%	p(a<=5)=0.04176*	0.036896
Professionalism of IT Department (inhibiting)	32	8	5	63%	24	5	21%	p(a<=5)=0.04176*	0.036896
Lack of Training (inhibiting OSS)	32	8	6	75%	24	16	67%		0.319214
Lack of Expertise and Familiarity (inhibting OSS)	32	8	6	75%	24	15	63%		0.283745
Lack of time (inhibiting OSS)	32	8	3	38%	24	14	58%		0.194142
Lack of Relevance (i.e. Demand or opportunity) inhibiting oSS	32	8	5	63%	24	10	42%		0.194142
Internal OSS Installed Base	32	8	3	38%	24	4	17%		0.176792
Inertia or Satisfaction with existing systems (inhibiting OSS)	32	8	4	50%	24	13	54%		0.308862
Conservative or risk averse management (inhibiting OSS)	32	8	5	63%	24	14	58%		0.316174
Open Source Software (PBC-OSS)									
OSS Unnacceptable license terms (e.g. Viral nature)	32	8	3	38%	24	6	25%		0.268724
Overwhelming and unnecessary number of patches	32	8	4	50%	24	12	50%		0.314918
Lack of Technical Support	32	8	6	75%	24	16	67%		0.319214
Complexity or lack of productisation	32	8	4	50%	24	18	75%		0.146045
Availability of commercial support (inhibiting - OSS)	32	8	5	63%	24	11	46%		0.232555
Trialability (i.e. The ability to demo capability)	32	8	1	13%	24	7	29%		0.263239
Prior implementation of OSS in organisation	32	8	2	25%	24	13	54%		0.123545
Organisation is Active user of OSS	32	8	0	0%	24	6	25%		0.148529
General OSS Adoption is Approval or Post-approval	38	8	1	13%	30	10	33%		0.199747
*p value<0.05									
**p value<0.01									
***p value<0.001									

Appendix O: Qualitative Data Set from Main Study

Four qualitative questions were included in the questionnaire:

Survey Question Ref. Q19: How else would you describe your general attitude toward implementing an IT project incorporating OSS within the year?

Survey Question Ref. Q22: In your opinion, are there any other outcomes you would expect from implementing an IT project incorporating Open Source Software (OSS)?

Survey Question Ref. Q26: To your knowledge, are there any other significant groups or individuals who would have expectation one way or another, for you to implement IT projects incorporating OSS within the year.

Survey Question Ref. Q31: In your opinion, are there any other factors that may drive or inhibit your implementation of IT projects incorporating OSS?

The responses are listed below, by Unique Response Number (URN).

URN	*10070892*
Q19	*I require access to relevant and affordable skillsets either in-house or via a 3rd party to develop and support OSS.*
Q22	*(blank)*
Q26	*The academic community*
Q31	*(blank)*
URN	*10071006*
Q19	*Primarily cost driven and a means to save money on MS Office Licences, set against*

	comaptibility issues and functionality of OSS/
Q22	*Reduced costs whilst still allowing users to do their jobs with fit for purpose tools.*
Q26	*(blank)*
Q31	*(blank)*
URN	*10071069*
Q19	*Only if it can do the job and is easy to implement.*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10071152*
Q19	*(blank)*
Q22	*Unable to manage risk and cost due to the management of change controls and expectation.*
Q26	*IT support personnel because there is additional risk and extra support considerations with open source software.*
Q31	*(blank)*
URN	*10071243*
Q19	*(blank)*

Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10072160*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10073646*
Q19	*No intentions*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10074230*
Q19	*OSS is not our first choice unless it was a no brainer*
Q22	*(blank)*
Q26	*(blank)*

Q31	*(blank)*
URN	*10076325*
Q19	*Investigating and will use if cost and service delivery is effective solution*
Q22	*(blank)*
Q26	*(blank)*
Q31	*Confidence in making the change*
URN	*10077520*
Q19	*Always positive, but fit to organisations existing technologies is imperative.*
Q22	*Better delivery than proprietary and more sustainable - all OSS projects I have done have worked this way.*
Q26	*(blank)*
Q31	*(blank)*
URN	*10094388*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10094816*

Q19	*Interested in utilising OSS in the future*
Q22	*No different to utilising commercial products*
Q26	*(blank)*
Q31	*(blank)*
URN	*10112936*
Q19	*Lack of support by business system vendors (eg. Capita, Northgate, Civica) is preventing wider adoption of OSS within my organsation.*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10116015*
Q19	*Currently within the local government software market there are limited opportuinites to invest in OSS. GIS is one area that we are currently changing to OSS.*
Q22	*We would like to adopt more OSS but it is hard in the local government market. We are not big enough to do our own thing so have to rely on a solution having gained enough momentum to be acceptable. We do not work in isolation so the best opportunity for OSS is as partnership project across a number of local service providers.*
Q26	*None I am aware of.*

Q31	*OSS needs a critical mas within a local authority market sector to succeed. I previously referenced GIS and this has now happened in that sector with OSS taking the lead in innovation but most of the other sectors of local government business are effectively controlled by just four large suppliers who have no interest in allowing OSS take over (Northgate, Capita, Civica and Idox).*
URN	*10120983*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10132693*
Q19	*Agnostic. OSS would be considered in the same way as any commercial software, so would go through the same evaluation process.*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10224146*
Q19	*(blank)*
Q22	*solution acceptance on the basis that it can't possibly be as good as the high cost alternative and so will be tolerated (whether or not it does the job required) until enough*

	funds exist to replace it with an expensive, less flexible, probably less functional, but branded alternative.
Q26	*(blank)*
Q31	*(blank)*
URN	*10224374*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10224430*
Q19	*Highly in favour*
Q22	*(blank)*
Q26	*The governance of our organization have expressed a desire for OSS*
Q31	*(blank)*
URN	*10224534*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*

Q31	*(blank)*
URN	*10224550*
Q19	*The software solution needs to meet the organisational requirements - this is paramount. Factors following this, e.g. cost, supplier, platform, are also extremely important but irrelevant if the software does not do what the organisation needs it to do.*
Q22	*There is potential for an OSS implementation to spawn other similar OSS implementations as part of a wider strategy which embraces flexibility while reducing software cost. The inherrent danger is that the OSS project that has developed and is supporting the software either wanes or dies out completely.*
Q26	*(blank)*
Q31	*User requirement vs cost vs supportability*
URN	*10224678*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10224700*
Q19	*Attractive for licence cost reduction however implementation and integration costs would be a barrier*

Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10224770*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10225238*
Q19	*The fact that software is open source is not the issue it is the amount and strength of support that is easily available with a long term strategy, this tends to be weaker with many OSS*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10225303*
Q19	*(blank)*
Q22	*(blank)*

Q26	*(blank)*
Q31	*(blank)*
URN	*10225431*
Q19	*OSS religion is not a concern to me. OSS is just a different set of parameters when selecting software : cost, risk, rewards. The single biggest issue is sustainability of choices i.e. sustainability of commmunity/supplier, access to skills. Following a Microsoft, Proprietary, Oracle, OSS or any other software religion is completely non sensical. It becomes important when I have the in house skills to modify software but this isn't often.*
Q22	*(blank)*
Q26	*(blank)*
Q31	*Skills, Skills, Skills. The OSS community is not one community but a massive variation. I believe that those commercial organisations open sourcing their products are often doing this for commercial advantage or PR. 80% of OSS with a community basis are often too small to future-proof and support the products well enough. Often a few individuals are the community leading lights and the continuity of small initiatives is questionanble. Profitable commercial organisations always have a better continuity story*
URN	*10225715*
Q19	*Won't happen. all our systems are QAd against Microsoft.*
Q22	*(blank)*

Q26	*(blank)*
Q31	*(blank)*
URN	*10226389*
Q19	*Open source is very attractive but it relies upon having in house reource to utilise the software. Currently our resource would not have the immediate skills to do this nor are we staffed up to meet demand. With time this will change as OSS become more prevalent. OSS is a different model for delivery and local government has been nuilt on a presumption of packaged products and consultancy to support implementation.*
Q22	*I would liek to see a development of skills in OSS to enable greater use of them as part of ICT architecture for local government. it would be ideal if government could lead the way in developing this approach.*
Q26	*Microsoft - as a major competitor on desktop*
Q31	*Cost*
URN	*10226395*
Q19	*There is a false perception that OSS is free, which disregards the time involved in coming to learn about it and (often) creating your own support and training materials.*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10226993*

Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10228082*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10228315*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10264884*
Q19	*OSS is not a key decision criteria, however OSS will be considered along with proprietary solutions. Decisions on solution are based on best fit to requirements including financial.*

Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10266750*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10457068*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10457098*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*

Q31	*(blank)*
URN	*10457713*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10458184*
Q19	*(blank)*
Q22	*Huge savings from collaboration with neighbouring Authorities and wider. Sharing development resource/training/knowledge/ideas, standardisation, economies of scale e.g. hosting.*
Q26	*(blank)*
Q31	*(blank)*
URN	*10458634*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*

URN	*10461272*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*Incorporating OSS is incumbent on any organisation having personnel who can exploit the resource. The question then arises of how 'bespoke' an application becomes and how well that application is then supported by the third party. Any adoption of OSS must be accompanied by excellent documentation, testing and support. Otherwise an organisation is doomed if key personnel leave or if these individuals inflate their worth because of their knowledge of the system. Third party software suppliers may become reticent and SLAs may fly out of the window if there is too much staff turnover. Traditional proprietary contracts carry with them a certain level of security in the knowledge that changes are made by the people who hold the support contract and documentation also remains their key priority.*
URN	*10461781*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10462926*

Q19	*If appropriate we would used OSS. Wanted to replace Blackboard with Moodle but internal opposition from academics.*
Q22	*If the software does what we want, I would try to persuade all concerned it was the appropriate course of action.*
Q26	*No*
Q31	*None*
URN	*10480490*
Q19	*Where an organisation has chosen to buy in software packages from a third party or to outsource the support of their IT, opportunities to implement Open Source Software will remain low as barriers around the cost of support will be prohibitively expensive.*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*
URN	*10480851*
Q19	*(blank)*
Q22	*(blank)*
Q26	*(blank)*
Q31	*(blank)*

Appendix P: Quantitative Analysis for General OSS Adoption (2010 to 2012) and Intention to Adopt OSS (2013/14)

The figure below summarises the factors found to be statistically significant for the various organisational OSS adoption behaviours (by year). The diagram also illustrates associated TPB construct and whether or not the factor was driving or inhibiting in respect of organisational OSS adoption or intention to adopt.

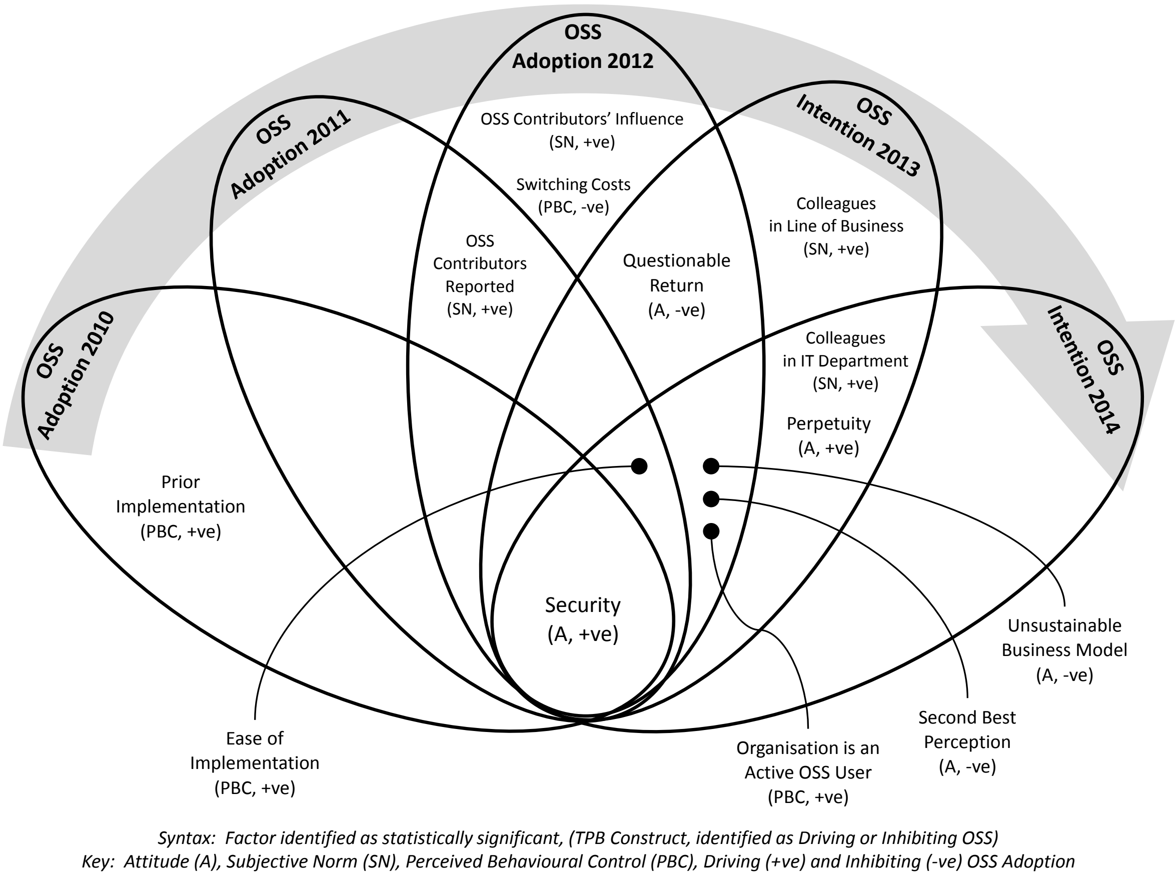


Figure 0.10: Comprehensive Summary of Statistically Significant Factors and Organisational OSS Adoption Behaviour (by Year)

General OSS Adoption in 2010

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship with the self-reported organisational OSS adoption behaviour in 2010 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% confidence level (within the sample) as with previous IS research (Barbosa, 2010). Confidence levels which were found to be greater than 99% and 99.5% were also indicated. The results show two statistically significant factors for reported OSS adoption in 2010 (i.e. Security and Past OSS implementation) as opposed to the potential 67 produced via the literature review.

The bar chart below represents the same factors and also compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption.

Table 0.11: Analysis of Factors Associated with General OSS Adoption in 2010

	Sample (N)	OSS Non-adopters in 2010			OSS Adopters in 2010			Fisher Exact Test	Hypergeometric
		Frequency	Agreed	%	Frequency	Agreed	%	One sided p-value	Probability (p)
Attitude (A)									
(Q17) Productive	44	16	6	38%	28	13	46%		0.21283
(Q18) Category Killer	44	16	5	31%	28	11	39%		0.22509
*(Q20a) Security	44	16	7	44%	28	23	82%	*p(a>=23)=0.01134	0.00978
(Q20b) Cost	44	16	11	69%	28	25	89%		0.08074
(Q20c) Quality	44	16	6	38%	28	16	57%		0.11578
(20d) Flexibility	44	16	11	69%	28	18	64%		0.24932
(Q20e) Technologically Disruptive	44	16	10	63%	28	20	71%		0.21652
(Q20f) Relative Advantage	44	16	8	50%	28	18	64%		0.16405
(Q20g) Job Performance	44	16	8	50%	28	19	68%		0.12951
(Q20h) Transparency	44	16	8	50%	28	19	68%		0.12951
(Q20i) Perpetuity	44	16	7	44%	28	18	64%		0.10656
(Q20j) Freedom to modify	44	16	13	81%	28	24	86%		0.29921
(Q20k) Speed	44	16	6	38%	28	18	64%		0.05967
(Q20l) Knowledge Creation	44	16	11	69%	28	19	68%		0.26244
(Q20m) Creativity & Innovation	44	16	12	75%	28	19	68%		0.24213
(Q20n) Vendor Lock-in	44	16	13	81%	28	26	93%		0.19492
(Q20o)Observable Results	44	16	7	44%	28	16	57%		0.17292
(Q20p) Ideological Compatibility	44	16	11	69%	28	20	71%		0.26151
(Q21a) Unsustainable Business Model	44	16	10	63%	28	14	50%		0.18242
(Q21b) Second Best Perception	44	16	10	63%	28	15	54%		0.21283
(Q21c) Reliability (no better than propietary alternatives)	44	16	9	56%	28	14	50%		0.22803
(Q21d) Preference for building proprietary software skills	44	16	7	44%	28	13	46%		0.24323
(Q21e) Most OSS project fail to attract participants	44	16	8	50%	28	13	46%		0.23943
(Q21f) Hidden costs and questionable returns	44	16	12	75%	28	16	57%		0.13287
(Q21g) OSS commercial contracts not free (of charge)	44	16	8	50%	28	18	64%		0.16405
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	39	14	12	86%	25	23	92%		0.33191
(Q23b) Reported others success stories	39	14	11	79%	25	22	88%		0.25660
(Q23c) OSS Contributors (reported)	34	13	5	38%	21	13	62%		0.11883
(Q24a) Personal Identification with OSS Community	44	16	4	25%	28	9	32%		0.24213
(Q24b) Network Effects	44	16	8	50%	28	15	54%		0.23943
(Q24c) Internal Politics	44	16	2	13%	28	5	18%		0.30776
(Q24d) External Politics	44	16	3	19%	28	4	14%		0.29921
(Q24e) Organisational Culture	44	16	4	25%	28	7	25%		0.28098
(Q24f) Champion or Sponsor	44	16	7	44%	28	19	68%		0.07675
(Q24g) Commitment to local consultants/suppliers	44	16	3	19%	28	5	18%		0.31053
(Q24h) Lack of legally responsible third party	44	16	1	6%	28	3	11%		0.38612
(Q25a) Friends and Acquaintances	44	16	5	31%	28	14	50%		0.12438
(Q25b) OSS Contributors (influence)	44	16	7	44%	28	19	68%		0.07675
(Q25c) Colleagues (in line of business)	44	16	7	44%	28	10	36%		0.21873
(Q25d) Colleagues (in IT Dept)	44	16	6	38%	28	17	61%		0.08544
(Q25e) Colleagues (in Line of Business)	44	16	5	31%	28	4	14%		0.12615
(Q25f) Competitors	44	16	1	6%	28	1	4%		0.47357
(Q25g) Third Party Partners	44	16	1	6%	28	4	14%		0.30166
(Q25h) Suppliers	44	16	0	0%	28	2	7%		0.39958
(Q25i) Customers	44	16	2	13%	28	3	11%		0.36199
(Q25j) Government	44	16	6	38%	28	10	36%		0.25219
(Q25k) The Media	44	16	1	6%	28	6	21%		0.15730
(Q25l) The General Public	44	16	1	6%	28	6	21%		0.15730
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	44	16	4	25%	28	13	46%		0.09929
(Q28) Respondent's decision to adopt	44	16	4	25%	28	4	14%		0.21026
(Q29a) Set of Standards (Specifying Proprietary Software)	44	16	7	44%	28	16	57%		0.17292
(Q29b) Professionalism of IT Dept	44	16	7	44%	28	17	61%		0.13950
(Q29c) Availability of Resources, Expertise and Familiarity	44	16	6	38%	28	17	61%		0.08544
(Q29d) Availability of Training	44	16	5	31%	28	13	46%		0.15886
(Q29e) Availability of Time	44	16	5	31%	28	14	50%		0.12438
(Q29f) Internal OSS Installed Base	44	16	8	50%	28	12	43%		0.22233
(Q29g) Inertia (i.e. level of acceptance)	44	16	2	13%	28	4	14%		0.34806
(Q29h) Conservative Management	44	16	2	13%	28	2	7%		0.33414
(Q29i) Availability of Commercial Support	44	16	6	38%	28	8	29%		0.21652
(Q29j) Trial-ability (i.e. ability to demo capability)	44	16	8	50%	28	15	54%		0.23943
(Q30a) Unacceptable License Terms	44	16	7	44%	28	12	43%		0.24703
(Q30b) Overwhelming number of patches and upgrades	44	16	11	69%	28	17	61%		0.22509
(Q30c) Lack of Technical Support	44	16	15	94%	28	24	86%		0.30166
(Q30d) Complexity	44	16	13	81%	28	19	68%		0.18339
(Q30e) Proprietary Volume Purchase Agreement	44	16	10	63%	28	18	64%		0.25219
(30f) Lack of Resource	44	16	14	88%	28	21	75%		0.20042
(Q30g) Switching Costs	44	16	12	75%	28	20	71%		0.26821
(Q30h) Set of Standards	44	16	11	69%	28	20	71%		0.26151
(Q30i) Lack of Relevance	44	16	9	56%	28	17	61%		0.23862
*(Q32) Past Implementation	44	16	1	6%	28	10	36%	*p(a>=10)=0.03018	0.02738
(Q33) Organisation is Active OSS User	44	16	3	19%	28	12	43%		0.07410
*p value<0.05									
**p value<0.01									
***p value<0.005									

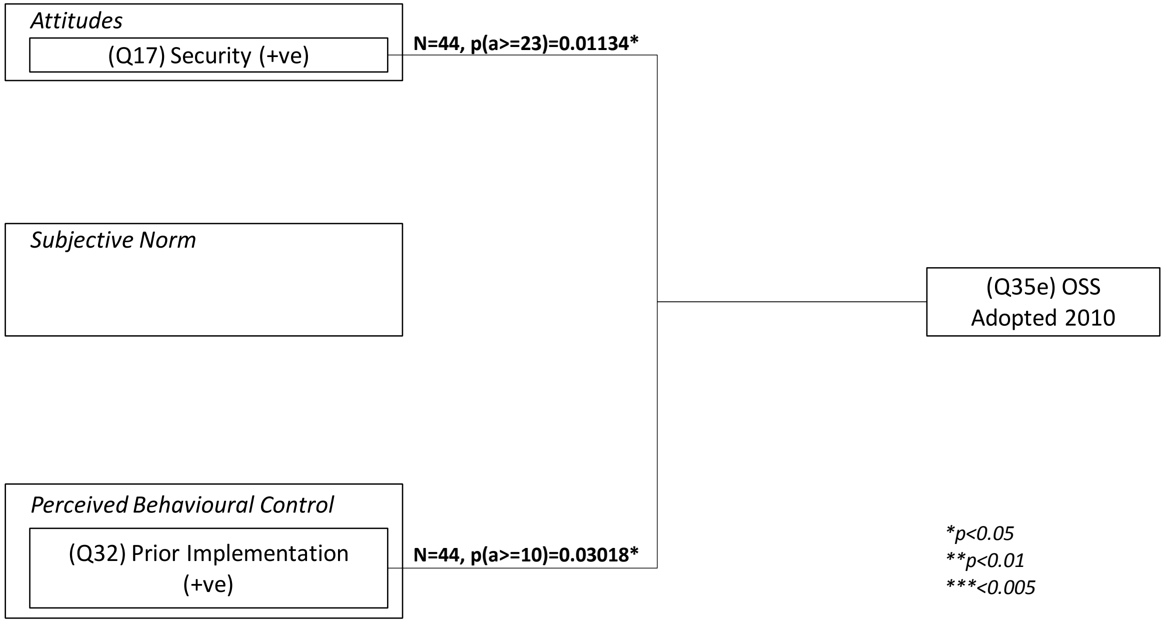
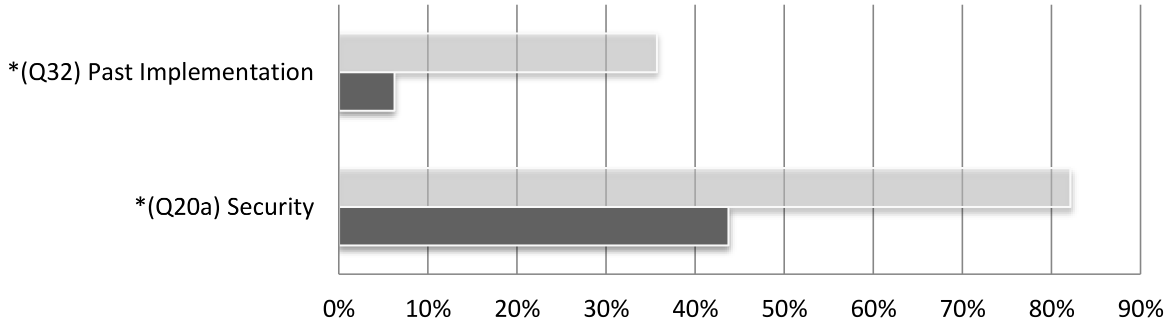


Figure 0.11: Factors Associated with OSS Adoption in 2010



	*(Q20a) Security	*(Q32) Past Implementation
OSS Adopters in 2010	82%	36%
OSS Non-adopters in 2010	44%	6%

Figure 0.12: Bar Chart Illustrating Factors Associated with General OSS Adoption in 2010

General OSS Adoption in 2011

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour in 2011 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95%, 99% and 99.5% confidence level (within the sample) as indicated. The results show three statistically significant factors for reported OSS adoption in 2011 (i.e. Security, OSS Contributors (reported) and Ease of Implementation) as opposed to the potential 67 produced via the literature review.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption.

The radar graph below shows the same factors and illustrates the difference in salient beliefs between respondents who (a) describe themselves as those who have adopted OSS in 2011and (b) those who do not, in terms of statistically significant factors

Table 0.12: Analysis of Factors Associated with General OSS Adoption in 2011

	Sample (N)	OSS Non-adopters in 2011			OSS Adopters in 2011			Fisher Exact Test	Hypergeometric
		Frequency	Agreed	%	Frequency	Agreed	%	One sided p-value	Probability (p)
Attitude (A)									
(Q17) Productive	44	13	4	31%	31	15	48%		0.15253
(Q18) Category Killer	44	13	3	23%	31	13	42%		0.14156
*(Q20a) Security	44	13	6	46%	31	24	77%	*p(a>=24)=0.04863	0.03925
(Q20b) Cost	44	13	9	69%	31	27	87%		0.12694
(Q20c) Quality	44	13	6	46%	31	16	52%		0.24511
(20d) Flexibility	44	13	9	69%	31	20	65%		0.26332
(Q20e) Technologically Disruptive	44	13	9	69%	31	21	68%		0.27586
(Q20f) Relative Advantage	44	13	7	54%	31	19	61%		0.23522
(Q20g) Job Performance	44	13	8	62%	31	19	61%		0.26462
(Q20h) Transparency	44	13	9	69%	31	18	58%		0.21486
(Q20i) Perpetuity	44	13	7	54%	31	18	58%		0.25122
(Q20j) Freedom to modify	44	13	10	77%	31	27	87%		0.23483
(Q20k) Speed	44	13	6	46%	31	18	58%		0.20098
(Q20l) Knowledge Creation	44	13	11	85%	31	19	61%		0.09575
(Q20m) Creativity & Innovation	44	13	10	77%	31	21	68%		0.24433
(Q20n) Vendor Lock-in	44	13	11	85%	31	28	90%		0.32284
(Q20o)Observable Results	44	13	6	46%	31	17	55%		0.22610
(Q20p) Ideological Compatibility	44	13	8	62%	31	23	74%		0.19556
(Q21a) Unsustainable Business Model	44	13	10	77%	31	14	45%		0.04307
(Q21b) Second Best Perception	44	13	9	69%	31	16	52%		0.15253
(Q21c) Reliability (no better than propietary alternatives)	44	13	7	54%	31	16	52%		0.25625
(Q21d) Preference for building proprietary software skills	44	13	6	46%	31	14	45%		0.25840
(Q21e) Most OSS project fail to attract participants	44	13	7	54%	31	14	45%		0.22610
(Q21f) Hidden costs and questionable returns	44	13	11	85%	31	17	55%		0.04964
(Q21g) OSS commercial contracts not free (of charge)	44	13	9	69%	31	17	55%		0.18417
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	39	11	9	82%	28	26	93%		0.25276
(Q23b) Reported others success stories	39	11	8	73%	28	25	89%		0.16568
***(Q23c) OSS Contributors (reported)	34	10	1	10%	24	17	71%	***p(a>=17)=0.001631	0.00157
(Q24a) Personal Identification with OSS Community	44	13	4	31%	31	9	29%		0.27765
(Q24b) Network Effects	44	13	8	62%	31	15	48%		0.19219
(Q24c) Internal Politics	44	13	2	15%	31	5	16%		0.34585
(Q24d) External Politics	44	13	3	23%	31	4	13%		0.23483
(Q24e) Organisational Culture	44	13	3	23%	31	8	26%		0.29418
(Q24f) Champion or Sponsor	44	13	8	62%	31	18	58%		0.25783
(Q24g) Commitment to local consultants/suppliers	44	13	4	31%	31	4	13%		0.12694
(Q24h) Lack of legally responsible third party	44	13	1	8%	31	3	10%		0.43046
(Q25a) Friends and Acquaintances	44	13	5	38%	31	14	45%		0.24225
(Q25b) OSS Contributors (influence)	44	13	6	46%	31	20	65%		0.14113
(Q25c) Colleagues (in line of business)	44	13	5	38%	31	12	39%		0.26462
(Q25d) Colleagues (in IT Dept)	44	13	6	46%	31	17	55%		0.22610
(Q25e) Colleagues (in Line of Business)	44	13	3	23%	31	6	19%		0.29703
(Q25f) Competitors	44	13	1	8%	31	1	3%		0.42600
(Q25g) Third Party Partners	44	13	0	0%	31	5	16%		0.15645
(Q25h) Suppliers	44	13	0	0%	31	2	6%		0.49154
(Q25i) Customers	44	13	2	15%	31	3	10%		0.32284
(Q25j) Government	44	13	5	38%	31	11	35%		0.26151
(Q25k) The Media	44	13	0	0%	31	7	23%		0.06862
(Q25l) The General Public	44	13	0	0%	31	7	23%		0.06862
Perceived Behavioural Control (PBC)									
*(Q27) Easy to implement	44	13	2	15%	31	15	48%	*p(a>=15)=0.04023	0.03415
(Q28) Respondent's decision to adopt	44	13	3	23%	31	5	16%		0.27419
(Q29a) Set of Standards (Specifying Proprietary Software)	44	13	7	54%	31	16	52%		0.25625
(Q29b) Professionalism of IT Dept	44	13	5	38%	31	19	61%		0.10313
(Q29c) Availability of Resources, Expertise and Familiarity	44	13	5	38%	31	18	58%		0.13189
(Q29d) Availability of Training	44	13	5	38%	31	13	42%		0.25783
(Q29e) Availability of Time	44	13	5	38%	31	14	45%		0.24225
(Q29f) Internal OSS Installed Base	44	13	6	46%	31	14	45%		0.25840
(Q29g) Inertia (i.e. level of acceptance)	44	13	1	8%	31	5	16%		0.31291
(Q29h) Conservative Management	44	13	1	8%	31	3	10%		0.43046
(Q29i) Availability of Commercial Support	44	13	5	38%	31	9	29%		0.22570
(Q29j) Trial-ability (i.e. ability to demo capability)	44	13	10	77%	31	16	52%		0.08349
(Q30a) Unacceptable License Terms	44	13	6	46%	31	17	55%		0.22610
(Q30b) Overwhelming number of patches and upgrades	44	13	9	69%	31	19	61%		0.24213
(Q30c) Lack of Technical Support	44	13	12	92%	31	27	87%		0.37665
(Q30d) Complexity	44	13	10	77%	31	22	71%		0.27338
(Q30e) Proprietary Volume Purchase Agreement	44	13	8	62%	31	20	65%		0.26151
(30f) Lack of Resource	44	13	12	92%	31	23	74%		0.14466
(Q30g) Switching Costs	44	13	11	85%	31	21	68%		0.16403
(Q30h) Set of Standards	44	13	9	69%	31	22	71%		0.27765
(Q30i) Lack of Relevance	44	13	9	69%	31	17	55%		0.18417
(Q32) Past Implementation	44	13	1	8%	31	10	32%		0.07518
(Q33) Organisation is Active OSS User	45	14	3	21%	31	12	39%		0.14895
*p value<0.05									
**p value<0.01									
***p value<0.005									

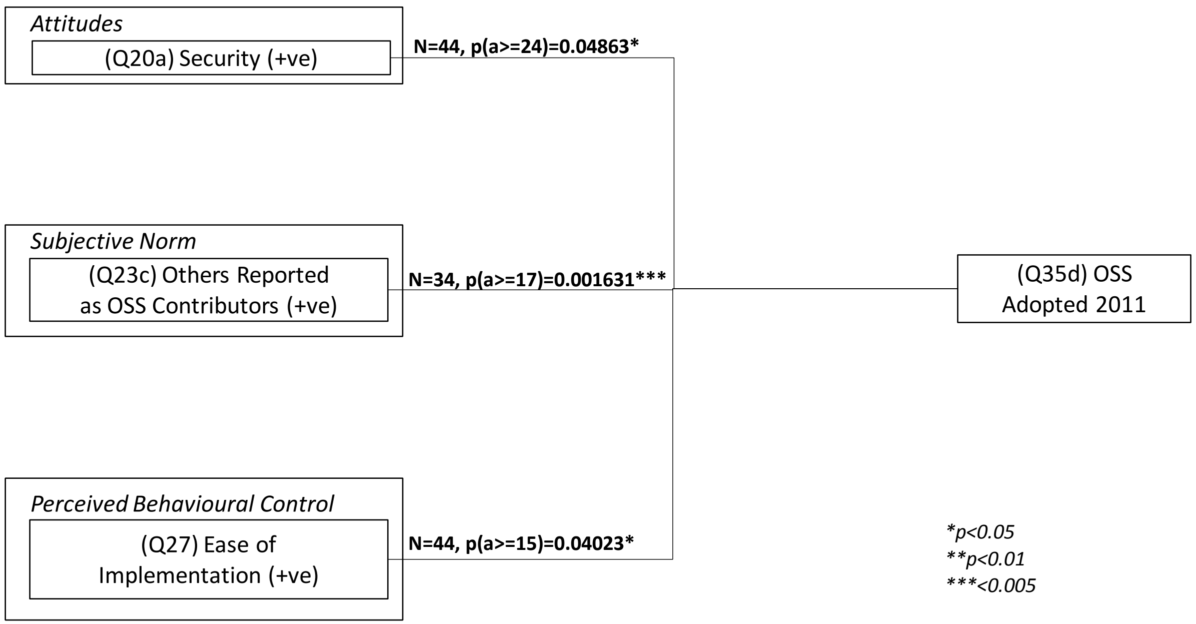
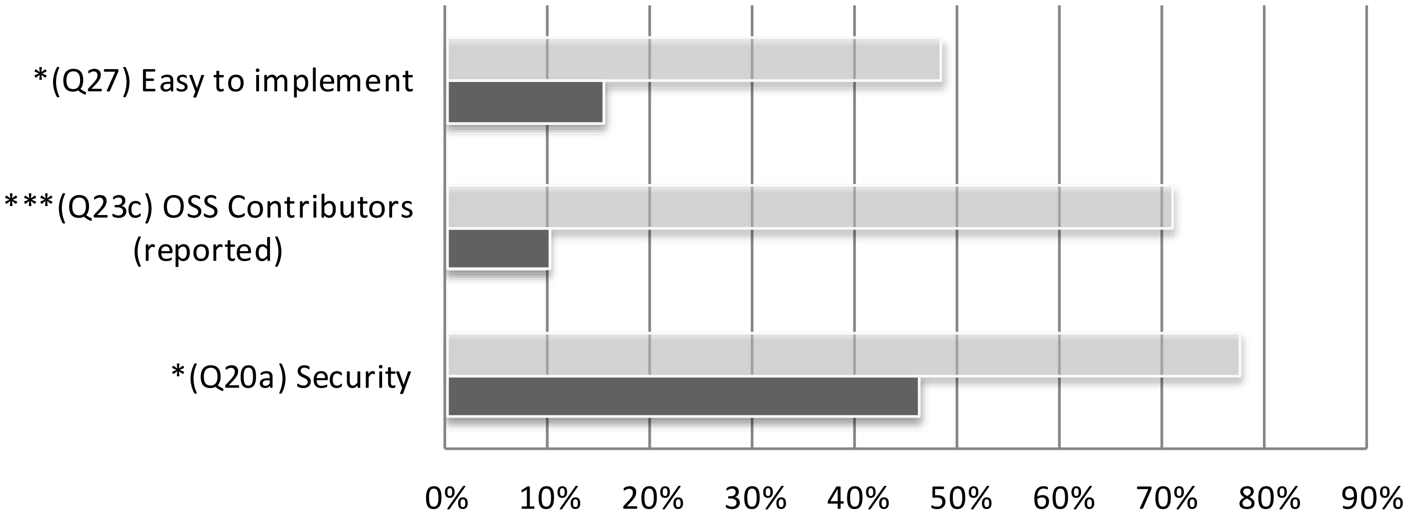


Figure 0.13: Factors Associated with OSS Adoption in 2011



	*(Q20a) Security	***(Q23c) OSS Contributors (reported)	*(Q27) Easy to implement
OSS Adopters in 2011	77%	71%	48%
OSS Non-adopters in 2011	46%	10%	15%

Figure 0.14: Bar Chart Illustrating Factors Associated with General OSS Adoption in 2011

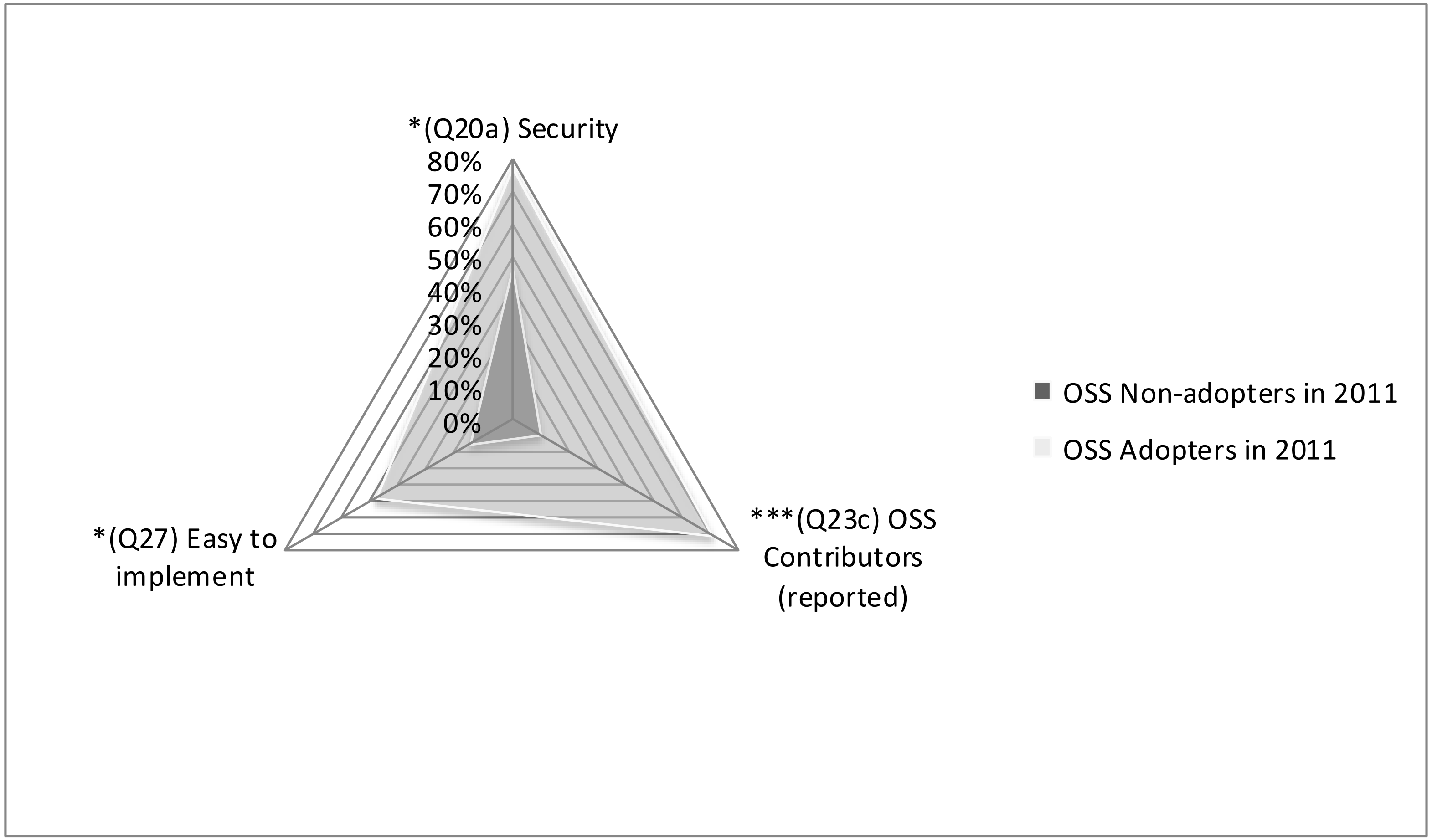


Figure 0.15: Radar Graph Illustrating Differences in Responses for Factors Associated with General OSS Adoption in 2011

General OSS Adoption in 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour in 2012 analysed via the previously described Fisher Exact Test procedure.

The diagram below summarises the relationship and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to the p-values as before. The results show nine statistically significant factors for reported OSS adoption in 2012, as opposed to the 67 produced via the literature review. Notably, OSS Contributors (reported) and Ease of Implementation were found to be greater than 99.5% confidence interval, Organisation Active User was greater than 99% and the remainder were greater than 95% confidence level.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters in 2012 agreed that the specified factors are important to organisational OSS adoption.

The radar graph below shows the same factors and illustrates the difference between respondents who (a) describe themselves as those who have adopted OSS in 2012and (b) those who have not, in terms of statistically significant factors

Table 0.13: Analysis of Factors Associated with General Intention to Adopt OSS in 2012

	Sample (N)	OSS Non-adopters in 2012			OSS Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	44	14	4	29%	30	15	50%		0.11021
(Q18) Category Killer	44	14	4	29%	30	12	40%		0.20777
*(Q20a) Security (+ve)	44	14	6	43%	30	24	80%	*p(a>=24)=0.01824	0.01551
(Q20b) Cost	44	14	10	71%	30	26	87%		0.15478
(Q20c) Quality	44	14	5	36%	30	17	57%		0.11395
(20d) Flexibility	44	14	8	57%	30	21	70%		0.18687
(Q20e) Technologically Disruptive	44	14	9	64%	30	21	70%		0.24916
(Q20f) Relative Advantage	44	14	7	50%	30	19	63%		0.18210
(Q20g) Job Performance	44	14	7	50%	30	20	67%		0.15024
(Q20h) Transparency	44	14	8	57%	30	19	63%		0.23901
(Q20i) Perpetuity	44	14	6	43%	30	19	63%		0.11644
(Q20j) Freedom to modify	44	14	11	79%	30	26	87%		0.26032
(Q20k) Speed	44	14	8	57%	30	16	53%		0.24798
(Q20l) Knowledge Creation	44	14	10	71%	30	20	67%		0.26162
(Q20m) Creativity & Innovation	44	14	9	64%	30	22	73%		0.22570
(Q20n) Vendor Lock-in	44	14	12	86%	30	27	90%		0.34020
(Q20o)Observable Results	44	14	7	50%	30	16	53%		0.24798
(Q20p) Ideological Compatibility	44	14	9	64%	30	22	73%		0.22570
*(Q21a) Unsustainable Business Model (-ve)	44	14	11	79%	30	13	43%	*p(a<=13)=0.02967	0.02475
*(Q21b) Second Best Perception (-ve)	44	14	11	79%	30	14	47%	*p(a<=14)=0.04621	0.03757
(Q21c) Reliability (no better than propietary alternatives)	44	14	9	64%	30	14	47%		0.14466
(Q21d) Preference for building proprietary software skills	44	14	8	57%	30	12	40%		0.14749
(Q21e) Most OSS project fail to attract participants	44	14	9	64%	30	12	40%		0.08604
*(Q21f) Hidden costs and questionable returns (-ve)	44	14	12	86%	30	16	53%	*p(a<=16)=0.03732	0.03176
(Q21g) OSS commercial contracts not free (of charge)	44	14	10	71%	30	16	53%		0.14139
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	39	11	9	82%	28	26	93%		0.25276
(Q23b) Reported others success stories	39	11	8	73%	28	25	89%		0.16568
***(Q23c) OSS Contributors (reported) (+ve)	34	10	1	10%	24	17	71%	***p(a>=17)=0.001631	0.00157
(Q24a) Personal Identification with OSS Community	44	14	6	43%	30	7	23%		0.11776
(Q24b) Network Effects	44	14	8	57%	30	15	50%		0.23145
(Q24c) Internal Politics	44	14	0	0%	30	7	23%		0.05313
(Q24d) External Politics	44	14	2	14%	30	5	17%		0.33841
(Q24e) Organisational Culture	44	14	2	14%	30	9	30%		0.16976
(Q24f) Champion or Sponsor	44	14	9	64%	30	17	57%		0.23288
(Q24g) Commitment to local consultants/suppliers	44	14	3	21%	30	5	17%		0.29268
(Q24h) Lack of legally responsible third party	44	14	1	7%	30	3	10%		0.41871
(Q25a) Friends and Acquaintances	44	14	6	43%	30	13	43%		0.25527
*(Q25b) OSS Contributors (influence) (+ve)	44	14	5	36%	30	21	70%	*p(a>=21)=0.03429	0.02782
(Q25c) Colleagues (in line of business)	44	14	4	29%	30	13	43%		0.17466
(Q25d) Colleagues (in IT Dept)	44	14	6	43%	30	17	57%		0.17869
(Q25e) Colleagues (in Line of Business)	44	14	3	21%	30	6	20%		0.30487
(Q25f) Competitors	44	14	1	7%	30	1	3%		0.44397
(Q25g) Third Party Partners	44	14	0	0%	30	5	17%		0.13122
(Q25h) Suppliers	44	14	0	0%	30	2	7%		0.45983
(Q25i) Customers	44	14	2	14%	30	3	10%		0.34020
(Q25j) Government	44	14	6	43%	30	10	33%		0.21652
(Q25k) The Media	44	14	1	7%	30	6	20%		0.21693
(Q25l) The General Public	44	14	1	7%	30	6	20%		0.21693
Perceived Behavioural Control (PBC)									
***(Q27) Easy to implement (+ve)	44	14	1	7%	30	16	53%	***p(a>=16)=0.003141	0.00297
(Q28) Respondent's decision to adopt	44	14	8	57%	30	19	63%		0.23901
(Q29a) Set of Standards (Specifying Proprietary Software)	44	14	7	50%	30	16	53%		0.24798
(Q29b) Professionalism of IT Dept	44	14	5	36%	30	19	63%		0.06210
(Q29c) Availability of Resources, Expertise and Familiarity	44	14	7	50%	30	17	57%		0.23339
(Q29d) Availability of Training	44	14	6	43%	30	12	40%		0.25229
(Q29e) Availability of Time	44	14	6	43%	30	13	43%		0.25527
(Q29f) Internal OSS Installed Base	44	14	7	50%	30	13	43%		0.23339
(Q29g) Inertia (i.e. level of acceptance)	44	14	2	14%	30	4	13%		0.35328
(Q29h) Conservative Management	44	14	1	7%	30	3	10%		0.41871
(Q29i) Availability of Commercial Support	44	14	5	36%	30	9	30%		0.24916
(Q29j) Trial-ability (i.e. ability to demo capability)	44	14	5	36%	30	18	60%		0.08604
(Q30a) Unacceptable License Terms	44	14	5	36%	30	14	47%		0.20665
(Q30b) Overwhelming number of patches and upgrades	44	14	10	71%	30	18	60%		0.20777
(Q30c) Lack of Technical Support	44	14	13	93%	30	26	87%		0.35328
(Q30d) Complexity	44	14	12	86%	30	20	67%		0.12964
(Q30e) Proprietary Volume Purchase Agreement	44	14	9	64%	30	19	63%		0.26244
(30f) Lack of Resource	44	14	13	93%	30	22	73%		0.11558
*(Q30g) Switching Costs (-ve)	44	14	13	93%	30	19	63%	*p(a<=19)=0.04036	0.03626
(Q30h) Set of Standards	44	14	9	64%	30	22	73%		0.22570
(Q30i) Lack of Relevance	44	14	10	71%	30	16	53%		0.14139
(Q32) Past Implementation	44	14	2	14%	30	9	30%		0.16976
**(Q33) Organisation is Active OSS User (+ve)	44	14	1	7%	30	14	47%	**p(a>=14)=0.009530	0.00886
*p value<0.05									
**p value<0.01									
***p value<0.005									

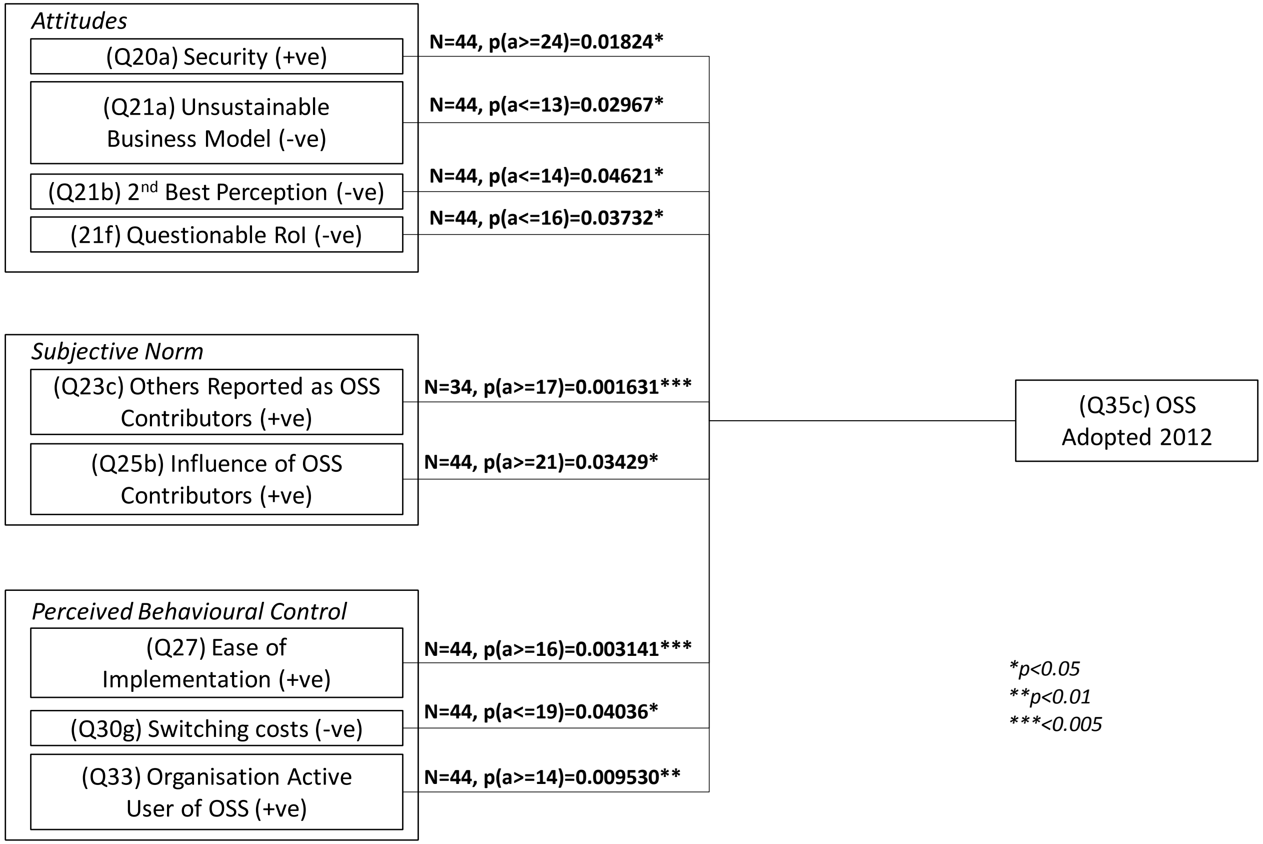
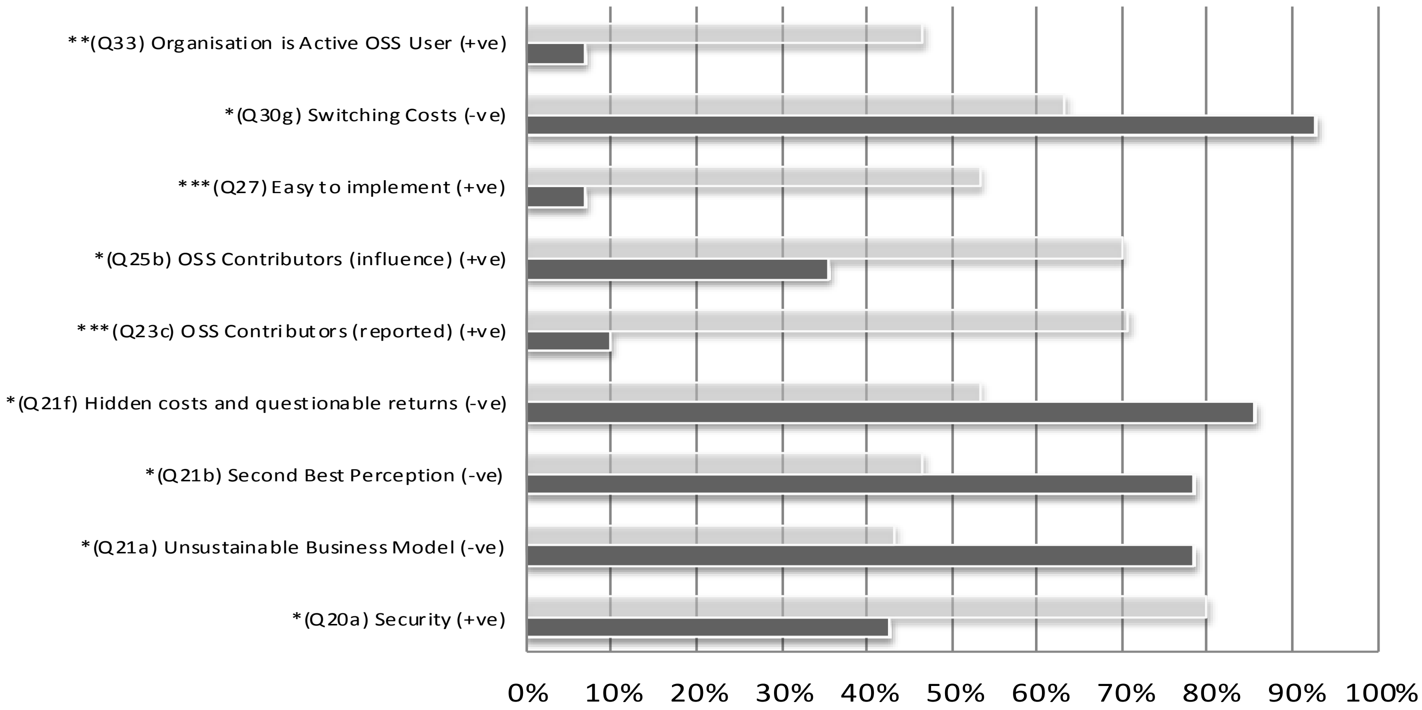


Figure 0.16: Factors Associated with OSS Adoption in 2012



	*(Q20a) Security (+ve)	*(Q21a) Unsustainable Business Model (-ve)	*(Q21b) Second Best Perception (-ve)	*(Q21f) Hidden costs and questionable returns (-ve)	***(Q23c) OSS Contributors (reported) (+ve)	*(Q25b) OSS Contributors (influence) (+ve)	***(Q27) Easy to implement (+ve)	*(Q30g) Switching Costs (-ve)	**(Q33) Organisation is Active OSS User (+ve)
OSS Adopters in 2012	80%	43%	47%	53%	71%	70%	53%	63%	47%
OSS Non-adopters in 2012	43%	79%	79%	86%	10%	36%	7%	93%	7%

Figure 0.17: Bar Chart Illustrating Factors Associated with General OSS Adoption in 2012

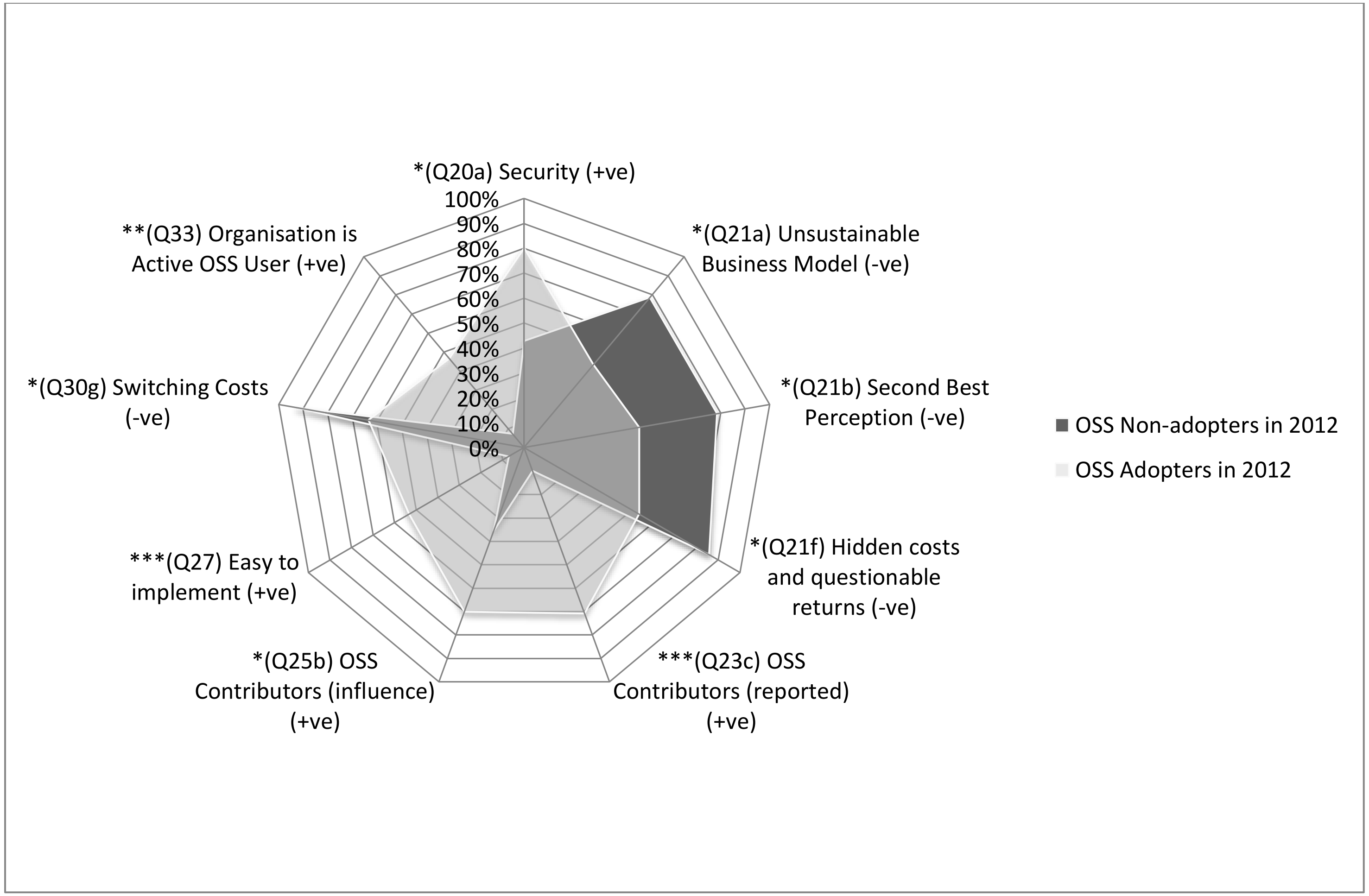


Figure 0.18: Radar Graph Illustrating Differences in Responses for Factors Associated with General OSS Adoption in 2012

General Intention to Adopt OSS in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS in 2013 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors which are categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to the same p-values as before. The results also show nine statistically significant factors for reported intention to adopt OSS in 2013, as opposed to the 67 produced via the literature review. Notably, Colleagues in IT and Ease of Implementation were found to be greater than 99.5% confidence interval and positively associated with OSS intention to adopt in 2013. Similarly, Organisation is an Active OSS User and Second Best Perception were found to be 99% confidence level, with the former indicated as positively associated and the latter negative. Additionally, the remaining five factors were found to be 95% confidence level with Unsustainable Business Model and Hidden Costs and Questionable returns indicated as negatively associated with OSS adoption and the remainder positive.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters in 2013 agreed that the specified factors are important to organisational OSS adoption.

The radar graph below represents the same factors which illustrate the difference in salient beliefs between respondents who describe themselves as (a) those who intend to adopt OSS in this year and (b) those who do not, in terms of statistically significant factors

Table 0.14: Analysis of Factors Associated with General Intention to Adopt OSS in 2013

	Sample (N)	No Intention to Adopt OSS in 2013			Intention to Adopt OSS in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	41	10	2	20%	31	17	55%		0.04877
(Q18) Category Killer	41	10	3	30%	31	13	42%		0.24011
*(Q20a) Security (+ve)	41	10	4	40%	31	25	81%	*p(a>=25)=0.02234	0.01958
(Q20b) Cost	41	10	7	70%	31	27	87%		0.16795
(Q20c) Quality	41	10	3	30%	31	18	58%		0.09196
(20d) Flexibility	41	10	4	40%	31	23	74%		0.04701
(Q20e) Technologically Disruptive	41	10	6	60%	31	23	74%		0.20974
(Q20f) Relative Advantage	41	10	5	50%	31	20	65%		0.20700
(Q20g) Job Performance	41	10	4	40%	31	21	68%		0.09036
(Q20h) Transparency	41	10	4	40%	31	21	68%		0.09036
*(Q20i) Perpetuity (+ve)	41	10	3	30%	31	21	68%	*p(a>=21)=0.04163	0.03511
(Q20j) Freedom to modify	41	10	8	80%	31	28	90%		0.26992
(Q20k) Speed	41	10	6	60%	31	17	55%		0.27553
(Q20l) Knowledge Creation	41	10	6	60%	31	22	71%		0.24027
(Q20m) Creativity & Innovation	41	10	6	60%	31	22	71%		0.24027
(Q20n) Vendor Lock-in	41	10	8	80%	31	29	94%		0.20663
(Q20o)Observable Results	41	10	5	50%	31	17	55%		0.27314
(Q20p) Ideological Compatibility	41	10	7	70%	31	23	74%		0.29962
*(Q21a) Unsustainable Business Model (-ve)	41	10	9	90%	31	14	45%	*p(a<=14)=0.01414	0.01312
**(Q21b) Second Best Perception (-ve)	41	10	9	90%	31	13	42%	**p(a<=13)=0.009007	0.00843
(Q21c) Reliability (no better than propietary alternatives)	41	10	7	70%	31	14	45%		0.11824
(Q21d) Preference for building proprietary software skills	41	10	6	60%	31	12	39%		0.14663
(Q21e) Most OSS project fail to attract participants	41	10	6	60%	31	13	42%		0.17703
(Q21f) Hidden costs and questionable returns (-ve)	41	10	9	90%	31	16	52%	*p(a<=16)=0.03207	0.02916
(Q21g) OSS commercial contracts not free (of charge)	41	10	7	70%	31	17	55%		0.20993
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	42	11	7	64%	31	25	81%		0.16513
(Q23b) Reported others success stories	42	11	6	55%	31	25	81%		0.07947
(Q23c) OSS Contributors (reported)	41	10	**2**	20%	31	15	48%		0.08922
(Q24a) Personal Identification with OSS Community	41	10	**4**	40%	31	8	26%		0.20974
(Q24b) Network Effects	41	10	5	50%	31	16	52%		0.28141
(Q24c) Internal Politics	41	10	0	0%	31	7	23%		0.11696
(Q24d) External Politics	41	10	1	10%	31	6	19%		0.32750
(Q24e) Organisational Culture	41	10	1	10%	31	10	32%		0.14038
(Q24f) Champion or Sponsor	41	10	5	50%	31	19	61%		0.23460
(Q24g) Commitment to local consultants/suppliers	41	10	1	10%	31	6	19%		0.32750
(Q24h) Lack of legally responsible third party	41	10	1	10%	31	3	10%		0.44386
(Q25a) Friends and Acquaintances	41	10	4	40%	31	14	45%		0.27553
(Q25b) OSS Contributors (influence)	41	10	5	50%	31	21	68%		0.17620
(Q25c) Colleagues (in line of business) (+ve)	41	10	1	10%	31	15	48%	*p(a>=15)=0.03207	0.02916
(Q25d) Colleagues (in IT Dept) (+ve)	41	10	1	10%	31	20	65%	***p(a>=20)=0.003311	0.00315
(Q25e) Colleagues (in Line of Business)	41	10	0	0%	31	8	26%		0.08256
(Q25f) Competitors	41	10	1	10%	31	1	3%		0.37805
(Q25g) Third Party Partners	41	10	0	0%	31	5	16%		0.22673
(Q25h) Suppliers	41	10	0	0%	31	2	6%		0.56707
(Q25i) Customers	41	10	1	10%	31	3	10%		0.44386
(Q25j) Government	41	10	4	40%	31	12	39%		0.28751
(Q25k) The Media	41	10	0	0%	31	7	23%		0.11696
(Q25l) The General Public	41	10	0	0%	31	7	23%		0.11696
Perceived Behavioural Control (PBC)									
***(Q27) Easy to implement (+ve)	41	10	0	0%	31	16	52%	***p(a>=16)=0.002916	0.00292
(Q28) Respondent's decision to adopt	41	10	5	50%	31	20	65%		0.20700
(Q29a) Set of Standards (Specifying Proprietary Software)	41	10	4	40%	31	18	58%		0.17703
(Q29b) Professionalism of IT Dept	41	10	3	30%	31	20	65%		0.05027
(Q29c) Availability of Resources, Expertise and Familiarity	41	10	4	40%	31	18	58%		0.17703
(Q29d) Availability of Training	41	10	4	40%	31	13	42%		0.28574
(Q29e) Availability of Time	41	10	4	40%	31	14	45%		0.27553
(Q29f) Internal OSS Installed Base	41	10	**3**	30%	31	16	52%		0.14741
(Q29g) Inertia (i.e. level of acceptance)	41	10	1	10%	31	4	13%		0.41987
(Q29h) Conservative Management	41	10	0	0%	31	3	10%		0.42167
(Q29i) Availability of Commercial Support	41	10	2	20%	31	11	35%		0.21625
(Q29j) Trial-ability (i.e. ability to demo capability)	41	10	3	30%	31	19	61%		0.06922
(Q30a) Unacceptable License Terms	41	10	3	30%	31	16	52%		0.14741
(Q30b) Overwhelming number of patches and upgrades	41	10	6	60%	31	20	65%		0.28032
(Q30c) Lack of Technical Support	41	10	9	90%	31	27	87%		0.41987
(Q30d) Complexity	41	10	9	90%	31	21	68%		0.14038
(Q30e) Proprietary Volume Purchase Agreement	41	10	8	80%	31	19	61%		0.18020
(30f) Lack of Resource	41	10	9	90%	31	23	74%		0.22517
(Q30g) Switching Costs	41	10	9	90%	31	21	68%		0.14038
(Q30h) Set of Standards	41	10	7	70%	31	22	71%		0.30628
(Q30i) Lack of Relevance	41	10	7	70%	31	18	58%		0.24011
(Q32) Past Implementation	41	10	1	10%	31	8	26%		0.22517
***(Q33) Organisation is Active OSS User (+ve)	41	10	0	0%	31	14	45%	***p(a>=14)=0.007525	0.00753
*p value<0.05									
**p value<0.01									
***p value<0.005									

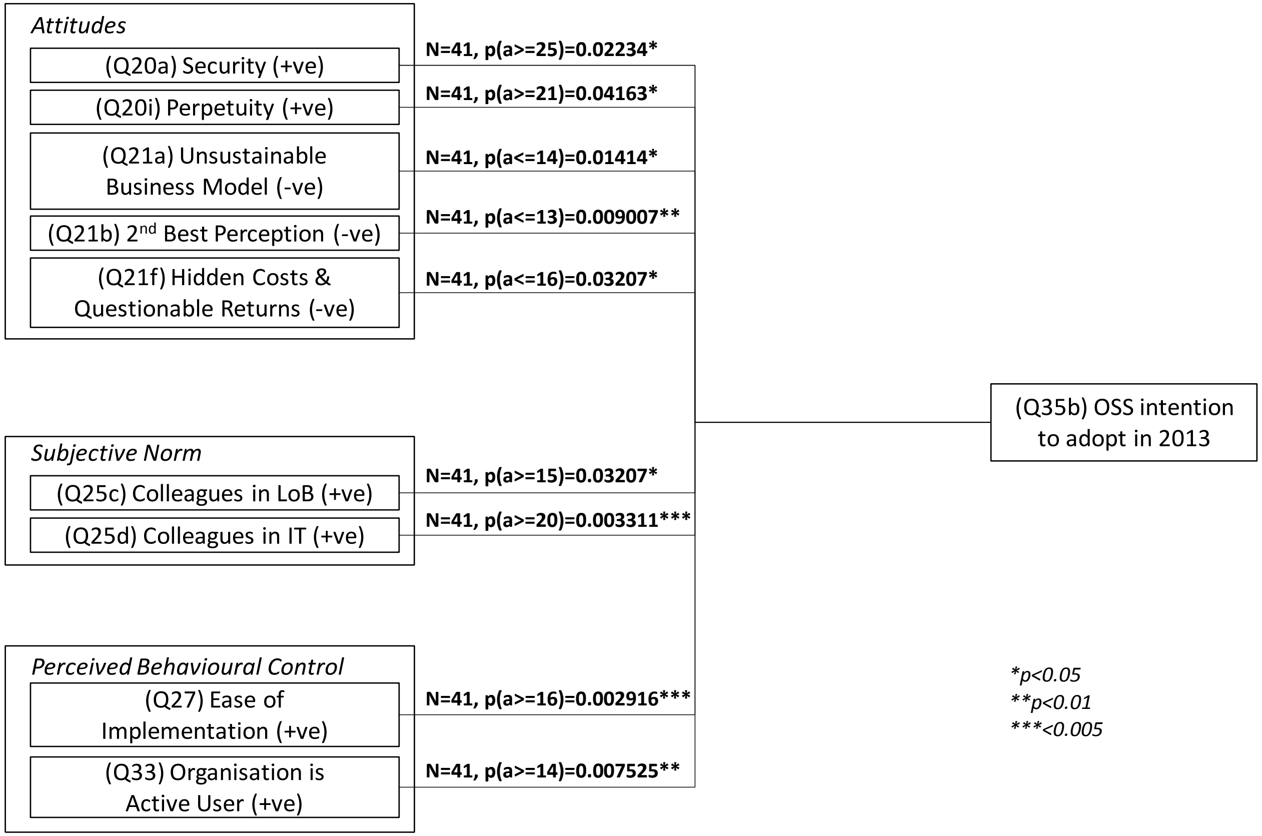
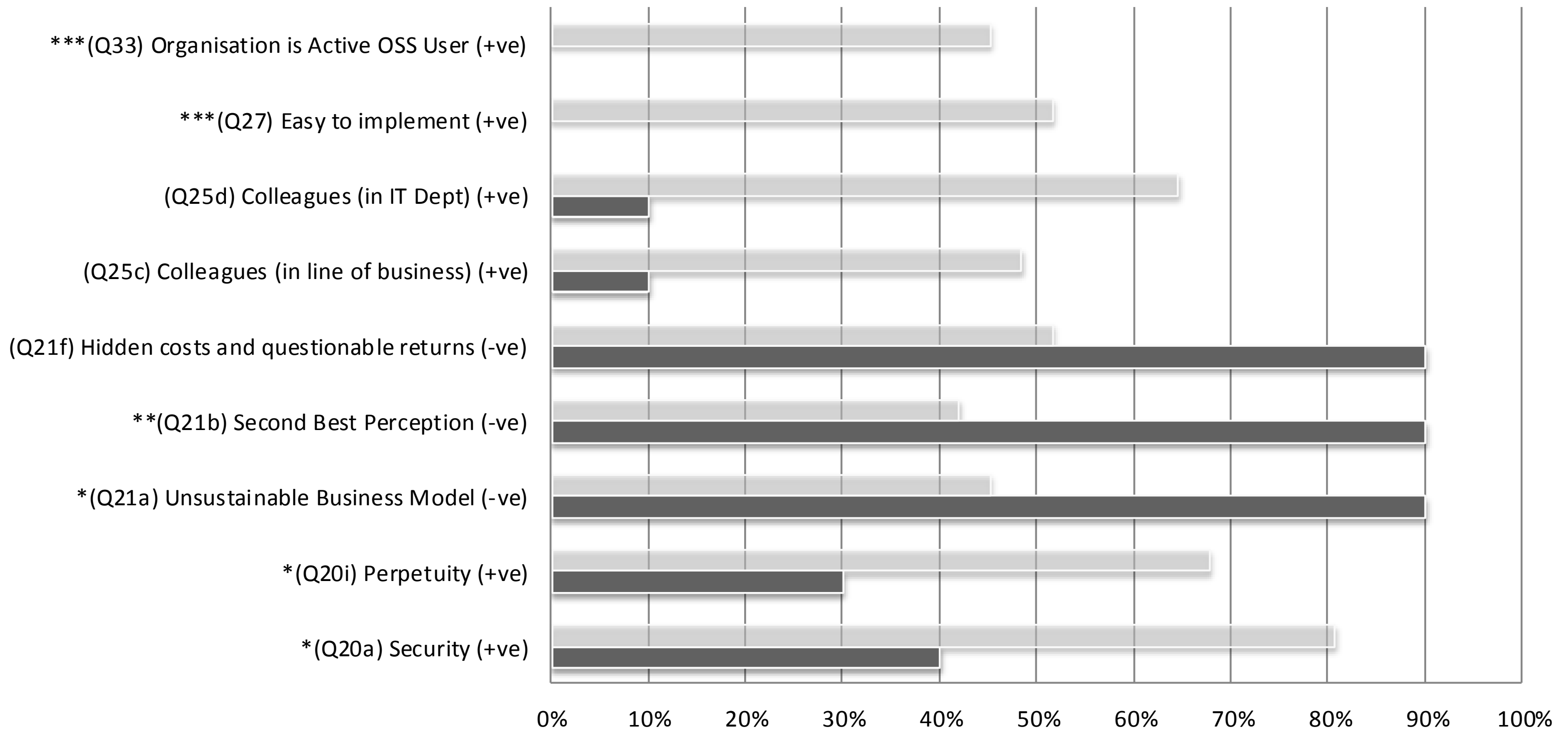


Figure 0.19: Factors Associated with Intention to Adopt OSS in 2013



	*(Q20a) Security (+ve)	*(Q20i) Perpetuity (+ve)	*(Q21a) Unsustainable Business Model (-ve)	**(Q21b) Second Best Perception (-ve)	(Q21f) Hidden costs and questionable returns (-ve)	(Q25c) Colleagues (in line of business) (+ve)	(Q25d) Colleagues (in IT Dept) (+ve)	***(Q27) Easy to implement (+ve)	***(Q33) Organisation is Active OSS User (+ve)
Intention to Adopt OSS in 2013	81%	68%	45%	42%	52%	48%	65%	52%	45%
No Intention to Adopt OSS in 2013	40%	30%	90%	90%	90%	10%	10%	0%	0%

Figure 0.20: Bar Chart Illustrating Factors Associated with General Intention to Adopt OSS in 2013

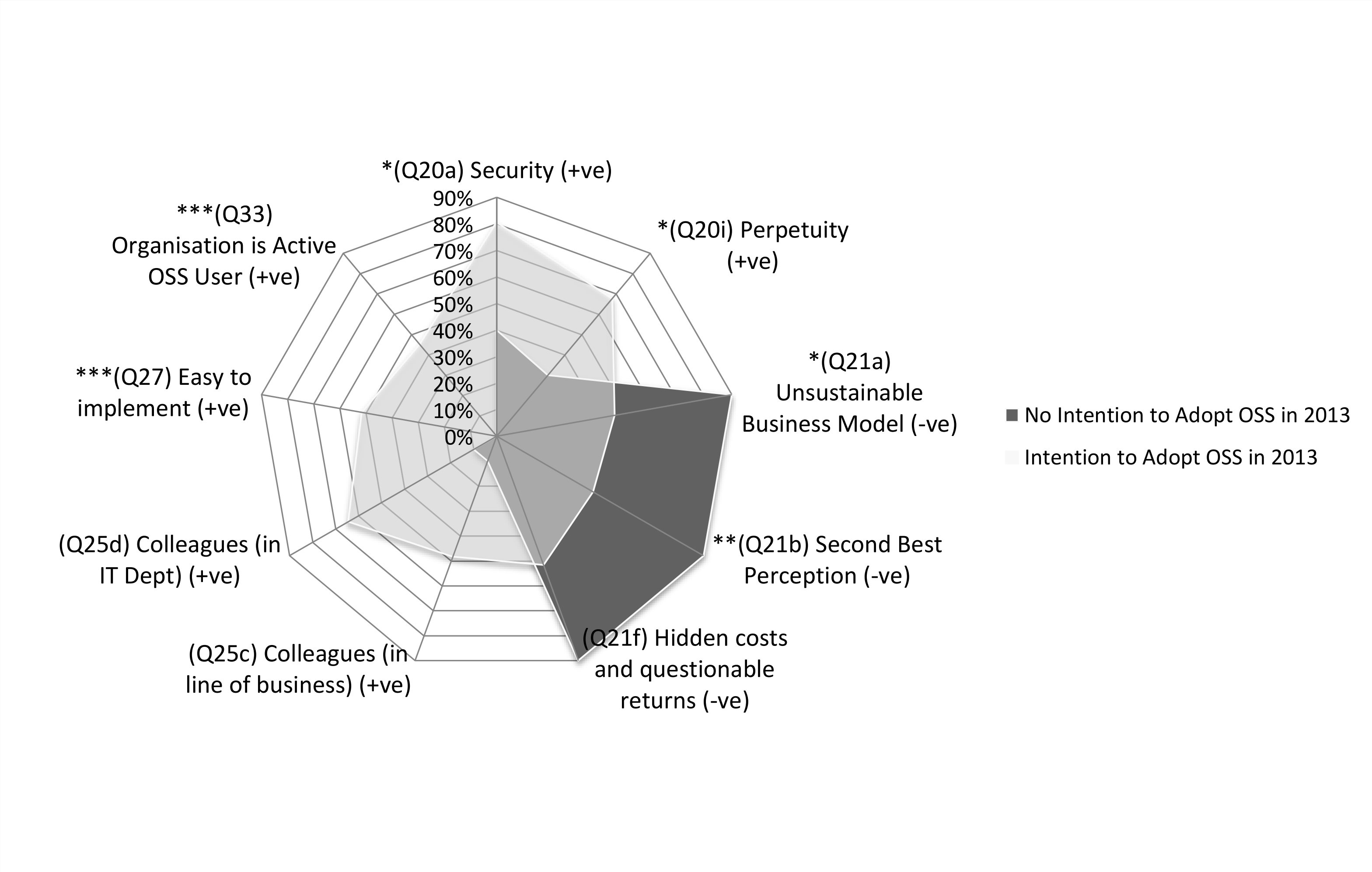


Figure 0.21: Radar Graph Illustrating Differences in Responses for Factors Associated with General Intention to Adopt in 2013

General Intention to Adopt OSS in 2014

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS in 2014 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to the same p-values as before. The results also show seven statistically significant factors for reported intention to adopt OSS in 2014, as opposed to the 67 produced via the literature review. Notably, Ease of Implementation was the only factor found to be greater than 99% confidence level and which was also positively associated with OSS intention to adopt in 2014. All the remaining items were found to be 95% confidence level. Similar to previous analysis in this study, Unsustainable Business Model and Second Best Perception factors were found to be negatively associated with self-reported intention to adopt OSS in 2014.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters in 2014 agreed that the specified factors are important to organisational OSS adoption.

The radar graph below represents the same factors which illustrate the difference in salient beliefs between respondents who describe themselves as (a) those who intend to adopt OSS in this year and (b) those who do not, in terms of statistically significant factors.

Table 0.15: Analysis of Factors Associated with General Intention to Adopt OSS in 2014

	Sample (N)	No Intention to Adopt OSS in 2014			Intention to Adopt OSS in 2014			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	40	8	2	25%	32	16	50%		0.14844
(Q18) Category Killer	40	8	2	25%	32	13	41%		0.24180
*(Q20a) Security (+ve)	40	8	3	38%	32	25	78%	*p(a>=25)=0.03857	0.03374
(Q20b) Cost	40	8	6	75%	32	27	84%		0.30244
(Q20c) Quality	40	8	2	25%	32	19	59%		0.07409
(20d) Flexibility	40	8	3	38%	32	23	72%		0.06768
(Q20e) Technologically Disruptive	40	8	5	63%	32	23	72%		0.28115
(Q20f) Relative Advantage	40	8	4	50%	32	20	63%		0.25147
(Q20g) Job Performance	40	8	3	38%	32	21	66%		0.11496
(Q20h) Transparency	40	8	3	38%	32	21	66%		0.11496
*(Q20i) Perpetuity (+ve)	40	8	2	25%	32	21	66%	*p(a>=21)=0.04685	0.04071
(Q20j) Freedom to modify	40	8	7	88%	32	28	88%		0.43720
(Q20k) Speed	40	8	5	63%	32	18	56%		0.29753
(Q20l) Knowledge Creation	40	8	4	50%	32	23	72%		0.16317
(Q20m) Creativity & Innovation	40	8	5	63%	32	22	69%		0.30023
(Q20n) Vendor Lock-in	40	8	7	88%	32	29	91%		0.43418
(Q20o)Observable Results	40	8	4	50%	32	17	53%		0.30164
(Q20p) Ideological Compatibility	40	8	5	63%	32	24	75%		0.25479
*(Q21a) Unsustainable Business Model (-ve)	40	8	7	88%	32	15	47%	*p(a<=15)=0.04407	0.03992
*(Q21b) Second Best Perception (-ve)	40	8	7	88%	32	14	44%	*p(a<=14)=0.03137	0.02873
(Q21c) Reliability (no better than propietary alternatives)	40	8	5	63%	32	15	47%		0.22982
(Q21d) Preference for building proprietary software skills	40	8	4	50%	32	13	41%		0.27404
(Q21e) Most OSS project fail to attract participants	40	8	4	50%	32	14	44%		0.29106
(Q21f) Hidden costs and questionable returns	40	8	7	88%	32	18	56%		0.09376
(Q21g) OSS commercial contracts not free (of charge)	40	8	5	63%	32	19	59%		0.30950
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	40	8	6	75%	32	25	78%		0.34466
(Q23b) Reported others success stories	40	8	6	75%	32	24	75%		0.34744
(Q23c) OSS Contributors (reported)	40	8	2	25%	32	14	44%		0.21002
(Q24a) Personal Identification with OSS Community	40	8	3	38%	32	9	28%		0.28115
(Q24b) Network Effects	40	8	4	50%	32	17	53%		0.30164
(Q24c) Internal Politics	40	8	0	0%	32	7	22%		0.18054
(Q24d) External Politics	40	8	**0**	0%	32	7	22%		0.18054
(Q24e) Organisational Culture	40	8	**1**	13%	32	10	31%		0.22324
(Q24f) Champion or Sponsor	40	8	**4**	50%	32	20	63%		0.25147
(Q24g) Commitment to local consultants/suppliers	40	8	1	13%	32	6	19%		0.38885
(Q24h) Lack of legally responsible third party	40	8	1	13%	32	3	9%		0.43418
(Q25a) Friends and Acquaintances	40	8	3	38%	32	14	44%		0.29753
(Q25b) OSS Contributors (influence)	40	8	3	38%	32	22	69%		0.08981
(Q25c) Colleagues (in line of business)	40	8	1	13%	32	15	47%		0.07201
*(Q25d) Colleagues (in IT Dept) (+ve)	40	8	1	13%	32	19	59%	*p(a>=19)=0.02180	0.02016
(Q25e) Colleagues (in Line of Business)	40	8	0	0%	32	8	25%		0.13677
(Q25f) Competitors	40	8	0	0%	32	2	6%		0.63590
(Q25g) Third Party Partners	40	8	0	0%	32	5	16%		0.30604
(Q25h) Suppliers	40	8	0	0%	32	2	6%		0.63590
(Q25i) Customers	40	8	1	13%	32	3	9%		0.43418
(Q25j) Government	40	8	4	50%	32	11	34%		0.22453
(Q25k) The Media	40	8	0	0%	32	7	22%		0.18054
(Q25l) The General Public	40	8	0	0%	32	7	22%		0.18054
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	40	8	0	0%	32	16	50%	**p(a>=16)=0.009563	0.00956
(Q28) Respondent's decision to adopt	40	8	5	63%	32	20	63%		0.31434
(Q29a) Set of Standards (Specifying Proprietary Software)	40	8	4	50%	32	17	53%		0.30164
(Q29b) Professionalism of IT Dept	40	8	3	38%	32	19	59%		0.17157
(Q29c) Availability of Resources, Expertise and Familiarity	40	8	4	50%	32	17	53%		0.30164
(Q29d) Availability of Training	40	8	4	50%	32	12	38%		0.25147
(Q29e) Availability of Time	40	8	4	50%	32	14	44%		0.29106
(Q29f) Internal OSS Installed Base	40	8	3	38%	32	16	50%		0.25640
(Q29g) Inertia (i.e. level of acceptance)	40	8	1	13%	32	4	13%		0.43720
(Q29h) Conservative Management	40	8	0	0%	32	3	9%		0.50202
(Q29i) Availability of Commercial Support	40	8	2	25%	32	11	34%		0.30023
(Q29j) Trial-ability (i.e. ability to demo capability)	40	8	3	38%	32	19	59%		0.17157
(Q30a) Unacceptable License Terms	40	8	2	25%	32	16	50%		0.14844
(Q30b) Overwhelming number of patches and upgrades	40	8	6	75%	32	20	63%		0.27243
(Q30c) Lack of Technical Support	40	8	7	88%	32	28	88%		0.43720
(Q30d) Complexity	40	8	**7**	88%	32	23	72%		0.26472
(Q30e) Proprietary Volume Purchase Agreement	40	8	6	75%	32	20	63%		0.27243
(30f) Lack of Resource	40	8	7	88%	32	24	75%		0.30773
(Q30g) Switching Costs	40	8	7	88%	32	22	69%		0.22324
(Q30h) Set of Standards	40	8	5	63%	32	23	72%		0.28115
(Q30i) Lack of Relevance	40	8	5	63%	32	19	59%		0.30950
(Q32) Past Implementation	40	8	1	13%	32	7	22%		0.35013
(Q33) Organisation is Active OSS User	40	8	0	0%	32	13	41%	*p(a>=13)=0.02887	0.02887
*p value<0.05									
**p value<0.01									
***p value<0.005									

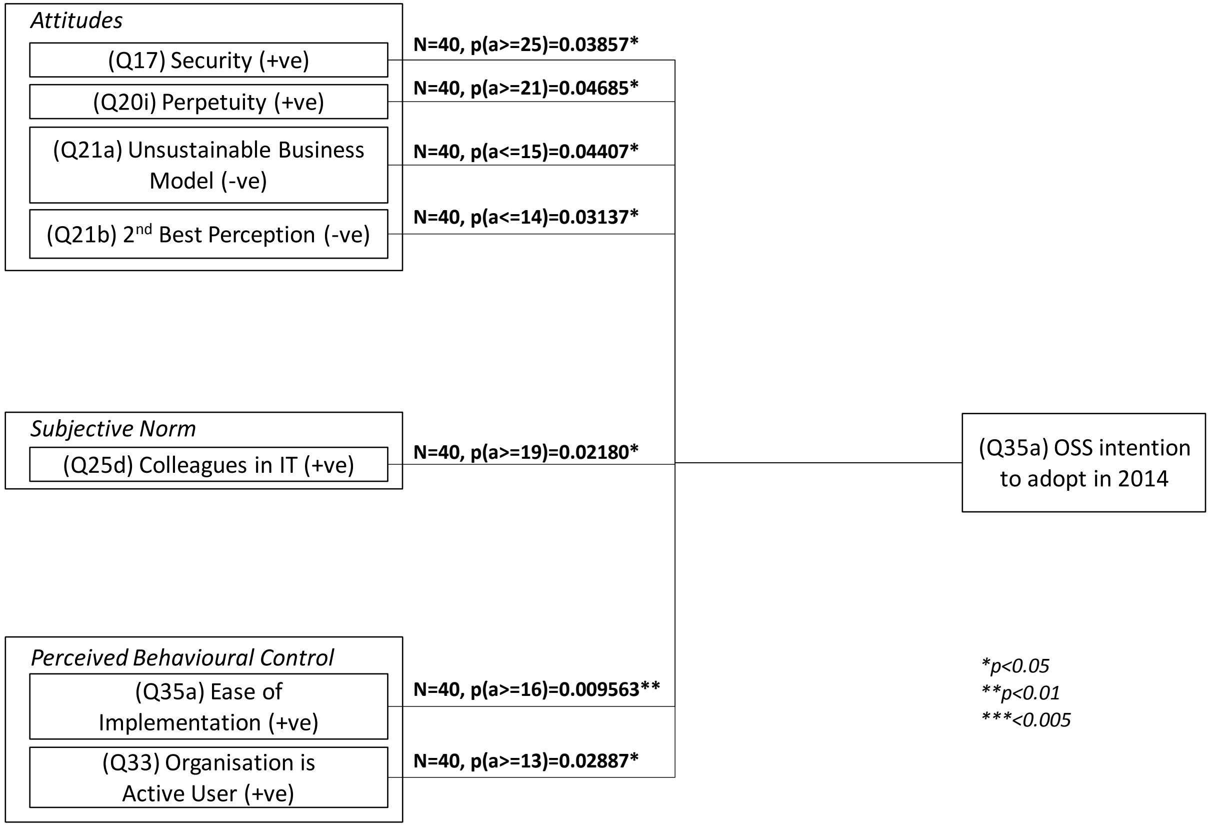
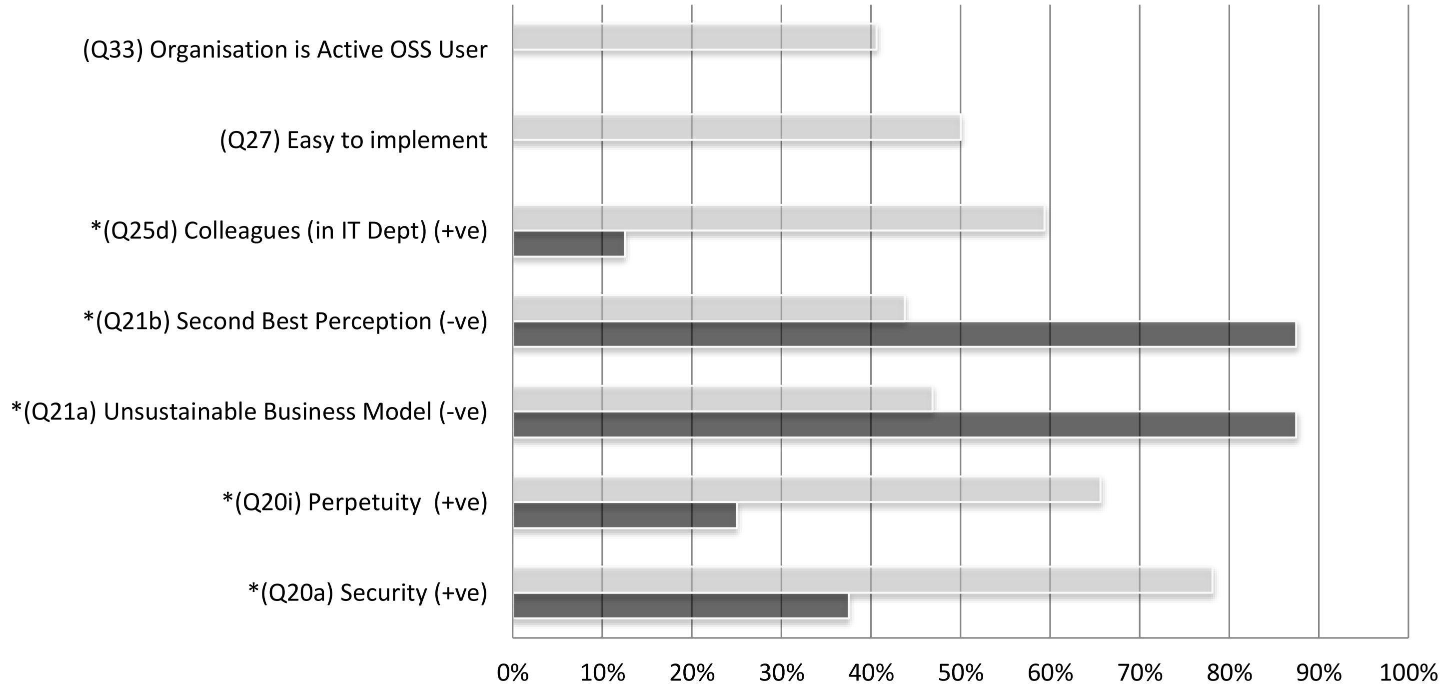


Figure 0.22: Factors Associated with Intention to Adopt in 2014



	*(Q20a) Security (+ve)	*(Q20i) Perpetuity (+ve)	*(Q21a) Unsustainable Business Model (-ve)	*(Q21b) Second Best Perception (-ve)	*(Q25d) Colleagues (in IT Dept) (+ve)	(Q27) Easy to implement	(Q33) Organisation is Active OSS User
Intention to Adopt OSS in 2014	78%	66%	47%	44%	59%	50%	41%
No Intention to Adopt OSS in 2014	38%	25%	88%	88%	13%	0%	0%

Figure 0.23: Bar Chart Illustrating Factors Associated with General Intention to Adopt OSS in 2014

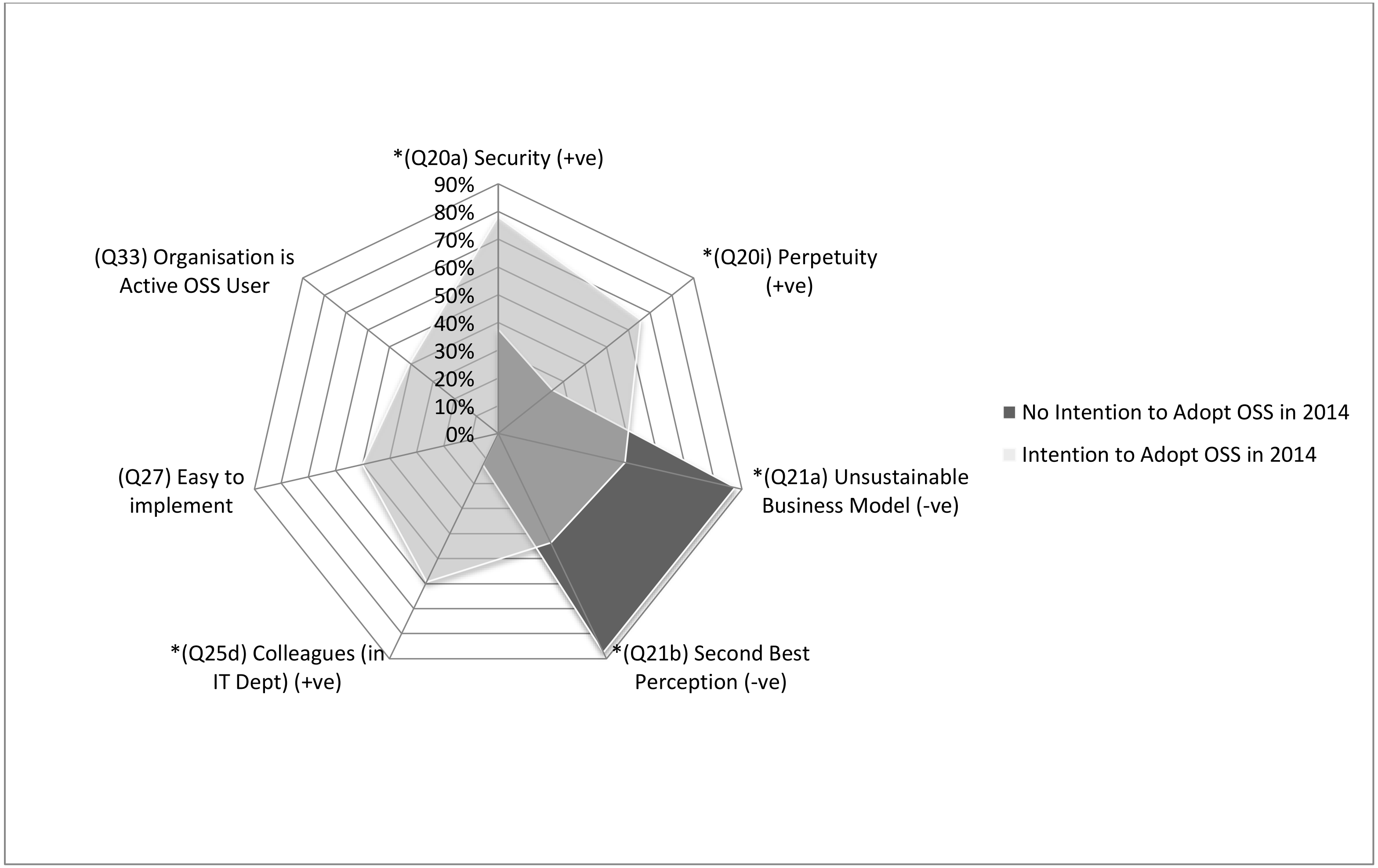


Figure 0.24: Radar Graph Illustrating Differences in Responses for Factors Associated with General Intention to Adopt OSS in 2014

Appendix Q: Quantitative Analysis for OSS Adoption and Intention to Adopt OSS by NAPCS Category

See Appendix A:NAPCS Software Industry Classification for a full description of the NAPCS,

Systems Category

The diagram below summarises the statistically significant factors, the TPB construct and whether the factors were driving (+ve) or inhibiting (-ve) the organisational OSS adoption behaviour in 2012 (by NAPCS systems software subcategory).

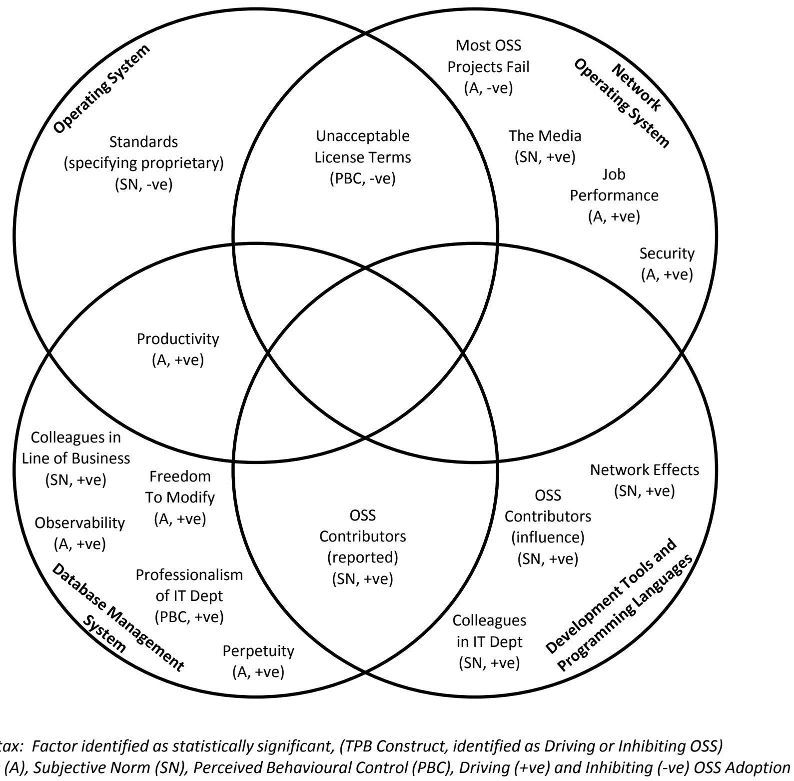
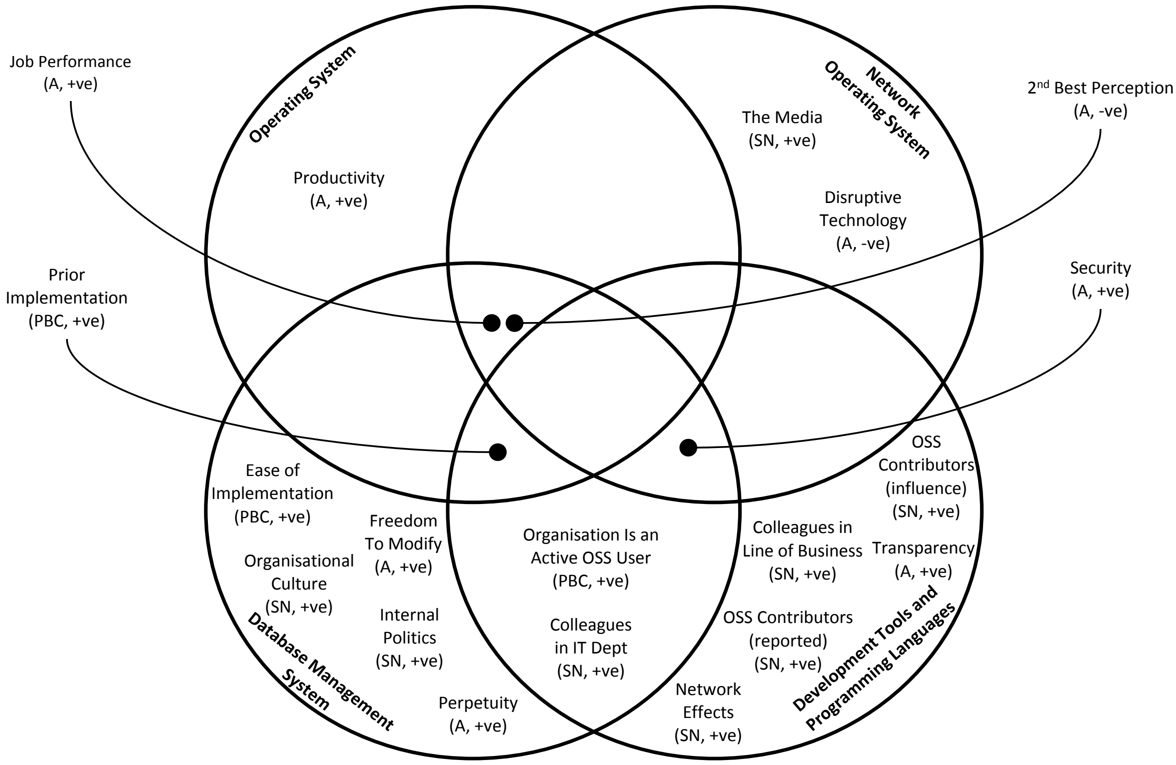


Figure 0.25: Comprehensive Summary of Driving/Inhibiting Factors for OSS Adoption (by Systems Subcategory)

The diagram below summarises the same information for intention to adopt OSS in 2013 (by systems subcategory).



Syntax: Factor identified as statistically significant, (TPB Construct, identified as Driving or Inhibiting OSS)
Key: Attitude (A), Subjective Norm (SN), Perceived Behavioural Control (PBC), Driving (+ve) and Inhibiting (-ve) OSS Adoption

Figure 0.26: Comprehensive Summary of Driving/Inhibiting Factors for Intention to Adopt OSS (by Systems Subcategory)

The remaining sections detail the analysis of factors for the various organisational OSS adoption behaviours (by systems subcategory).

OSS Development Tools and Programming Languages

Adoption in 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show four statistically significant factors for reported OSS adoption of this category of software in 2012. Notably, the OSS Contributors (reported) factor was found to be greater than 99.5% confidence level and positively associated with OSS adoption. The remaining factors were greater than 95% confidence level and also positively associated (i.e. Network Effects, OSS Contributors (influence) and Colleagues in IT). There were no statistically significant inhibiting factors identified for this category of software.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below shows the same factors and illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) have adopted this category of OSS in 2012and (b) have not, in terms of statistically significant factors

Table 0.16: Analysis of Factors Associated with OSS Adoption in Development Tools and Programming Languages Subcategory

	Sample (N)	OSS Development Tools and Programming Languages Non-adopters in 2012			OSS Development Tools and Programming Languages Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	44	15	5	33%	29	13	45%		0.19795
(Q18) Category Killer	44	15	4	27%	29	11	38%		0.20541
(Q20a) Security	44	15	8	53%	29	22	76%		0.08737
(Q20b) Cost	44	15	14	93%	29	22	76%		0.13210
(Q20c) Quality	44	15	6	40%	29	16	55%		0.16143
(20d) Flexibility	44	15	8	53%	29	20	69%		0.15465
(Q20e) Technologically Disruptive	44	15	12	80%	29	18	62%		0.13694
(Q20f) Relative Advantage	44	15	9	60%	29	17	59%		0.25229
(Q20g) Job Performance	44	15	8	53%	29	19	66%		0.18779
(Q20h) Transparency	44	15	6	40%	29	20	69%		0.04869
(Q20i) Perpetuity	44	15	7	47%	29	18	62%		0.15803
(Q20j) Freedom to modify	44	15	12	80%	29	25	86%		0.28201
(Q20k) Speed	44	15	8	53%	29	17	59%		0.23704
(Q20l) Knowledge Creation	44	15	10	67%	29	19	66%		0.26162
(Q20m) Creativity & Innovation	44	15	9	60%	29	22	76%		0.15047
(Q20n) Vendor Lock-in	44	15	14	93%	29	25	86%		0.32805
(Q20o)Observable Results	44	15	7	47%	29	16	55%		0.21698
(Q20p) Ideological Compatibility	44	15	10	67%	29	21	72%		0.24827
(Q21a) Unsustainable Business Model	44	15	10	67%	29	15	52%		0.16532
(Q21b) Second Best Perception	44	15	10	67%	29	16	55%		0.19795
(Q21c) Reliability (no better than propietary alternatives)	44	15	11	73%	29	13	45%		0.05260
(Q21d) Preference for building proprietary software skills	44	15	8	53%	29	13	45%		0.21698
(Q21e) Most OSS project fail to attract participants	44	15	9	60%	29	13	45%		0.16143
(Q21f) Hidden costs and questionable returns	44	15	11	73%	29	18	62%		0.20541
(Q21g) OSS commercial contracts not free (of charge)	44	15	9	60%	29	18	62%		0.25229
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	38	10	8	80%	28	26	93%		0.23044
(Q23b) Reported others success stories	38	10	8	80%	28	24	86%		0.33375
*(Q23c) OSS Contributors (reported) (+ve)	34	9	1	11%	25	17	68%	*p(a>=17)=0.004635	0.00442
(Q24a) Personal Identification with OSS Community	44	15	5	33%	29	8	28%		0.24827
**(Q24b) Network Effects (+ve)	44	15	4	27%	29	18	62%	**p(a>=18)=0.002731	0.02244
(Q24c) Internal Politics	44	15	2	13%	29	6	21%		0.28142
(Q24d) External Politics	44	15	2	13%	29	5	17%		0.32539
(Q24e) Organisational Culture	44	15	1	7%	29	9	31%		0.06054
(Q24f) Champion or Sponsor	44	15	8	53%	29	17	59%		0.23704
(Q24g) Commitment to local consultants/suppliers	44	15	3	20%	29	6	21%		0.30487
(Q24h) Lack of legally responsible third party	44	15	1	7%	29	3	10%		0.40375
(Q25a) Friends and Acquaintances	44	15	6	40%	29	12	41%		0.25229
*(Q25b) OSS Contributors (influence) (+ve)	44	15	5	33%	29	21	72%	*p(a>=21)=0.01481	0.01252
(Q25c) Colleagues (in line of business)	44	15	3	20%	29	13	45%		0.07410
*(Q25d) Colleagues (in IT Dept) (+ve)	44	15	4	27%	29	18	62%	*p(a>=18)=0.02731	0.02244
(Q25e) Colleagues (in Line of Business)	44	15	2	13%	29	7	24%		0.23117
(Q25f) Competitors	44	15	1	7%	29	1	3%		0.45983
(Q25g) Third Party Partners	44	15	1	7%	29	4	14%		0.32805
(Q25h) Suppliers	44	15	0	0%	29	2	7%		0.42918
(Q25i) Customers	44	15	1	7%	29	4	14%		0.32805
(Q25j) Government	44	15	6	40%	29	10	34%		0.24057
(Q25k) The Media	44	15	1	7%	29	6	21%		0.18594
(Q25l) The General Public	44	15	3	20%	29	4	14%		0.28201
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	44	15	4	27%	29	13	45%		0.13497
(Q28) Respondent's decision to adopt	44	15	4	27%	29	5	17%		0.22866
(Q29a) Set of Standards (Specifying Proprietary Software)	44	15	7	47%	29	16	55%		0.21698
(Q29b) Professionalism of IT Dept	44	15	8	53%	29	16	55%		0.24798
(Q29c) Availability of Resources, Expertise and Familiarity	44	15	7	47%	29	17	59%		0.18963
(Q29d) Availability of Training	44	15	7	47%	29	12	41%		0.23704
(Q29e) Availability of Time	44	15	7	47%	29	13	45%		0.24798
(Q29f) Internal OSS Installed Base	44	15	7	47%	29	13	45%		0.24798
(Q29g) Inertia (i.e. level of acceptance)	44	15	0	0%	29	6	21%		0.06729
(Q29h) Conservative Management	44	15	0	0%	29	4	14%		0.17496
(Q29i) Availability of Commercial Support	44	15	5	33%	29	8	28%		0.24827
(Q29j) Trial-ability (i.e. ability to demo capability)	44	15	5	33%	29	17	59%		0.07407
(Q30a) Unacceptable License Terms	44	15	9	60%	29	11	38%		0.09833
(Q30b) Overwhelming number of patches and upgrades	44	15	12	80%	29	16	55%		0.07410
(Q30c) Lack of Technical Support	44	15	13	87%	29	26	90%		0.35328
(Q30d) Complexity	44	15	12	80%	29	20	69%		0.21606
(Q30e) Proprietary Volume Purchase Agreement	44	15	12	80%	29	17	59%		0.10270
(30f) Lack of Resource	44	15	14	93%	29	21	72%		0.09082
(Q30g) Switching Costs	44	15	13	87%	29	19	66%		0.09972
(Q30h) Set of Standards	44	15	10	67%	29	21	72%		0.24827
(Q30i) Lack of Relevance	44	15	11	73%	29	16	55%		0.13497
(Q32) Past Implementation	44	15	2	13%	29	9	31%		0.13711
*(Q33) Organisation is Active OSS User (+ve)	44	15	2	13%	29	13	45%	*p(a>=13)=0.03639	0.03099
*p value<0.05									
**p value<0.01									
***p value<0.005									

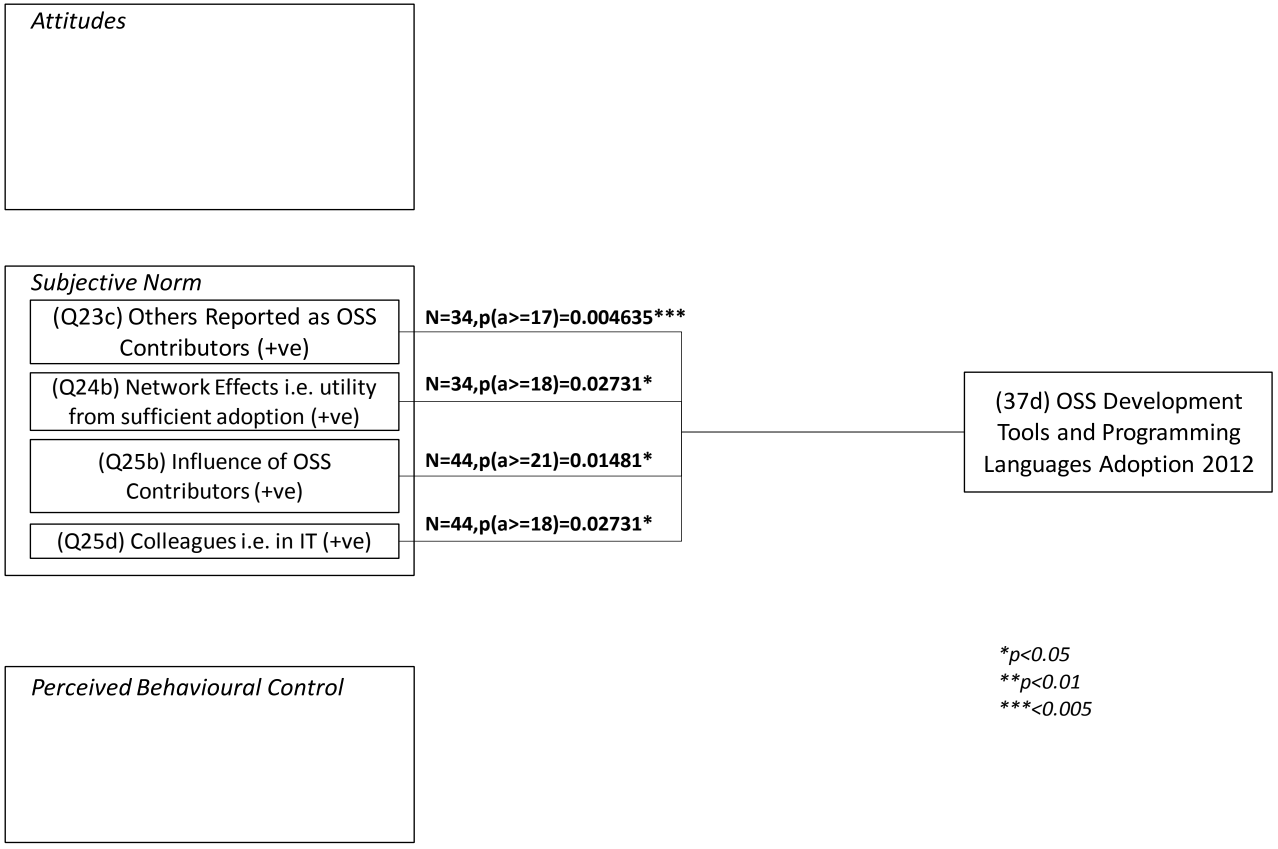
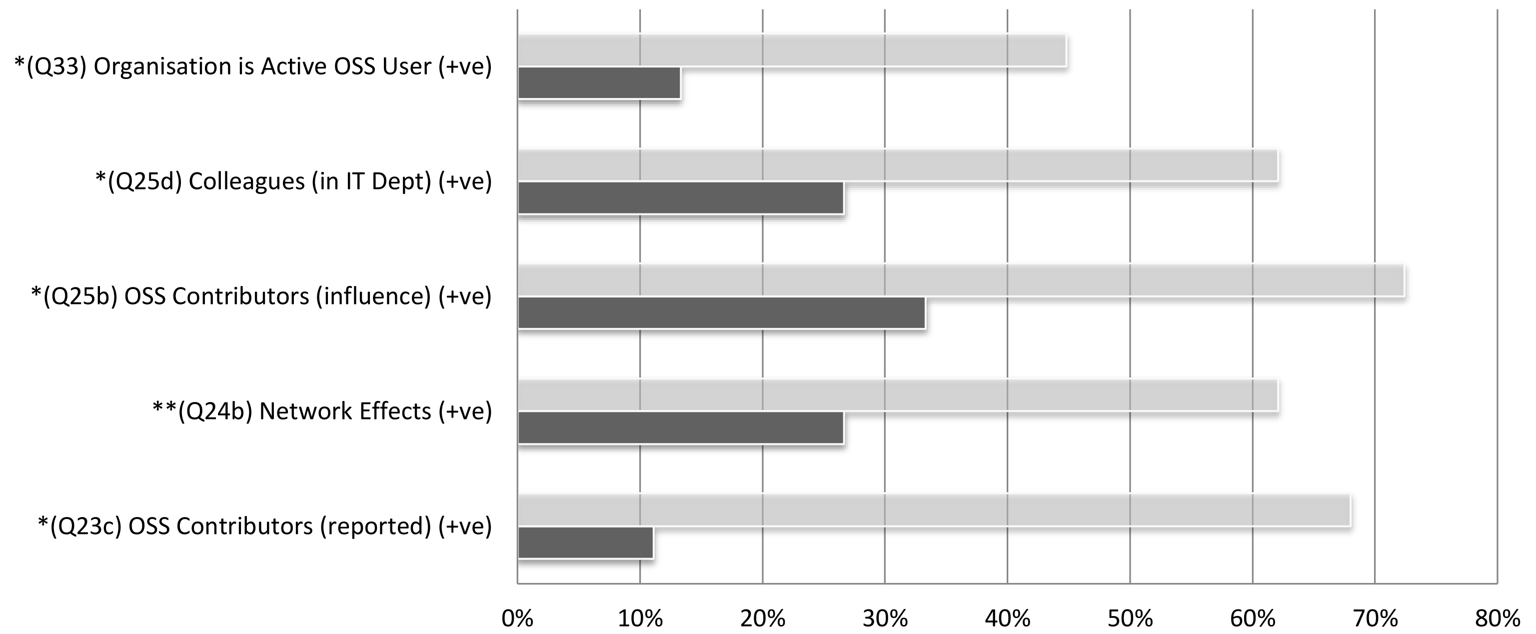


Figure 0.27: Factors Associated with OSS Adoption in the Development Tools and Programming Languages Subcategory



	*(Q23c) OSS Contributors (reported) (+ve)	**(Q24b) Network Effects (+ve)	*(Q25b) OSS Contributors (influence) (+ve)	*(Q25d) Colleagues (in IT Dept) (+ve)	*(Q33) Organisation is Active OSS User (+ve)
OSS Development Tools and Programming Languages Adopters in 2012	68%	62%	72%	62%	45%
OSS Development Tools and Programming Languages Non-adopters in 2012	11%	27%	33%	27%	13%

Figure 0.28: Bar Chart Illustrating Factors Associated with OSS Adoption in the Development Tools and Programming Languages Subcategory

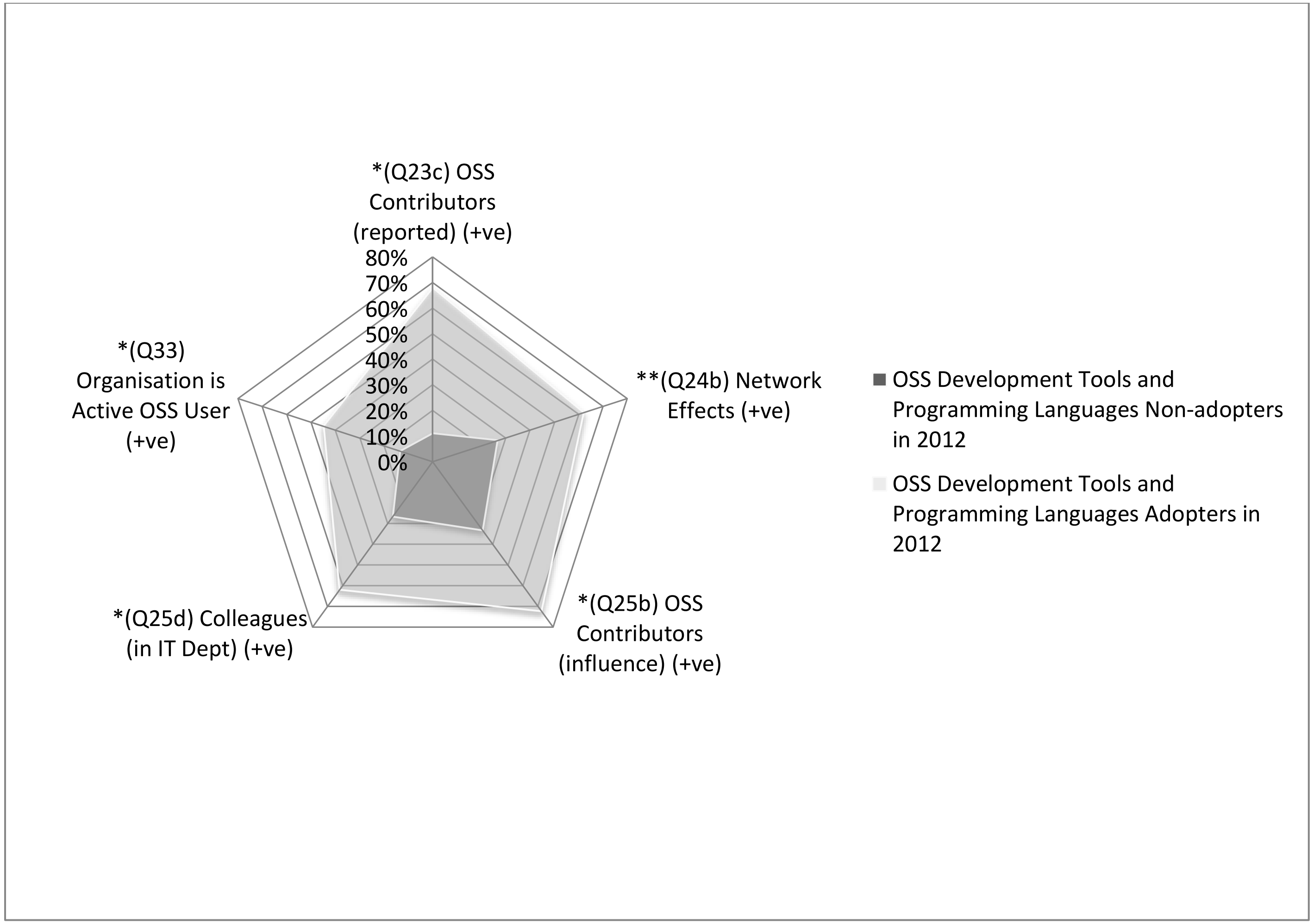


Figure 0.29: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Development Tools and Programming Languages Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show ten statistically significant factors for intention to adopt OSS of this category of software in 2013. Most notably, Friends and Acquaintances and Colleagues in Line of Business were found to be greater than 99.5% confidence level and positively associated with OSS adoption. Similarly, Organisation is an Active User was found to be 99% confidence influence and positively associated. The remaining factors were greater than 95% and also positively associated. There were no statistically significant inhibiting factors identified for this category of software.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as Intention to Adopt OSS and No Intention to Adopt OSS agree that the specified factors are important to intention to adopt this category of software.

The radar graph below shows the same factors and illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) intend to adopt this category of OSS in 2012and (b) do not, in terms of statistically significant factors

Table 0.17: Analysis of Factors Associated with Intention to Adopt OSS in Development Tools and Programming Languages Subcategory

	Sample (N)	No Intention to Adopt OSS Development Tools and Programming Languages in 2013			Intention to Adopt OSS Development Tools and Programming Languages in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	43	10	2	20%	33	17	52%		0.06559
(Q18) Category Killer	43	10	3	30%	33	13	39%		0.25937
*(Q20a) Security (+ve)	43	10	4	40%	33	26	79%	*p(a>=26)=0.02846	0.02453
(Q20b) Cost	43	10	9	90%	33	27	82%		0.34371
(Q20c) Quality	43	10	3	30%	33	19	58%		0.09340
(20d) Flexibility	43	10	5	50%	33	24	73%		0.12400
(Q20e) Technologically Disruptive	43	10	8	80%	33	23	70%		0.27155
(Q20f) Relative Advantage	43	10	6	60%	33	20	61%		0.28579
(Q20g) Job Performance	43	10	4	40%	33	23	70%		0.07330
*(Q20h) Transparency (+ve)	43	10	3	30%	33	24	73%	*p(a>=24)=0.01997	0.01745
(Q20i) Perpetuity	43	10	4	40%	33	22	67%		0.09650
(Q20j) Freedom to modify	43	10	7	70%	33	30	91%		0.10739
(Q20k) Speed	43	10	4	40%	33	19	58%		0.17901
(Q20l) Knowledge Creation	43	10	6	60%	33	24	73%		0.22143
(Q20m) Creativity & Innovation	43	10	7	70%	33	24	73%		0.30172
(Q20n) Vendor Lock-in	43	10	9	90%	33	30	91%		0.44210
(Q20o)Observable Results	43	10	4	40%	33	19	58%		0.17901
(Q20p) Ideological Compatibility	43	10	6	60%	33	24	73%		0.22143
(Q21a) Unsustainable Business Model	43	10	6	60%	33	17	52%		0.25509
(Q21b) Second Best Perception	43	10	8	80%	33	17	52%		0.08631
(Q21c) Reliability (no better than propietary alternatives)	43	10	8	80%	33	15	45%		0.04859
(Q21d) Preference for building proprietary software skills	43	10	5	50%	33	15	45%		0.27209
(Q21e) Most OSS project fail to attract participants	43	10	6	60%	33	15	45%		0.20703
(Q21f) Hidden costs and questionable returns	43	10	8	80%	33	20	61%		0.17021
(Q21g) OSS commercial contracts not free (of charge)	43	10	5	50%	33	20	61%		0.23742
Subjective Norm (SN)	37	7	5	71%	30	28	93%		0.13831
(Q23a) Reported that others have adopted OSS	37	7	5	71%	30	27	90%		0.19560
*(Q23b) Reported others success stories (+ve)	32	6	1	17%	26	17	65%	*p(a>=17)=0.04308	0.03977
(Q23c) OSS Contributors (reported)	43	10	2	20%	33	11	33%		0.23811
**(Q24a) Personal Identification with OSS Community (+ve)	43	10	2	20%	33	21	64%	**p(a>=21)=0.01873	0.01662
(Q24b) Network Effects	43	10	1	10%	33	7	21%		0.29461
(Q24c) Internal Politics	43	10	2	20%	33	6	18%		0.34371
*(Q24d) External Politics (+ve)	43	10	0	0%	33	11	33%	*p(a>=11)=0.03365	0.03365
(Q24e) Organisational Culture	43	10	5	50%	33	21	64%		0.21230
(Q24f) Champion or Sponsor	43	10	2	20%	33	7	21%		0.34090
(Q24g) Commitment to local consultants/suppliers	43	10	0	0%	33	4	12%		0.33158
(Q24h) Lack of legally responsible third party	43	10	2	20%	33	16	48%		0.08631
*(Q25a) Friends and Acquaintances (+ve)	43	10	2	20%	33	25	76%	*p(a>=25)=0.002521	0.00236
*(Q25b) OSS Contributors (influence) (+ve)	43	10	1	10%	33	16	48%	*p(a>=16)=0.03047	0.02770
***(Q25c) Colleagues (in line of business) (+ve)	43	10	1	10%	33	21	64%	***p(a>=21)=0.003557	0.00337
(Q25d) Colleagues (in IT Dept)	43	10	1	10%	33	8	24%		0.24621
(Q25e) Colleagues (in Line of Business)	43	10	1	10%	33	1	3%		0.36545
(Q25f) Competitors	43	10	0	0%	33	5	15%		0.24656
(Q25g) Third Party Partners	43	10	0	0%	33	2	6%		0.58472
(Q25h) Suppliers	43	10	1	10%	33	4	12%		0.42510
(Q25i) Customers	43	10	4	40%	33	13	39%		0.28579
(Q25j) Government	43	10	0	0%	33	7	21%		0.13257
(Q25k) The Media	43	10	2	20%	33	5	15%		0.33143
(Q25l) The General Public	43	10	2	20%	33	15	45%		0.11081
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	43	10	2	20%	33	15	45%		0.11081
(Q28) Respondent's decision to adopt	43	10	4	40%	33	5	15%		0.08838
(Q29a) Set of Standards (Specifying Proprietary Software)	43	10	4	40%	33	20	61%		0.15037
(Q29b) Professionalism of IT Dept	43	10	5	50%	33	19	58%		0.25777
(Q29c) Availability of Resources, Expertise and Familiarity	43	10	4	40%	33	20	61%		0.15037
(Q29d) Availability of Training	43	10	4	40%	33	15	45%		0.27209
(Q29e) Availability of Time	43	10	4	40%	33	16	48%		0.25509
(Q29f) Internal OSS Installed Base	43	10	4	40%	33	17	52%		0.23291
(Q29g) Inertia (i.e. level of acceptance)	43	10	0	0%	33	6	18%		0.18167
(Q29h) Conservative Management	43	10	0	0%	33	4	12%		0.33158
(Q29i) Availability of Commercial Support	43	10	3	30%	33	11	33%		0.29631
(Q29j) Trial-ability (i.e. ability to demo capability)	43	10	4	40%	33	19	58%		0.17901
(Q30a) Unacceptable License Terms	43	10	6	60%	33	14	42%		0.17901
(Q30b) Overwhelming number of patches and upgrades	43	10	7	70%	33	20	61%		0.25937
(Q30c) Lack of Technical Support	43	10	8	80%	33	30	91%		0.25506
(Q30d) Complexity	43	10	8	80%	33	23	70%		0.27155
(Q30e) Proprietary Volume Purchase Agreement	43	10	8	80%	33	19	58%		0.13895
(30f) Lack of Resource	43	10	9	90%	33	26	79%		0.29461
(Q30g) Switching Costs	43	10	9	90%	33	23	70%		0.16092
(Q30h) Set of Standards	43	10	6	60%	33	26	79%		0.15597
(Q30i) Lack of Relevance	43	10	7	70%	33	19	58%		0.23329
*(Q32) Past Implementation (+ve)	43	10	0	0%	33	10	30%	*p(a>=10)=0.04828	0.04828
*(Q33) Organisation is Active OSS User (+ve)	43	10	0	0%	33	15	45%	*p(a>=15)=0.006844	0.00684
*p value<0.05									
**p value<0.01									
***p value<0.005									

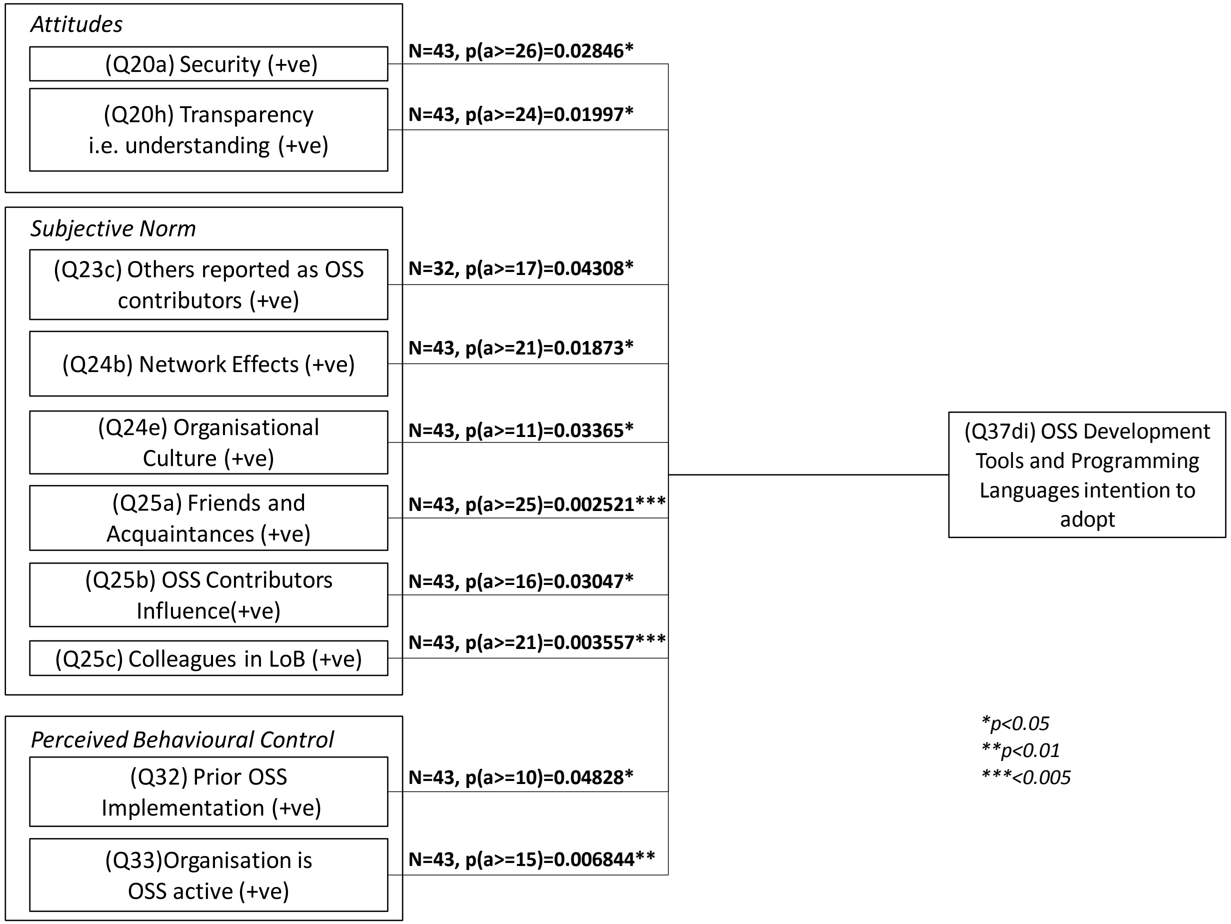
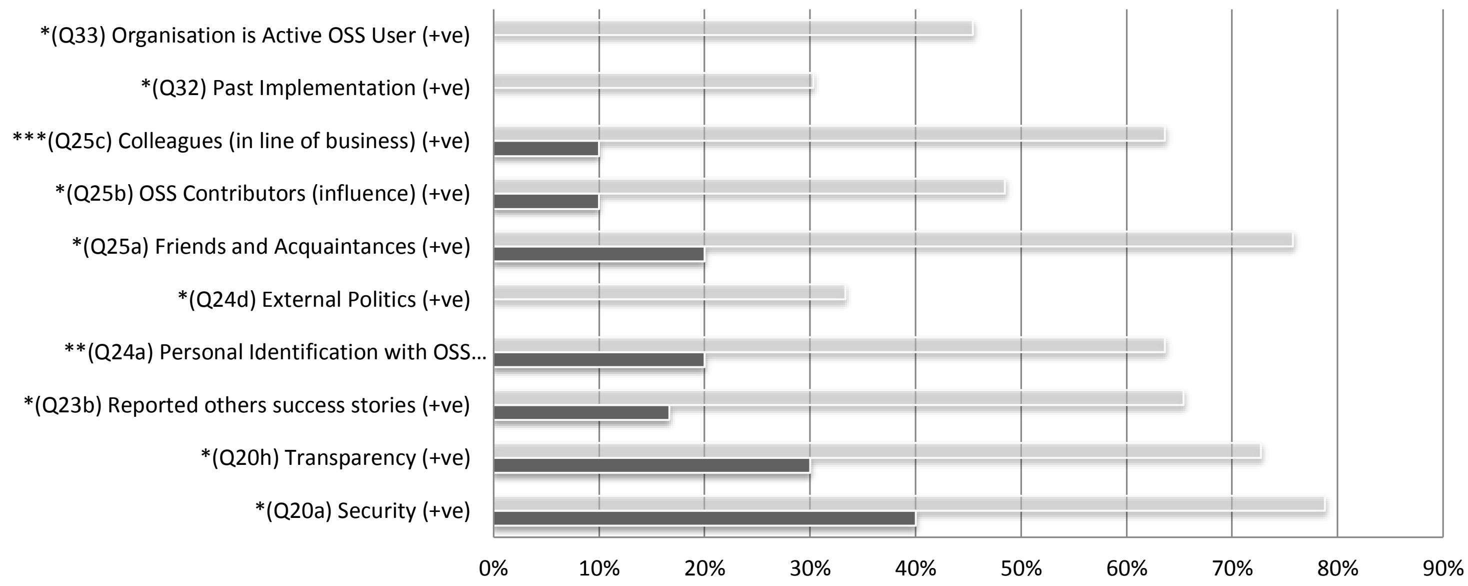


Figure 0.30: Factors Associated with Intention to Adopt OSS in the Development Tools and Programming Languages Subcategory



	*(Q20a) Security (+ve)	*(Q20h) Transparency (+ve)	*(Q23b) Reported others success stories (+ve)	**(Q24a) Personal Identification with OSS Community (+ve)	*(Q24d) External Politics (+ve)	*(Q25a) Friends and Acquaintances (+ve)	*(Q25b) OSS Contributors (influence) (+ve)	***(Q25c) Colleagues (in line of business) (+ve)	*(Q32) Past Implementation (+ve)	*(Q33) Organisation is Active OSS User (+ve)
Intention to Adopt OSS Development Tools and Programming Languages in 2013	79%	73%	65%	64%	33%	76%	48%	64%	30%	45%
No Intention to Adopt OSS Development Tools and Programming Languages in 2013	40%	30%	17%	20%	0%	20%	10%	10%	0%	0%

Figure 0.31: Bar Chart Illustrating Factors Associated with Intention to Adopt OSS in the Development Tools and Programming Languages Subcategory

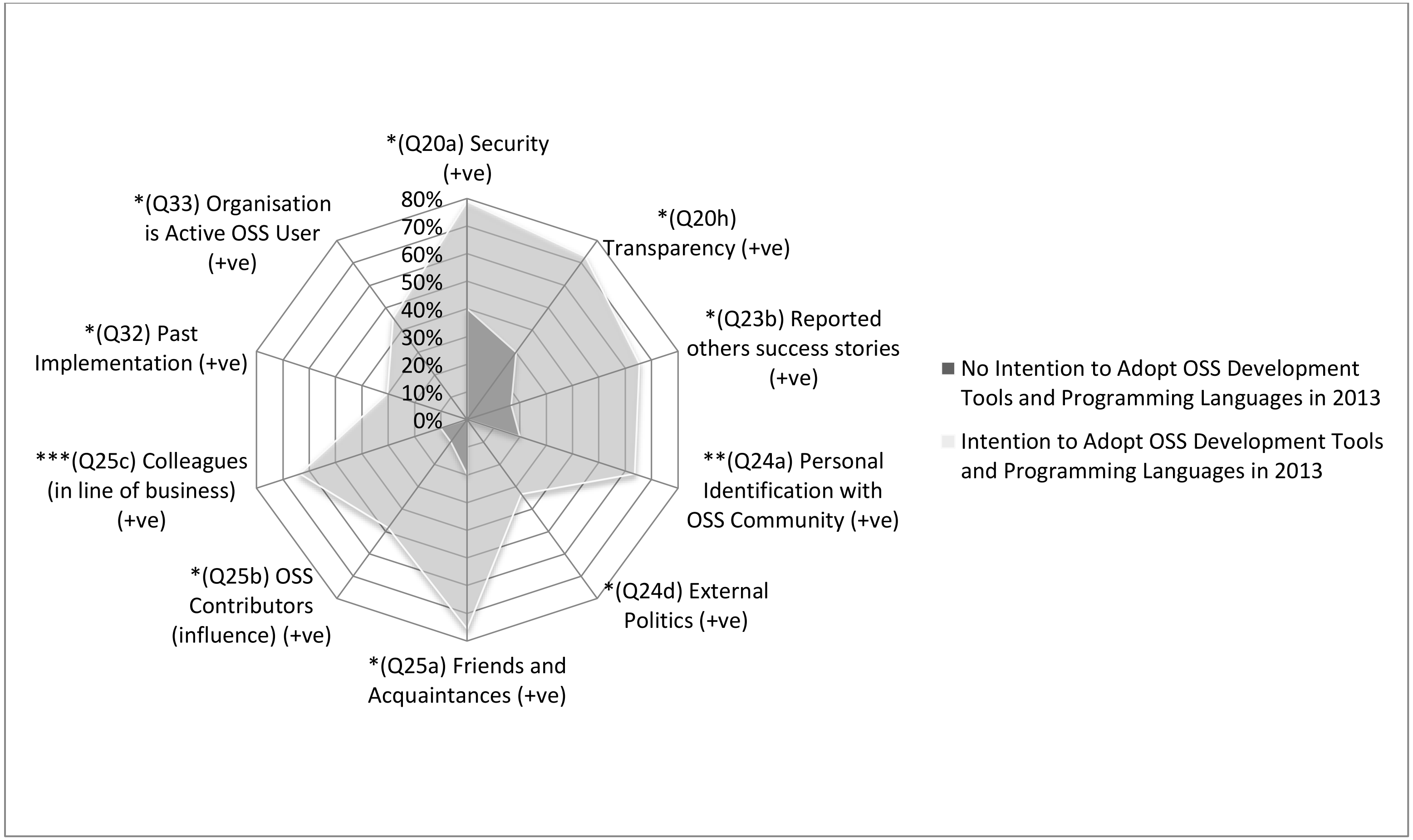


Figure 0.32: Radar Graph Illustrating Differences in Responses for Factors Associated with Intention to Adopt OSS in the Development Tools and Programming Languages Subcategory

OSS Operating System

Adoption in 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show three statistically significant factors for reported OSS adoption of this category of software in 2012. The factors which were greater than 95% confidence level and also negatively associated with the OSS adoption category were found to be Unacceptable License Terms and Set of Proprietary Standards. The remaining factor (i.e. Productivity) was found to be positively associated with OSS adoption for this category of software.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below shows the same factors which illustrates the difference in salient beliefs between respondents who describe themselves as those who have (a) adopted this category of OSS in 2012and (b) have not, in terms of statistically significant factors

Table 0.18: Analysis of Factors Associated with OSS Adoption in Operating System Subcategory

	Sample (N)	OSS Operating System Non-adopters in 2012			OSS Operating System Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
*(Q17) Productivity	44	13	2	15%	31	16	52%	*p(a>=16)=0.02632	0.02277
(Q18) Category Killer	44	13	3	23%	31	12	39%		0.17555
(Q20a) Security	44	13	7	54%	31	23	74%		0.11776
(Q20b) Cost	44	13	11	85%	31	25	81%		0.32404
(Q20c) Quality	44	13	6	46%	31	16	52%		0.24511
(20d) Flexibility	44	13	7	54%	31	21	68%		0.18264
(Q20e) Technologically Disruptive	44	13	11	85%	31	19	61%		0.09575
(Q20f) Relative Advantage	44	13	7	54%	31	19	61%		0.23522
(Q20g) Job Performance	44	13	6	46%	31	21	68%		0.11089
(Q20h) Transparency	44	13	7	54%	31	19	61%		0.23522
(Q20i) Perpetuity	44	13	6	46%	31	19	61%		0.17189
(Q20j) Freedom to modify	44	13	11	85%	31	26	84%		0.34585
(Q20k) Speed	44	13	6	46%	31	19	61%		0.17189
(Q20l) Knowledge Creation	44	13	7	54%	31	22	71%		0.15047
(Q20m) Creativity & Innovation	44	13	10	77%	31	21	68%		0.24433
(Q20n) Vendor Lock-in	44	13	11	85%	31	28	90%		0.32284
(Q20o)Observable Results	44	13	4	31%	31	19	61%		0.05013
(Q20p) Ideological Compatibility	44	13	9	69%	31	22	71%		0.27765
(Q21a) Unsustainable Business Model	44	13	9	69%	31	16	52%		0.15253
(Q21b) Second Best Perception	44	13	10	77%	31	16	52%		0.08349
(Q21c) Reliability (no better than propietary alternatives)	44	13	8	62%	31	16	52%		0.21964
(Q21d) Preference for building proprietary software skills	44	13	8	62%	31	13	42%		0.13189
(Q21e) Most OSS project fail to attract participants	44	13	9	69%	31	13	42%		0.07009
(Q21f) Hidden costs and questionable returns	44	13	11	85%	31	18	58%		0.06997
(Q21g) OSS commercial contracts not free (of charge)	44	13	9	69%	31	18	58%		0.21486
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	37	9	9	100%	28	25	89%		0.42162
(Q23b) Reported others success stories	37	9	7	78%	28	25	89%		0.27056
(Q23c) OSS Contributors (reported)	32	7	4	57%	25	14	56%		0.33092
(Q24a) Personal Identification with OSS Community	44	13	4	31%	31	9	29%		0.27765
(Q24b) Network Effects	44	13	5	38%	31	17	55%		0.16220
(Q24c) Internal Politics	44	13	3	23%	31	5	16%		0.27419
(Q24d) External Politics	44	13	2	15%	31	5	16%		0.34585
(Q24e) Organisational Culture	44	13	2	15%	31	8	26%		0.24799
(Q24f) Champion or Sponsor	44	13	6	46%	31	19	61%		0.17189
(Q24g) Commitment to local consultants/suppliers	44	13	2	15%	31	7	23%		0.28932
(Q24h) Lack of legally responsible third party	44	13	1	8%	31	3	10%		0.43046
(Q25a) Friends and Acquaintances	44	13	**7**	54%	31	11	35%		0.14113
(Q25b) OSS Contributors (influence)	44	13	**7**	54%	31	19	61%		0.23522
(Q25c) Colleagues (in line of business)	44	13	**4**	31%	31	12	39%		0.24213
(Q25d) Colleagues (in IT Dept)	44	13	5	38%	31	17	55%		0.16220
(Q25e) Colleagues (in Line of Business)	44	13	1	8%	31	8	26%		0.14466
(Q25f) Competitors	44	13	1	8%	31	1	3%		0.42600
(Q25g) Third Party Partners	44	13	1	8%	31	4	13%		0.37665
(Q25h) Suppliers	44	13	0	0%	31	2	6%		0.49154
(Q25i) Customers	44	13	1	8%	31	4	13%		0.37665
(Q25j) Government	44	13	3	23%	31	13	42%		0.14156
(Q25k) The Media	44	13	0	0%	31	7	23%		0.06862
(Q25l) The General Public	44	13	0	0%	31	7	23%		0.06862
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	44	13	3	23%	31	14	45%		0.11050
(Q28) Respondent's decision to adopt	44	13	7	54%	31	19	61%		0.23522
(Q29a) Set of Standards (Specifying Proprietary Software)	44	13	7	54%	31	16	52%		0.25625
(Q29b) Professionalism of IT Dept	44	13	7	54%	31	17	55%		0.25840
(Q29c) Availability of Resources, Expertise and Familiarity	44	13	6	46%	31	18	58%		0.20098
(Q29d) Availability of Training	44	13	6	46%	31	13	42%		0.25122
(Q29e) Availability of Time	44	13	6	46%	31	14	45%		0.25840
(Q29f) Internal OSS Installed Base	44	13	6	46%	31	14	45%		0.25840
(Q29g) Inertia (i.e. level of acceptance)	44	13	1	8%	31	5	16%		0.31291
(Q29h) Conservative Management	44	13	1	8%	31	3	10%		0.43046
(Q29i) Availability of Commercial Support	44	13	2	15%	31	11	35%		0.12722
(Q29j) Trial-ability (i.e. ability to demo capability)	44	13	4	31%	31	18	58%		0.07009
*(Q30a) Unacceptable License Terms (-ve)	44	13	9	69%	31	11	35%	*p(a<=11)=0.04253	0.03438
(Q30b) Overwhelming number of patches and upgrades	44	13	10	77%	31	18	58%		0.14156
(Q30c) Lack of Technical Support	44	13	12	92%	31	27	87%		0.37665
(Q30d) Complexity	44	13	11	85%	31	21	68%		0.16403
(Q30e) Proprietary Volume Purchase Agreement	44	13	9	69%	31	20	65%		0.26332
(30f) Lack of Resource	44	13	10	77%	31	25	81%		0.29703
(Q30g) Switching Costs	44	13	9	69%	31	23	74%		0.26744
*(Q30h) Set of Standards (-ve)	44	13	12	92%	31	19	61%	*p(a<=19)=0.03931	0.03534
(Q30i) Lack of Relevance	44	13	9	69%	31	18	58%		0.21486
(Q32) Past Implementation	44	13	2	15%	31	9	29%		0.20504
(Q33) Organisation is Active OSS User	44	13	4	31%	31	11	35%		0.26332
*p value<0.05									
**p value<0.01									
***p value<0.005									

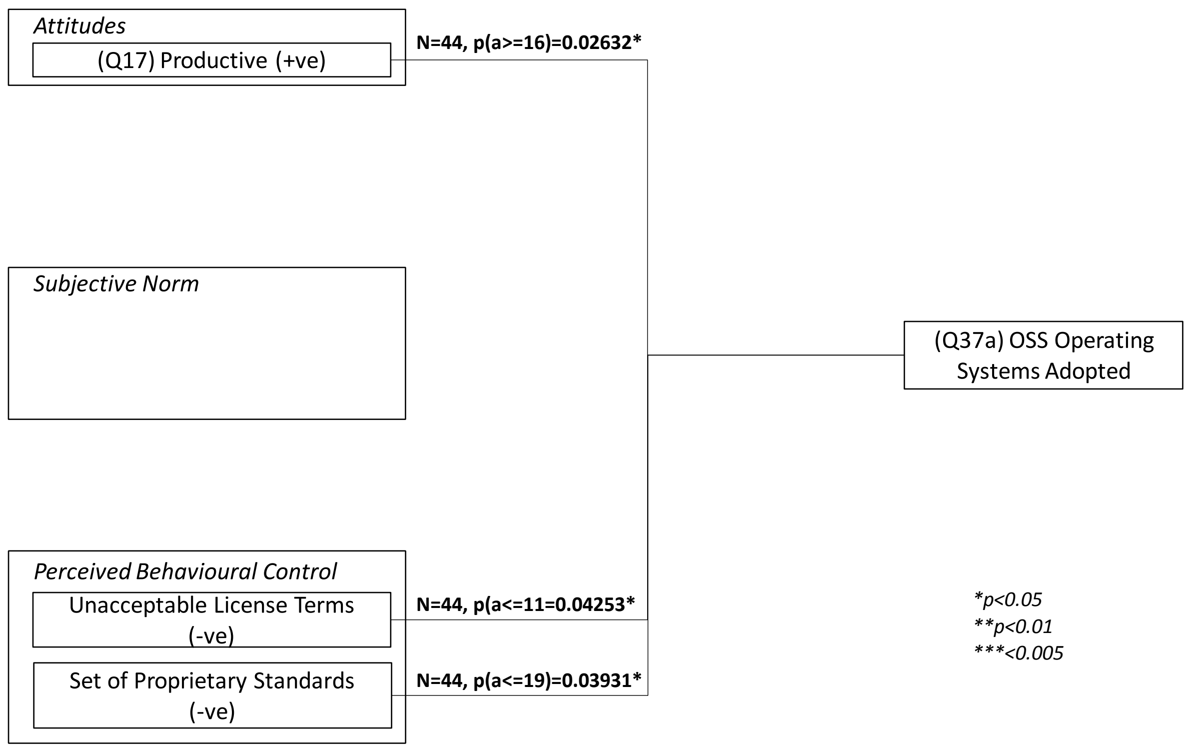
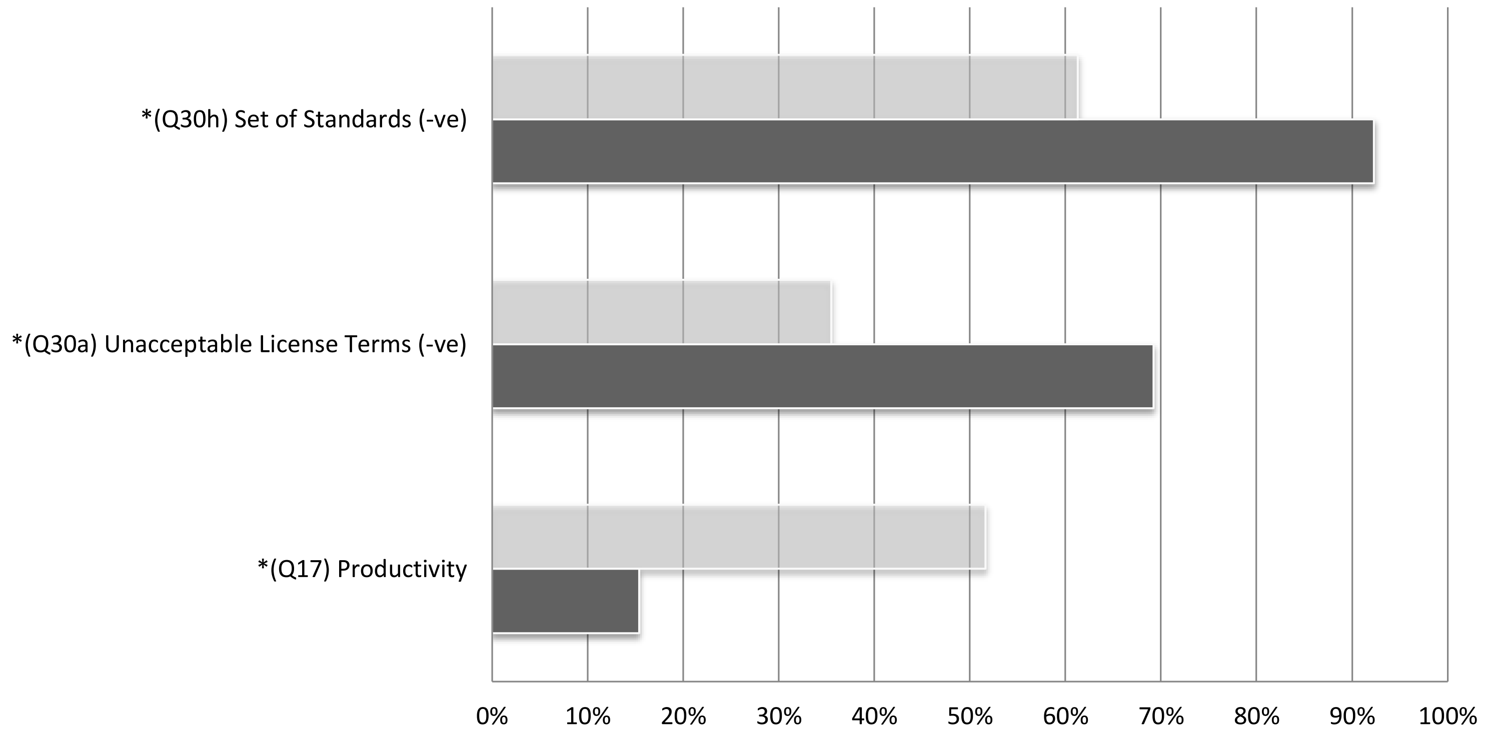


Figure 0.33: Factors Associated with OSS Adoption in the Operating System Subcategory



	*(Q17) Productivity	*(Q30a) Unacceptable License Terms (-ve)	*(Q30h) Set of Standards (-ve)
OSS Operating System Adopters in 2012	52%	35%	61%
OSS Operating System Non-adopters in 2012	15%	69%	92%

Figure 0.34: Bar Chart Illustrating Factors Associated with OSS Adoption in the Operating Systems Subcategory

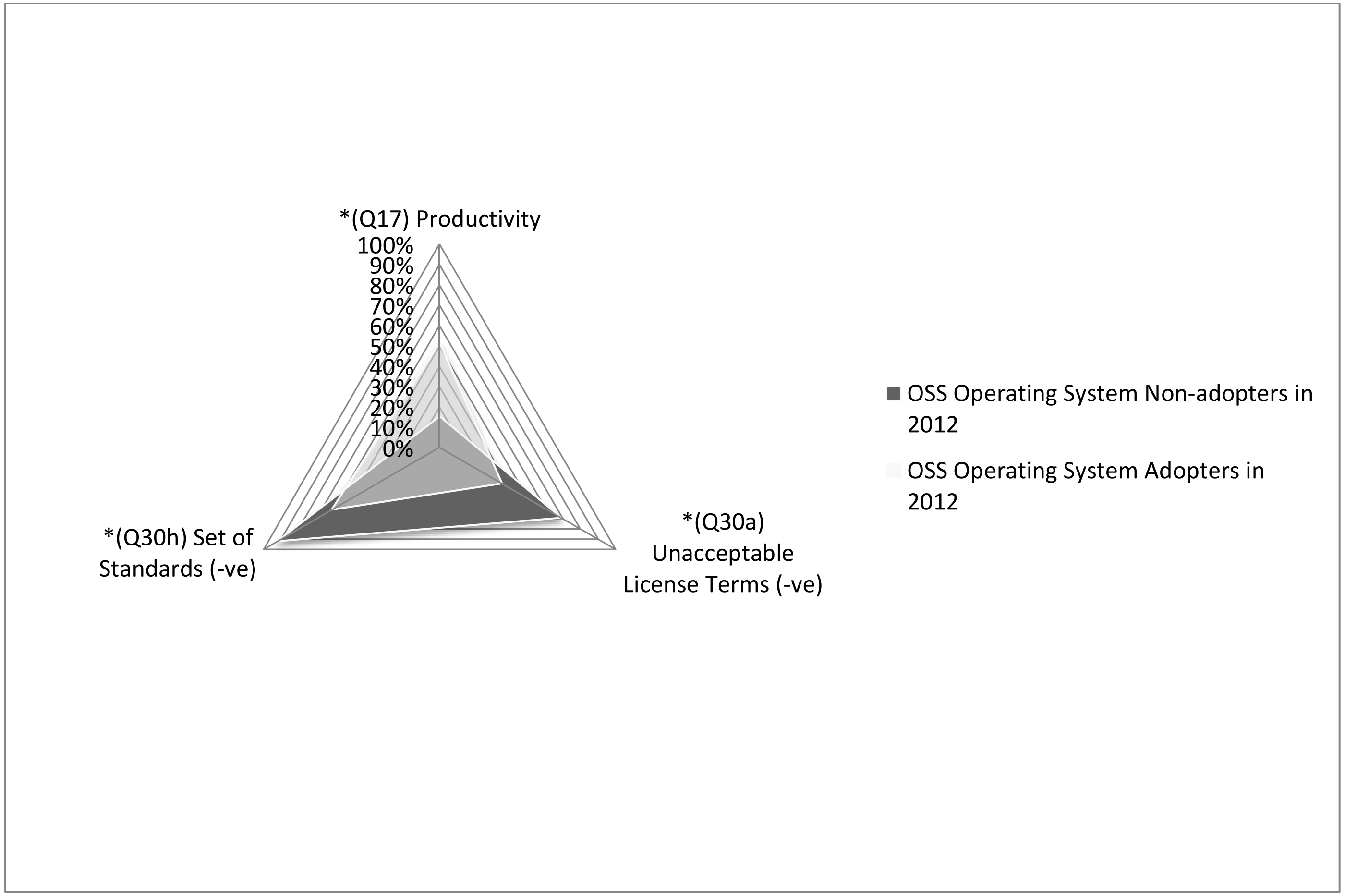


Figure 0.35: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Operating Systems Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show four statistically significant factors for intention to adopt OSS of this category of software in 2013. All of the four factors were greater than 95% and three were positively associated with OSS adoption of this category of software (i.e. Attitudes associated with Productivity and Job Performance, and Perceived Behavioural Control associated with prior implementation of OSS were positively associate). The only negatively associated factor identified (i.e.) inhibiting factors for this category of software was Second Best Perception. There were also no factors identified as belonging to the Subjective Norm construct category. Additionally, there were no factors identified as greater than the 99% confidence level.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as (a) Intention to Adopt OSS and (b) No Intention to Adopt OSS agree that the specified factors are important in terms of this category of software.

The radar graph below shows the same factors which illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) intend to adopt this category of OSS in 2012and (b) do not, in terms of statistically significant factors.

Table 0.19: Analysis of Factors Associated with Intention to Adopt OSS in Operating System Subcategory

	Sample (N)	No Intention to Adopt OSS Operating System in 2013			Intention to Adopt OSS Operating System in 2013			Fisher Exact Test One sided p-value
		Frequency	Agreed	%	Frequency	Agreed	%	
Attitude (A)								
*(Q17) Productivity	43	12	2	17%	31	17	55%	*p(a>=17)=0.02513
(Q18) Category Killer	43	12	5	42%	31	11	35%	
(Q20a) Security	43	12	6	50%	31	24	77%	
(Q20b) Cost	43	12	10	83%	31	26	84%	
(Q20c) Quality	43	12	4	33%	31	18	58%	
(20d) Flexibility	43	12	6	50%	31	23	74%	
(Q20e) Technologically Disruptive	43	12	11	92%	31	20	65%	
(Q20f) Relative Advantage	43	12	6	50%	31	20	65%	
*(Q20g) Job Performance (+ve)	43	12	4	33%	31	23	74%	*p(a>=23)=0.01710
(Q20h) Transparency	43	12	6	50%	31	21	68%	
(Q20i) Perpetuity	43	12	5	42%	31	21	68%	
(Q20j) Freedom to modify	43	12	11	92%	31	27	87%	
(Q20k) Speed	43	12	6	50%	31	18	58%	
(Q20l) Knowledge Creation	43	12	6	50%	31	24	77%	
(Q20m) Creativity & Innovation	43	12	9	75%	31	21	68%	
(Q20n) Vendor Lock-in	43	12	11	92%	31	29	94%	
(Q20o)Observable Results	43	12	4	33%	31	19	61%	
(Q20p) Ideological Compatibility	43	12	8	67%	31	23	74%	
(Q21a) Unsustainable Business Model	43	12	9	75%	31	15	48%	
*(Q21b) Second Best Perception (-ve)	43	12	10	83%	31	15	48%	*p(a>=15)=0.03817
(Q21c) Reliability (no better than propietary alternatives)	43	12	7	58%	31	16	52%	
(Q21d) Preference for building proprietary software skills	43	12	7	58%	31	13	42%	
(Q21e) Most OSS project fail to attract participants	43	12	8	67%	31	13	42%	
(Q21f) Hidden costs and questionable returns	43	12	10	83%	31	17	55%	
(Q21g) OSS commercial contracts not free (of charge)	43	12	9	75%	31	17	55%	
Subjective Norm (SN)								
(Q23a) Reported that others have adopted OSS	44	13	9	69%	31	24	77%	
(Q23b) Reported others success stories	44	13	7	54%	31	25	81%	
(Q23c) OSS Contributors (reported)	44	13	3	23%	31	14	45%	
(Q24a) Personal Identification with OSS Community	43	12	5	42%	31	8	26%	
(Q24b) Network Effects	43	12	6	50%	31	17	55%	
(Q24c) Internal Politics	43	12	2	17%	31	6	19%	
(Q24d) External Politics	43	12	3	25%	31	5	16%	
(Q24e) Organisational Culture	43	12	3	25%	31	8	26%	
(Q24f) Champion or Sponsor	43	12	8	67%	31	18	58%	
(Q24g) Commitment to local consultants/suppliers	43	12	2	17%	31	7	23%	
(Q24h) Lack of legally responsible third party	43	12	1	8%	31	3	10%	
(Q25a) Friends and Acquaintances	43	12	5	42%	31	13	42%	
(Q25b) OSS Contributors (influence)	43	12	7	58%	31	20	65%	
(Q25c) Colleagues (in line of business)	43	12	3	25%	31	14	45%	
(Q25d) Colleagues (in IT Dept)	43	12	4	33%	31	19	61%	
(Q25e) Colleagues (in Line of Business)	43	12	1	8%	31	8	26%	
(Q25f) Competitors	43	12	1	8%	31	1	3%	
(Q25g) Third Party Partners	43	12	**1**	8%	31	4	13%	
(Q25h) Suppliers	43	12	**0**	0%	31	2	6%	
(Q25i) Customers	43	12	**1**	8%	31	4	13%	
(Q25j) Government	43	12	5	42%	31	12	39%	
(Q25k) The Media	43	12	0	0%	31	7	23%	
(Q25l) The General Public	43	12	0	0%	31	7	23%	
Perceived Behavioural Control (PBC)								
(Q27) Easy to implement	43	12	2	17%	31	15	48%	
(Q28) Respondent's decision to adopt	43	12	7	58%	31	19	61%	
(Q29a) Set of Standards (Specifying Proprietary Software)	43	12	8	67%	31	16	52%	
(Q29b) Professionalism of IT Dept	43	12	7	58%	31	17	55%	
(Q29c) Availability of Resources, Expertise and Familiarity	43	12	6	50%	31	18	58%	
(Q29d) Availability of Training	43	12	6	50%	31	13	42%	
(Q29e) Availability of Time	43	12	6	50%	31	14	45%	
(Q29f) Internal OSS Installed Base	43	12	7	58%	31	14	45%	
(Q29g) Inertia (i.e. level of acceptance)	43	12	2	17%	31	4	13%	
(Q29h) Conservative Management	43	12	1	8%	31	3	10%	
(Q29i) Availability of Commercial Support	43	12	3	25%	31	11	35%	
(Q29j) Trial-ability (i.e. ability to demo capability)	43	12	5	42%	31	18	58%	
(Q30a) Unacceptable License Terms	43	12	7	58%	31	13	42%	
(Q30b) Overwhelming number of patches and upgrades	43	12	9	75%	31	18	58%	
(Q30c) Lack of Technical Support	43	12	11	92%	31	27	87%	
(Q30d) Complexity	43	12	11	92%	31	20	65%	
(Q30e) Proprietary Volume Purchase Agreement	43	12	8	67%	31	20	65%	
(30f) Lack of Resource	43	12	9	75%	31	26	84%	
(Q30g) Switching Costs	43	12	9	75%	31	24	77%	
(Q30h) Set of Standards	43	12	11	92%	31	20	65%	
(Q30i) Lack of Relevance	43	12	8	67%	31	18	58%	
*(Q32) Past Implementation (+ve)	43	12	0	0%	31	10	32%	*p(a>=10)=0.02313
(Q33) Organisation is Active OSS User	43	12	2	17%	31	13	42%	

*p value<0.05
**p value<0.01
***p value<0.005

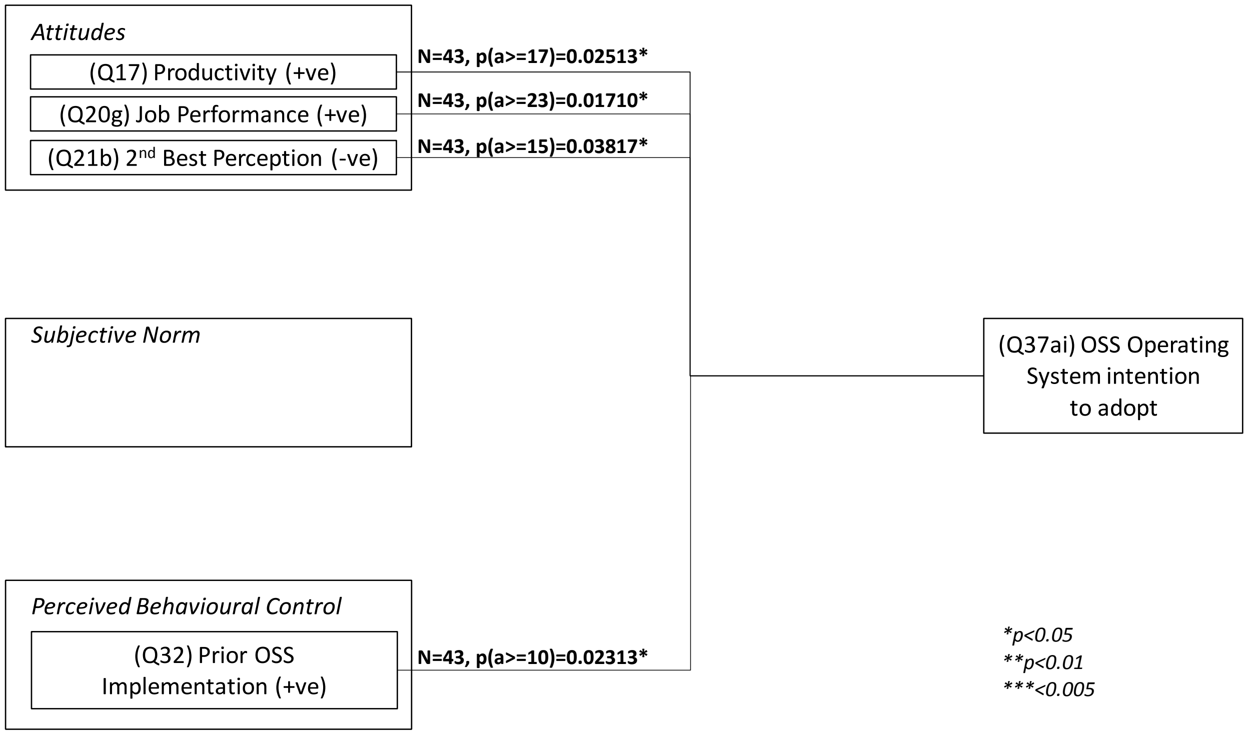
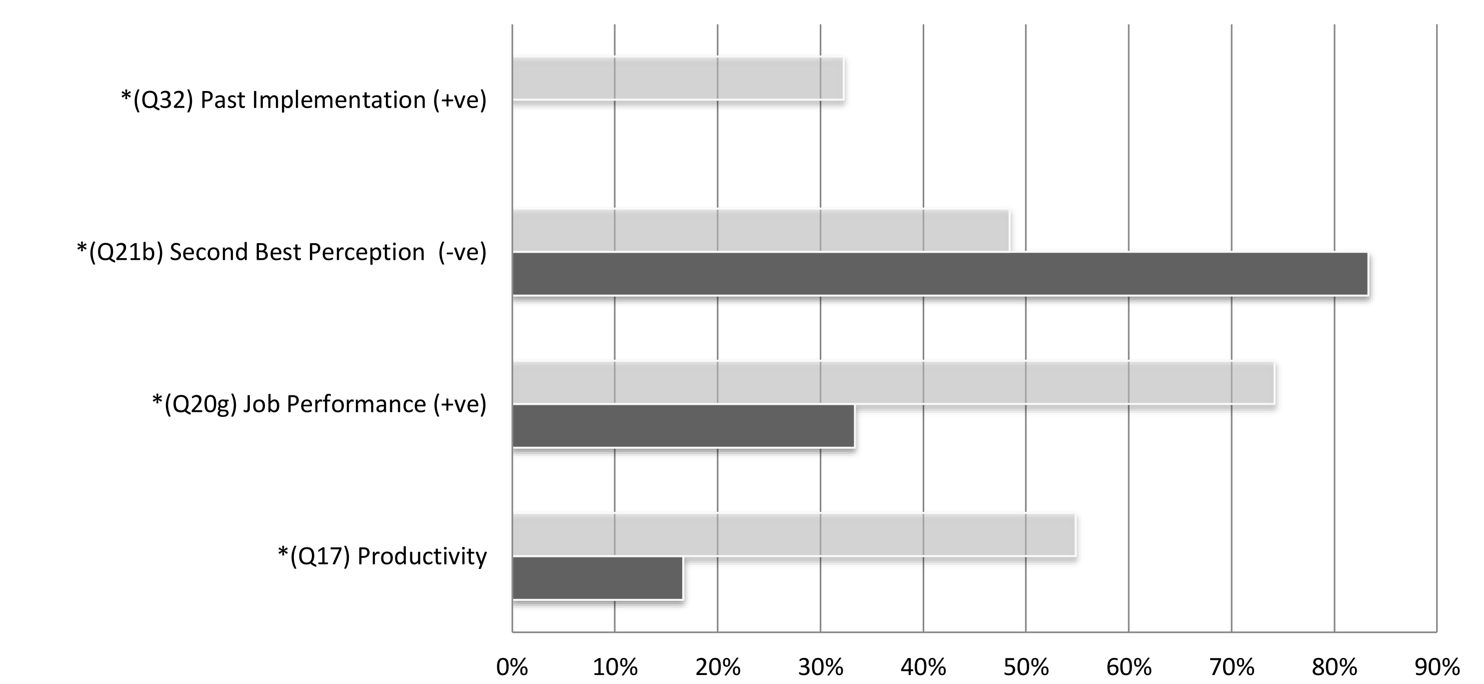


Figure 0.36: Factors Associated with Intention to Adopt OSS in the Operating System Subcategory



	*(Q17) Productivity	*(Q20g) Job Performance (+ve)	*(Q21b) Second Best Perception (-ve)	*(Q32) Past Implementation (+ve)
Intention to Adopt OSS Operating System in 2013	55%	74%	48%	32%
No Intention to Adopt OSS Operating System in 2013	17%	33%	83%	0%

Figure 0.37: Bar Chart Illustrating Factors Associated with Intention to Adopt OSS in the Operating System Subcategory

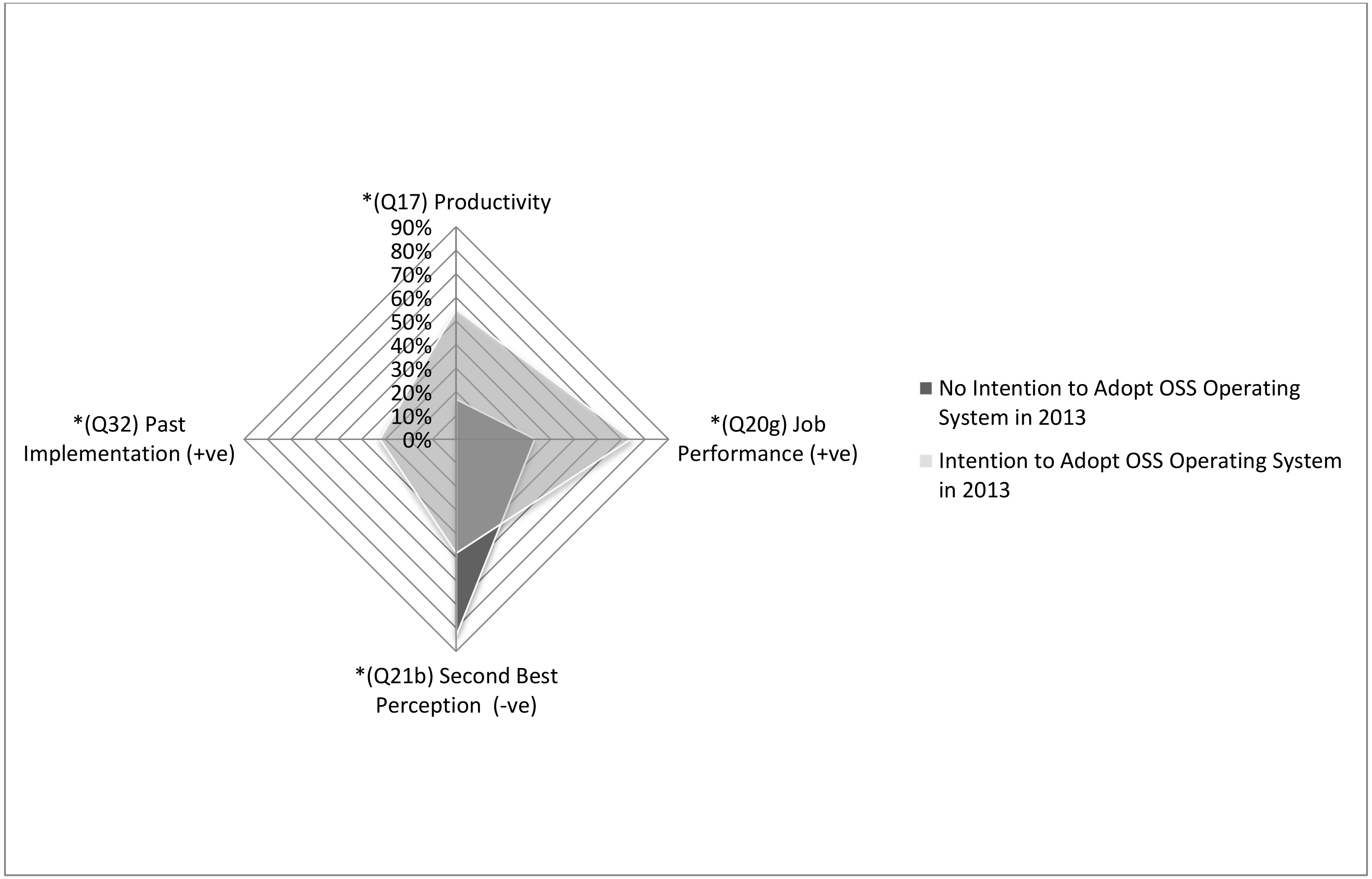


Figure 0.38: Radar Graph Illustrating Differences in Responses for Factors Associated with Intention to Adopt OSS in the Operating Systems Subcategory

OSS Network Operating System

Adoption in 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show five statistically significant factors for reported OSS adoption of this category of software in 2012. The factors which were greater than 95% confidence level and negatively associated with the OSS adoption category were found to be Unacceptable License Terms and Most OSS Projects Fail. The remaining factors (i.e. Security, Job Performance and The Media) were found to be positively associated with OSS adoption for this category of software and at the same confidence level of greater than 95%.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

Similarly, Figure xyz, represents the five factors in a radar diagram which illustrates the difference in salient beliefs between respondents who describe themselves as those who have (a) adopted this category of OSS in 2012and (b) have not, in terms of statistically significant factors

Table 0.20: Analysis of Factors Associated with OSS Adoption in Network Operating System Subcategory

	Sample (N)	OSS Network Operating System Non-adopters in 2012			OSS Network Operating System Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	43	15	4	27%	28	13	46%		0.12135
(Q18) Category Killer	43	15	4	27%	28	11	39%		0.19344
*(Q20a) Security (+ve)	43	15	7	47%	28	22	79%	*p(a>=22)=0.03805	0.03093
(Q20b) Cost	43	15	12	80%	28	23	82%		0.30838
(Q20c) Quality	43	15	5	33%	28	16	57%		0.08684
(20d) Flexibility	43	15	8	53%	28	19	68%		0.16761
(Q20e) Technologically Disruptive	43	15	13	87%	28	17	61%		0.06165
(Q20f) Relative Advantage	43	15	7	47%	28	18	64%		0.13881
*(Q20g) Job Performance (+ve)	43	15	6	40%	28	20	71%	*p(a>=20)=0.04671	0.03694
(Q20h) Transparency	43	15	7	47%	28	18	64%		0.13881
(Q20i) Perpetuity	43	15	6	40%	28	18	64%		0.08205
(Q20j) Freedom to modify	43	15	12	80%	28	24	86%		0.28910
(Q20k) Speed	43	15	6	40%	28	18	64%		0.08205
(Q20l) Knowledge Creation	43	15	7	47%	28	21	75%		0.05028
(Q20m) Creativity & Innovation	43	15	10	67%	28	20	71%		0.25518
(Q20n) Vendor Lock-in	43	15	13	87%	28	25	89%		0.35735
(Q20o)Observable Results	43	15	5	33%	28	17	61%		0.06130
(Q20p) Ideological Compatibility	43	15	10	67%	28	20	71%		0.25518
(Q21a) Unsustainable Business Model	43	15	9	60%	28	16	57%		0.25028
(Q21b) Second Best Perception	43	15	12	80%	28	14	50%		0.04334
(Q21c) Reliability (no better than propietary alternatives)	43	15	9	60%	28	15	54%		0.23411
(Q21d) Preference for building proprietary software skills	43	15	9	60%	28	12	43%		0.14473
*(Q21e) Most OSS project fail to attract participants (-ve)	43	15	11	73%	28	11	39%	*p(a<=11)=0.03427	0.02786
(Q21f) Hidden costs and questionable returns	43	15	12	80%	28	17	61%		0.12466
(Q21g) OSS commercial contracts not free (of charge)	43	15	9	60%	28	18	64%		0.24768
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	39	13	11	85%	26	24	92%		0.30820
(Q23b) Reported others success stories	39	13	11	85%	26	23	88%		0.35223
(Q23c) OSS Contributors (reported)	37	13	10	77%	24	14	58%		0.15745
(Q24a) Personal Identification with OSS Community	43	15	4	27%	28	9	32%		0.25776
(Q24b) Network Effects	43	15	5	33%	28	17	61%		0.06130
(Q24c) Internal Politics	43	15	2	13%	28	6	21%		0.27280
(Q24d) External Politics	43	15	2	13%	28	5	18%		0.32024
(Q24e) Organisational Culture	43	15	1	7%	28	9	32%		0.05404
(Q24f) Champion or Sponsor	43	15	7	47%	28	17	61%		0.17263
(Q24g) Commitment to local consultants/suppliers	43	15	3	20%	28	6	21%		0.30397
(Q24h) Lack of legally responsible third party	43	15	1	7%	28	3	11%		0.39818
(Q25a) Friends and Acquaintances	43	15	7	47%	28	11	39%		0.22715
(Q25b) OSS Contributors (influence)	43	15	7	47%	28	19	68%		0.10553
(Q25c) Colleagues (in line of business)	43	15	4	27%	28	12	43%		0.15659
(Q25d) Colleagues (in IT Dept)	43	15	7	47%	28	15	54%		0.22902
(Q25e) Colleagues (in Line of Business)	43	15	3	20%	28	6	21%		0.30397
(Q25f) Competitors	43	15	1	7%	28	1	4%		0.46512
(Q25g) Third Party Partners	43	15	1	7%	28	4	14%		0.31906
(Q25h) Suppliers	43	15	0	0%	28	2	7%		0.41860
(Q25i) Customers	43	15	1	7%	28	4	14%		0.31906
(Q25j) Government	43	15	4	27%	28	12	43%		0.15659
*(Q25k) The Media (+ve)	43	15	0	0%	28	7	25%	*p(a>=7)=0.03674	0.03674
(Q25l) The General Public	43	15	1	7%	28	6	21%		0.17537
Perceived Behavioural Control (PBC)		15			28				
(Q27) Easy to implement	43	15	**5**	33%	28	11	39%		0.24318
(Q28) Respondent's decision to adopt	43	15	**4**	27%	28	5	18%		0.23789
(Q29a) Set of Standards (Specifying Proprietary Software)	43	15	**7**	47%	28	16	57%		0.20380
(Q29b) Professionalism of IT Dept	43	15	8	53%	28	16	57%		0.24456
(Q29c) Availability of Resources, Expertise and Familiarity	43	15	7	47%	28	17	61%		0.17263
(Q29d) Availability of Training	43	15	6	40%	28	13	46%		0.23411
(Q29e) Availability of Time	43	15	5	33%	28	15	54%		0.11705
(Q29f) Internal OSS Installed Base	43	15	7	47%	28	13	46%		0.25083
(Q29g) Inertia (i.e. level of acceptance)	43	15	1	7%	28	5	18%		0.24181
(Q29h) Conservative Management	43	15	1	7%	28	3	11%		0.39818
(Q29i) Availability of Commercial Support	43	15	2	13%	28	11	39%		0.06165
(Q29j) Trial-ability (i.e. ability to demo capability)	43	15	5	33%	28	17	61%		0.06130
*(Q30a) Unacceptable License Terms (-ve)	43	15	10	67%	28	9	32%	*p(a<=9)=0.03194	0.02591
(Q30b) Overwhelming number of patches and upgrades	43	15	10	67%	28	17	61%		0.24318
(Q30c) Lack of Technical Support	43	15	13	87%	28	25	89%		0.35735
(Q30d) Complexity	43	15	11	73%	28	20	71%		0.27659
(Q30e) Proprietary Volume Purchase Agreement	43	15	9	60%	28	20	71%		0.19847
(30f) Lack of Resource	43	15	11	73%	28	24	86%		0.19274
(Q30g) Switching Costs	43	15	11	73%	28	20	71%		0.27659
(Q30h) Set of Standards	43	15	12	80%	28	18	64%		0.16325
(Q30i) Lack of Relevance	43	15	10	67%	28	16	57%		0.21691
(Q32) Past Implementation	43	15	3	20%	28	8	29%		0.24586
(Q33) Organisation is Active OSS User	43	15	4	27%	28	11	39%		0.19344
*p value<0.05									
**p value<0.01									
***p value<0.005									

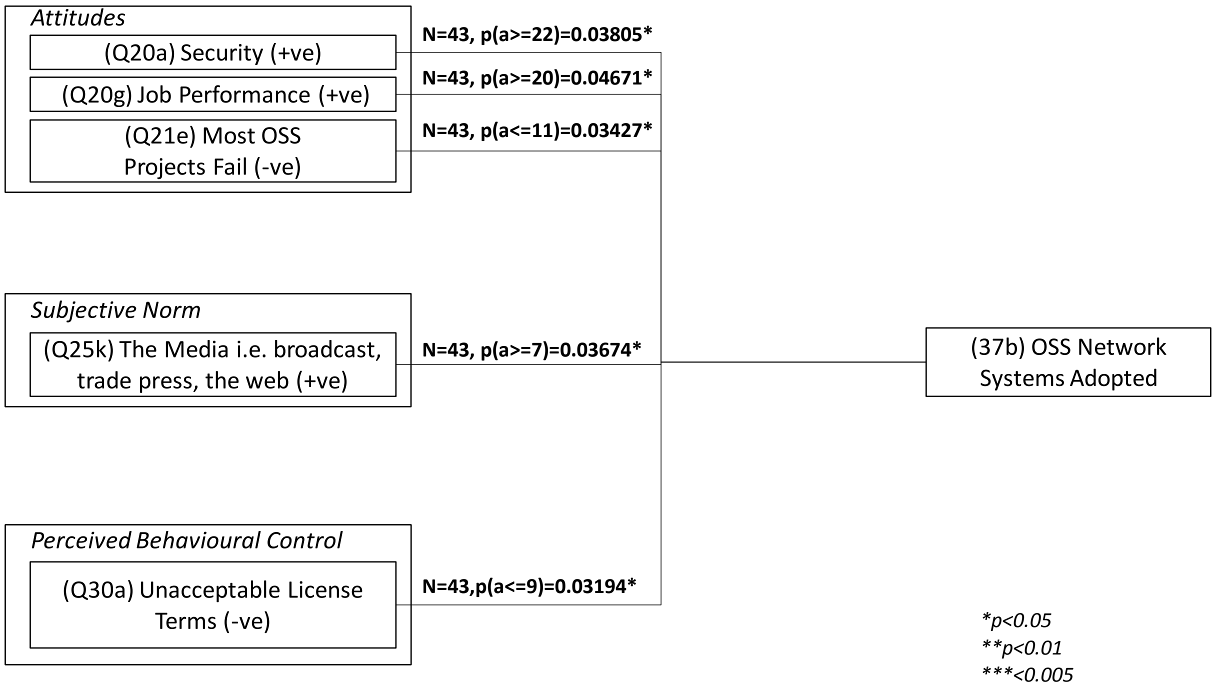
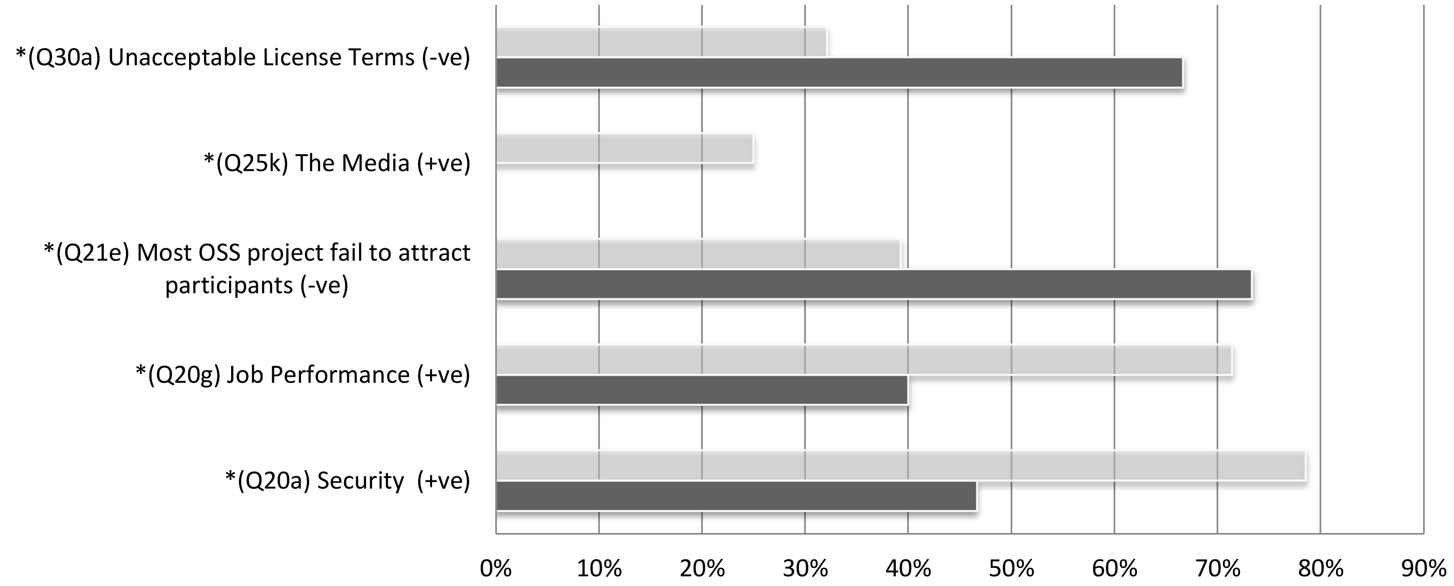


Figure 0.39: Factors Associated with OSS Adoption in the Network Operating System Subcategory



	*(Q20a) Security (+ve)	*(Q20g) Job Performance (+ve)	*(Q21e) Most OSS project fail to attract participants (-ve)	*(Q25k) The Media (+ve)	*(Q30a) Unacceptable License Terms (-ve)
OSS Network Operating System Adopters in 2012	79%	71%	39%	25%	32%
OSS Network Operating System Non-adopters in 2012	47%	40%	73%	0%	67%

Figure 0.40: Bar Chart Illustrating Factors Associated with OSS Adoption in the Network Operating System Subcategory

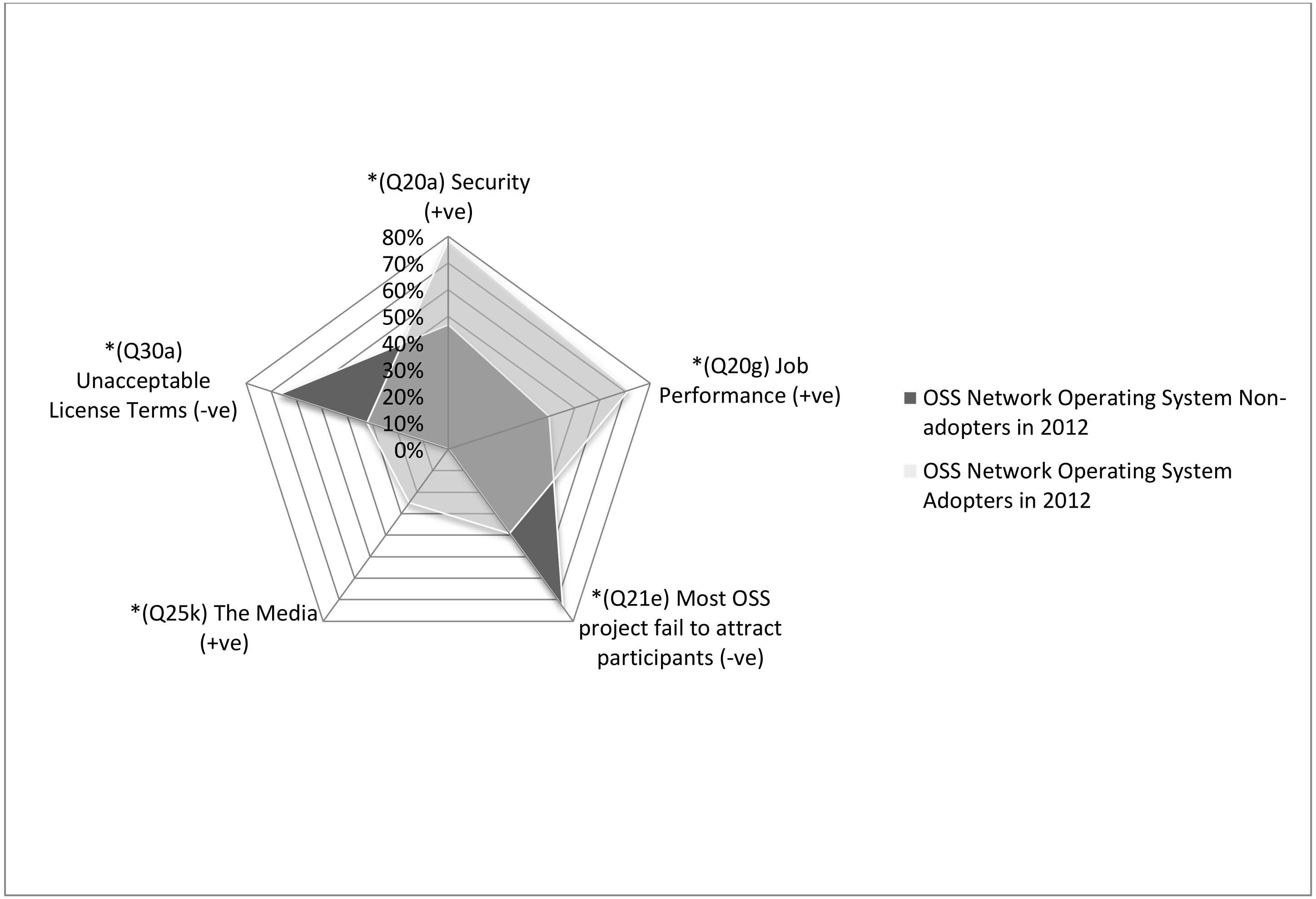


Figure 0.41: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Network Operating Systems Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show five statistically significant factors for intention to adopt OSS of this category of software in 2013. All of the factors were shown to be greater than 95% and three were positively associated with OSS adoption of this category of software (i.e. Attitudes associated with Security and Job Performance). The remaining two factors identified were negatively associated (i.e.) inhibiting factors for this category of software were shown to be Second Best Perception and The Media. There were no factors identified as belonging to the Perceived Behavioural Control construct category. Additionally, there were no factors identified as greater than the 99% confidence level.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as (a) Intention to Adopt OSS and (b) No Intention to Adopt OSS agree that the specified factors are important in terms of this category of software.

Similarly, Figure xyz, represents the five factors in a radar diagram which illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) intend to adopt this category of OSS in 2012and (b) do not, in terms of statistically significant factors

Table 0.21: Analysis of Factors Associated with Intention to Adopt OSS in Network Operating System Subcategory

	Sample (N)	No Intention to Adopt OSS Network Operating System in 2013			Intention to Adopt OSS Network Operating System in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	42	15	5	33%	27	13	48%		0.17030
(Q18) Category Killer	42	15	6	40%	27	10	37%		0.25358
*(Q20a) Security (+ve)	42	15	7	47%	27	22	81%	*p(a>=22)=0.02416	0.02036
(Q20b) Cost	42	15	12	80%	27	23	85%		0.29599
(Q20c) Quality	42	15	5	33%	27	16	59%		0.07274
(20d) Flexibility	42	15	9	60%	27	19	70%		0.21020
*(Q20e) Technologically Disruptive (-ve)	42	15	14	93%	27	17	63%	*p(a<=17)=0.03261	0.02956
(Q20f) Relative Advantage	42	15	7	47%	27	18	67%		0.11843
*(Q20g) Job Performance (+ve)	42	15	6	40%	27	20	74%	*p(a>=20)=0.03274	0.02669
(Q20h) Transparency	42	15	8	53%	27	18	67%		0.18113
(Q20i) Perpetuity	42	15	7	47%	27	18	67%		0.11843
(Q20j) Freedom to modify	42	15	13	87%	27	24	89%		0.36104
(Q20k) Speed	42	15	6	40%	27	17	63%		0.09451
(Q20l) Knowledge Creation	42	15	8	53%	27	21	78%		0.07464
(Q20m) Creativity & Innovation	42	15	10	67%	27	19	70%		0.26125
(Q20n) Vendor Lock-in	42	15	14	93%	27	25	93%		0.45862
(Q20o)Observable Results	42	15	5	33%	27	17	63%		0.04931
(Q20p) Ideological Compatibility	42	15	10	67%	27	20	74%		0.24116
(Q21a) Unsustainable Business Model	42	15	10	67%	27	14	52%		0.17030
*(Q21b) Second Best Perception (-ve)	42	15	12	80%	27	13	48%	*p(a<=13)=0.04381	0.03584
(Q21c) Reliability (no better than propietary alternatives)	42	15	9	60%	27	14	52%		0.22470
(Q21d) Preference for building proprietary software skills	42	15	9	60%	27	11	41%		0.12701
(Q21e) Most OSS project fail to attract participants	42	15	10	67%	27	11	41%		0.07274
(Q21f) Hidden costs and questionable returns	42	15	12	80%	27	15	56%		0.08016
(Q21g) OSS commercial contracts not free (of charge)	42	15	9	60%	27	17	63%		0.25358
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	36	12	10	83%	24	22	92%		0.30924
(Q23b) Reported others success stories	36	12	9	75%	24	22	92%		0.16106
(Q23c) OSS Contributors (reported)	32	10	4	40%	22	13	59%		0.18465
(Q24a) Personal Identification with OSS Community	42	15	4	27%	27	9	33%		0.25070
(Q24b) Network Effects	42	15	6	40%	27	17	63%		0.09451
(Q24c) Internal Politics	42	15	2	13%	27	6	22%		0.26333
(Q24d) External Politics	42	15	3	20%	27	5	19%		0.31121
(Q24e) Organisational Culture	42	15	2	13%	27	9	33%		0.11497
(Q24f) Champion or Sponsor	42	15	9	60%	27	16	59%		0.25624
(Q24g) Commitment to local consultants/suppliers	42	15	3	20%	27	6	22%		0.30206
(Q24h) Lack of legally responsible third party	42	15	1	7%	27	3	11%		0.39199
(Q25a) Friends and Acquaintances	42	15	7	47%	27	11	41%		0.23721
(Q25b) OSS Contributors (influence)	42	15	8	53%	27	19	70%		0.14478
(Q25c) Colleagues (in line of business)	42	15	5	33%	27	12	44%		0.20499
(Q25d) Colleagues (in IT Dept)	42	15	7	47%	27	16	59%		0.18779
(Q25e) Colleagues (in Line of Business)	42	15	3	20%	27	6	22%		0.30206
(Q25f) Competitors	42	15	1	7%	27	1	4%		0.47038
(Q25g) Third Party Partners	42	15	1	7%	27	4	15%		0.30946
(Q25h) Suppliers	42	15	0	0%	27	2	7%		0.40767
(Q25i) Customers	42	15	1	7%	27	4	15%		0.30946
(Q25j) Government	42	15	6	40%	27	11	41%		0.25624
*(Q25k) The Media (+ve)	42	15	0	0%	27	7	26%	*p(a>=7)=0.03292	0.03292
(Q25l) The General Public	42	15	1	7%	27	6	22%		0.16458
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	42	15	4	27%	27	12	44%		0.14251
(Q28) Respondent's decision to adopt	42	15	5	33%	27	4	15%		0.11820
(Q29a) Set of Standards (Specifying Proprietary Software)	42	15	9	60%	27	15	56%		0.24599
(Q29b) Professionalism of IT Dept	42	15	10	67%	27	14	52%		0.17030
(Q29c) Availability of Resources, Expertise and Familiarity	42	15	8	53%	27	16	59%		0.23721
(Q29d) Availability of Training	42	15	7	47%	27	12	44%		0.25038
(Q29e) Availability of Time	42	15	6	40%	27	14	52%		0.19539
(Q29f) Internal OSS Installed Base	42	15	8	53%	27	13	48%		0.23980
(Q29g) Inertia (i.e. level of acceptance)	42	15	1	7%	27	5	19%		0.23084
(Q29h) Conservative Management	42	15	1	7%	27	3	11%		0.39199
(Q29i) Availability of Commercial Support	42	15	3	20%	27	11	41%		0.11223
(Q29j) Trial-ability (i.e. ability to demo capability)	42	15	7	47%	27	16	59%		0.18779
(Q30a) Unacceptable License Terms	42	15	9	60%	27	10	37%		0.09451
(Q30b) Overwhelming number of patches and upgrades	42	15	9	60%	27	17	63%		0.25358
(Q30c) Lack of Technical Support	42	15	13	87%	27	24	89%		0.36104
(Q30d) Complexity	42	15	12	80%	27	18	67%		0.19285
(Q30e) Proprietary Volume Purchase Agreement	42	15	10	67%	27	18	67%		0.26626
(30f) Lack of Resource	42	15	11	73%	27	24	89%		0.14799
(Q30g) Switching Costs	42	15	12	80%	27	20	74%		0.27460
(Q30h) Set of Standards	42	15	12	80%	27	18	67%		0.19285
(Q30i) Lack of Relevance	42	15	9	60%	27	16	59%		0.25624
(Q32) Past Implementation	42	15	1	7%	27	9	33%		0.04778
(Q33) Organisation is Active OSS User	42	15	3	20%	27	12	44%		0.08016
*p value<0.05									
**p value<0.01									
***p value<0.005									

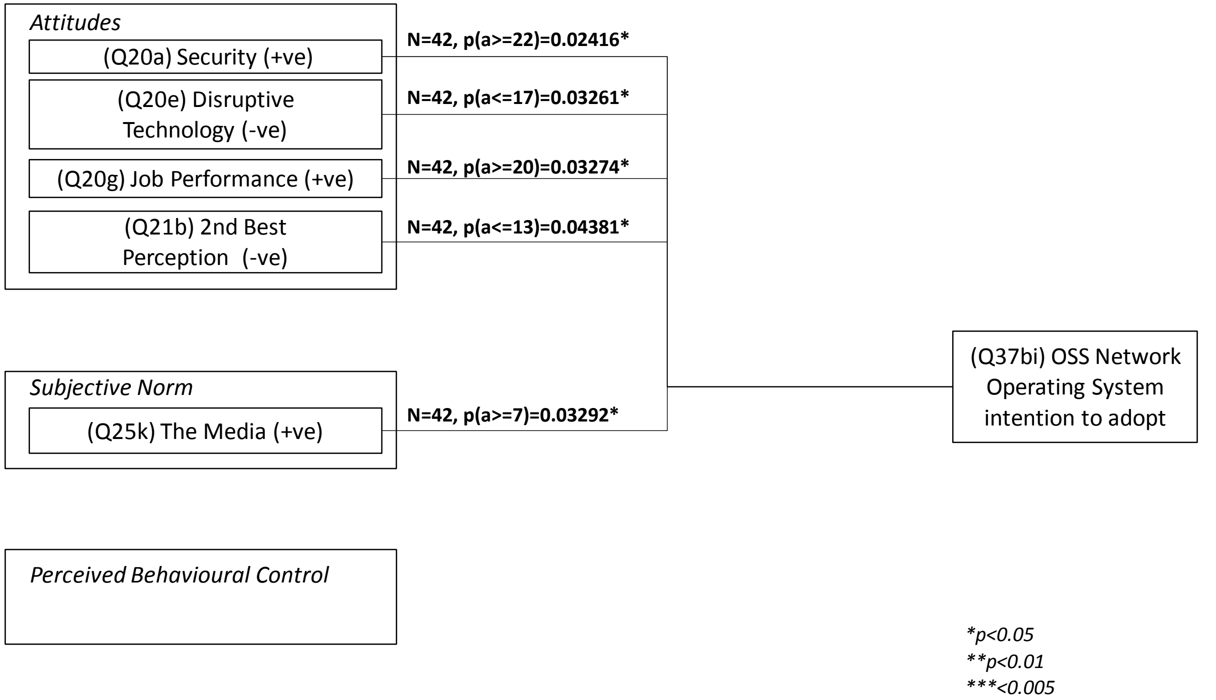
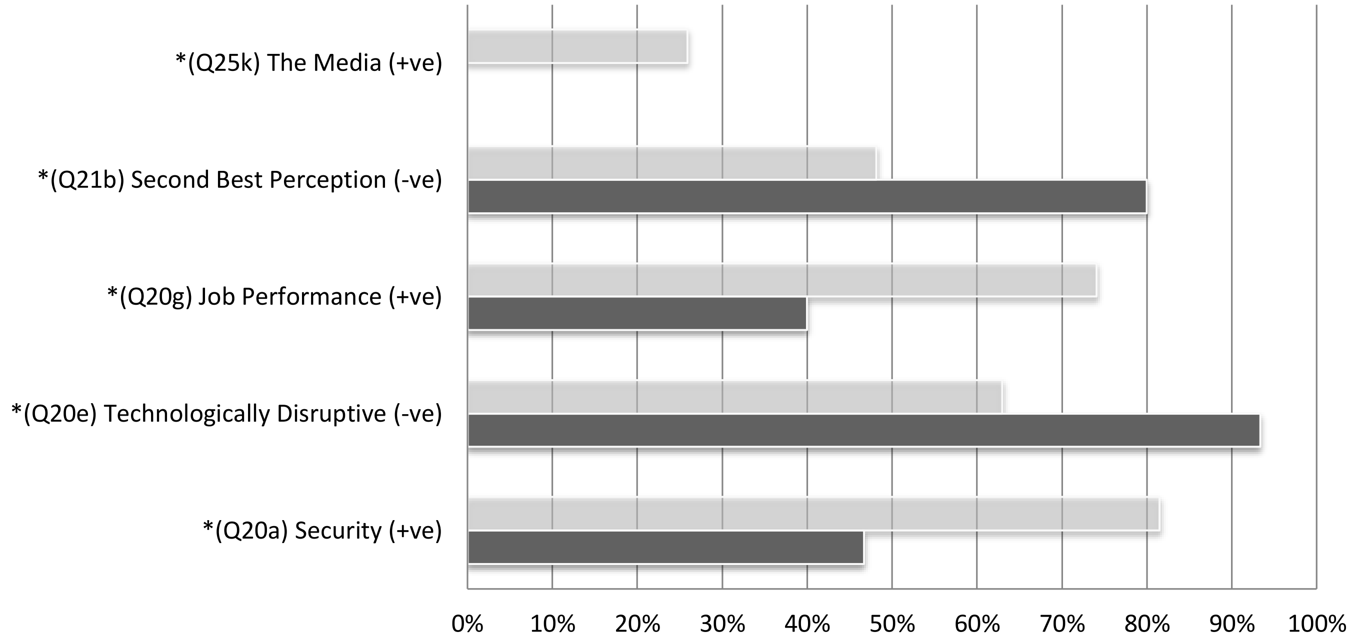


Figure 0.42: Factors Associated with the Intention to Adopt OSS in the Network Operating Systems Subcategory



	*(Q20a) Security (+ve)	*(Q20e) Technologically Disruptive (-ve)	*(Q20g) Job Performance (+ve)	*(Q21b) Second Best Perception (-ve)	*(Q25k) The Media (+ve)
Intention to Adopt OSS Network Operating System in 2013	81%	63%	74%	48%	26%
No Intention to Adopt OSS Network Operating System in 2013	47%	93%	40%	80%	0%

Figure 0.43: Bar Chart Illustrating Factors Associated with Intention to Adopt OSS in the Network Operating System Subcategory

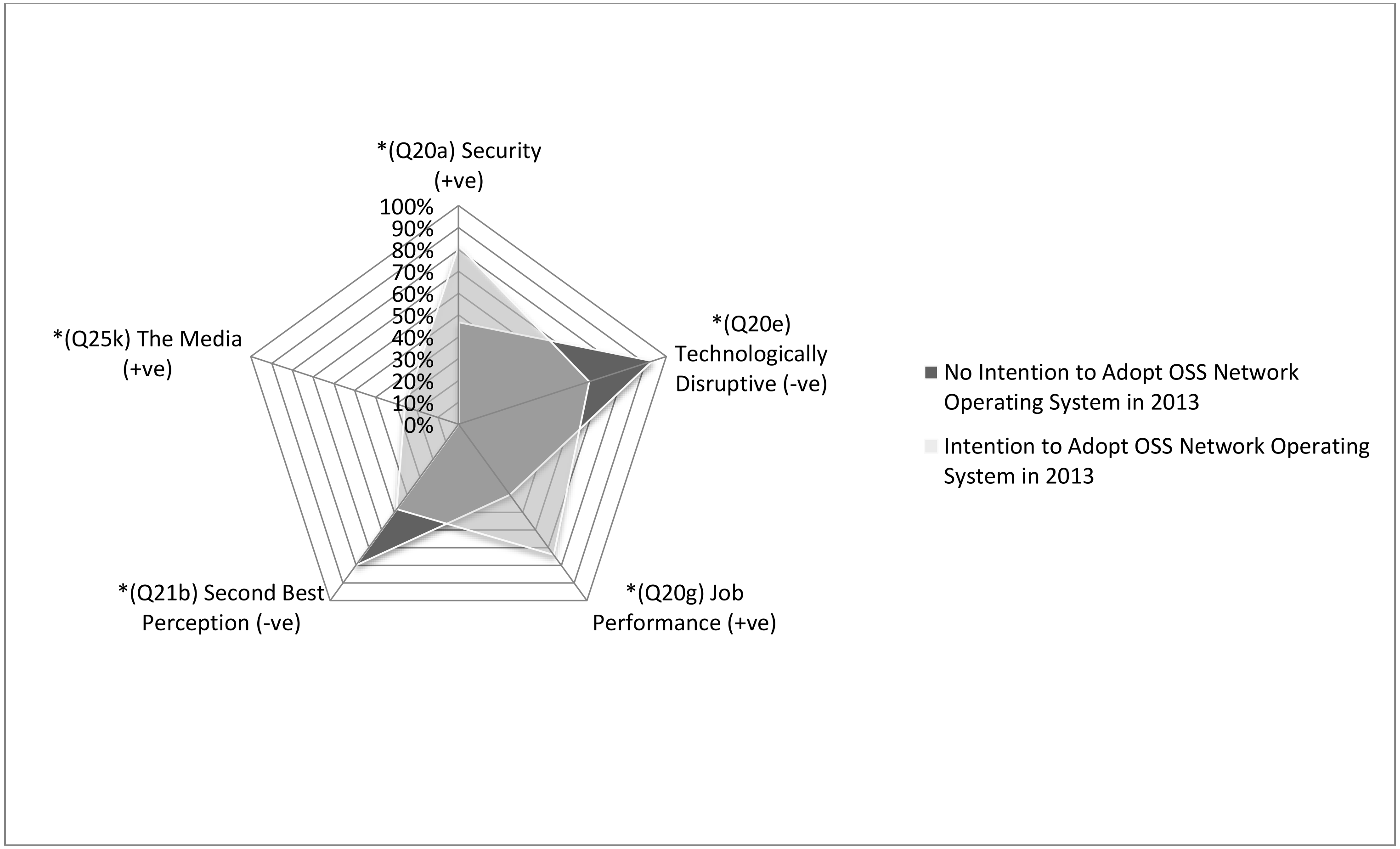


Figure 0.44: Radar Graph Illustrating Differences in Responses for Factors Associated with Intention to Adopt OSS in the Network Operating Systems Subcategory

OSS Data Management System

Adoption in 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show seven statistically significant factors for reported OSS adoption of this category of software in 2012. Most notably, Freedom To Modify was shown to be a driving factor (i.e. positively associated with OSS adoption of this category of software) at the greater than 99.5% confidence level. The remaining factors (i.e. Productivity, Perpetuity, Observability, OSS Contributors (reported), Colleagues in Line of Business and Professionalism of IT Department) were found to be positively associated with OSS adoption for this category of software and at the confidence level of greater than 95%. No inhibiting factors were found for this software category.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

Similarly, Figure xyz, represents the seven factors in a radar diagram which illustrates the difference in salient beliefs between respondents who describe themselves as those who have (a) adopted this category of OSS in 2012and (b) have not, in terms of statistically significant factors

Table 0.22: Analysis of Factors Associated with General OSS Adoption in Data Management System Subcategory

	Sample (N)	OSS Database Management System Non-adopters in 2012			OSS Database Management System Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
*(Q17) Productivity (+ve)	44	14	2	14%	30	16	53%	*p(a>=16)=0.01457	0.01285
(Q18) Category Killer	44	14	4	29%	30	11	37%		0.23784
(Q20a) Security	44	14	8	57%	30	22	73%		0.15290
(Q20b) Cost	44	14	12	86%	30	24	80%		0.30487
(Q20c) Quality	44	14	5	36%	30	17	57%		0.11395
(20d) Flexibility	44	14	6	43%	30	22	73%		0.04218
(Q20e) Technologically Disruptive	44	14	12	86%	30	18	60%		0.06847
(Q20f) Relative Advantage	44	14	8	57%	30	18	60%		0.25229
(Q20g) Job Performance	44	14	6	43%	30	21	70%		0.06260
(Q20h) Transparency	44	14	6	43%	30	20	67%		0.08764
*(Q20i) Perpetuity (+ve)	44	14	4	29%	30	21	70%	*p(a>=21)=0.01182	0.01017
***(Q20j) Freedom to modify (+ve)	44	14	8	57%	30	29	97%	***p(a>=29)=0.002441	0.00235
(Q20k) Speed	44	14	5	36%	30	20	67%		0.04270
(Q20l) Knowledge Creation	44	14	8	57%	30	21	70%		0.18687
(Q20m) Creativity & Innovation	44	14	8	57%	30	23	77%		0.11776
(Q20n) Vendor Lock-in	44	14	11	79%	30	28	93%		0.14580
*(Q20o)Observable Results (+ve)	44	14	4	29%	30	19	63%	*p(a>=19)=0.03329	0.02717
(Q20p) Ideological Compatibility	44	14	10	71%	30	21	70%		0.27586
(Q21a) Unsustainable Business Model	44	14	8	57%	30	17	57%		0.25527
(Q21b) Second Best Perception	44	14	11	79%	30	15	50%		0.05484
(Q21c) Reliability (no better than propietary alternatives)	44	14	9	64%	30	15	50%		0.17634
(Q21d) Preference for building proprietary software skills	44	14	8	57%	30	13	43%		0.17869
(Q21e) Most OSS project fail to attract participants	44	14	9	64%	30	13	43%		0.11395
(Q21f) Hidden costs and questionable returns	44	14	11	79%	30	18	60%		0.13694
(Q21g) OSS commercial contracts not free (of charge)	44	14	8	57%	30	19	63%		0.23901
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	38	11	8	73%	27	26	96%		0.06035
(Q23b) Reported others success stories	38	11	8	73%	27	24	89%		0.17482
*(Q23c) OSS Contributors (reported) (+ve)	34	9	2	22%	25	16	64%	*p(a>=16)=0.03801	0.03337
(Q24a) Personal Identification with OSS Community	44	14	4	29%	30	9	30%		0.27586
(Q24b) Network Effects	44	14	5	36%	30	17	57%		0.11395
(Q24c) Internal Politics	44	14	1	7%	30	7	23%		0.16081
(Q24d) External Politics	44	14	1	7%	30	6	20%		0.21693
(Q24e) Organisational Culture	44	14	2	14%	30	8	27%		0.21466
(Q24f) Champion or Sponsor	44	14	9	64%	30	16	53%		0.20665
(Q24g) Commitment to local consultants/suppliers	44	14	1	7%	30	8	27%		0.11558
(Q24h) Lack of legally responsible third party	44	14	1	7%	30	3	10%		0.41871
(Q25a) Friends and Acquaintances	44	14	5	36%	30	13	43%		0.23288
(Q25b) OSS Contributors (influence)	44	14	6	43%	30	20	67%		0.08764
*(Q25c) Colleagues (in line of business) (+ve)	44	14	2	14%	30	14	47%	*p(a>=14)=0.03732	0.03176
(Q25d) Colleagues (in IT Dept)	44	14	4	29%	30	18	60%		0.04115
(Q25e) Colleagues (in Line of Business)	44	14	1	7%	30	8	27%		0.11558
(Q25f) Competitors	44	14	1	7%	30	1	3%		0.44397
(Q25g) Third Party Partners	44	14	1	7%	30	4	13%		0.35328
(Q25h) Suppliers	44	14	0	0%	30	2	7%		0.45983
(Q25i) Customers	44	14	2	14%	30	3	10%		0.34020
(Q25j) Government	44	14	4	29%	30	12	40%		0.20777
(Q25k) The Media	44	14	0	0%	30	7	23%		0.05313
(Q25l) The General Public	44	14	1	7%	30	6	20%		0.21693
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	44	14	4	29%	30	13	43%		0.17466
(Q28) Respondent's decision to adopt	44	14	4	29%	30	5	17%		0.20122
(Q29a) Set of Standards (Specifying Proprietary Software)	44	14	5	36%	30	18	60%		0.08604
*(Q29b) Professionalism of IT Dept (+ve)	44	14	4	29%	30	20	67%	*p(a>=20)=0.02035	0.01708
(Q29c) Availability of Resources, Expertise and Familiarity	44	14	5	36%	30	19	63%		0.06210
(Q29d) Availability of Training	44	14	5	36%	30	14	47%		0.20665
(Q29e) Availability of Time	44	14	5	36%	30	15	50%		0.17634
(Q29f) Internal OSS Installed Base	44	14	5	36%	30	15	50%		0.17634
(Q29g) Inertia (i.e. level of acceptance)	44	14	1	7%	30	5	17%		0.28263
(Q29h) Conservative Management	44	14	0	0%	30	4	13%		0.20188
(Q29i) Availability of Commercial Support	44	14	3	21%	30	10	33%		0.21066
(Q29j) Trial-ability (i.e. ability to demo capability)	44	14	5	36%	30	17	57%		0.11395
(Q30a) Unacceptable License Terms	44	14	7	50%	30	13	43%		0.23339
(Q30b) Overwhelming number of patches and upgrades	44	14	9	64%	30	19	63%		0.26244
(Q30c) Lack of Technical Support	44	14	12	86%	30	27	90%		0.34020
(Q30d) Complexity	44	14	10	71%	30	22	73%		0.27779
(Q30e) Proprietary Volume Purchase Agreement	44	14	**8**	57%	30	21	70%		0.18687
(30f) Lack of Resource	44	14	**12**	86%	30	23	77%		0.26132
(Q30g) Switching Costs	44	14	**10**	71%	30	22	73%		0.27779
(Q30h) Set of Standards	44	14	11	79%	30	20	67%		0.21066
(Q30i) Lack of Relevance	44	14	9	64%	30	18	60%		0.25229
(Q32) Past Implementation	44	14	3	21%	30	8	27%		0.27779
(Q33) Organisation is Active OSS User	44	14	4	29%	30	11	37%		0.23784
*p value<0.05									
**p value<0.01									
***p value<0.005									

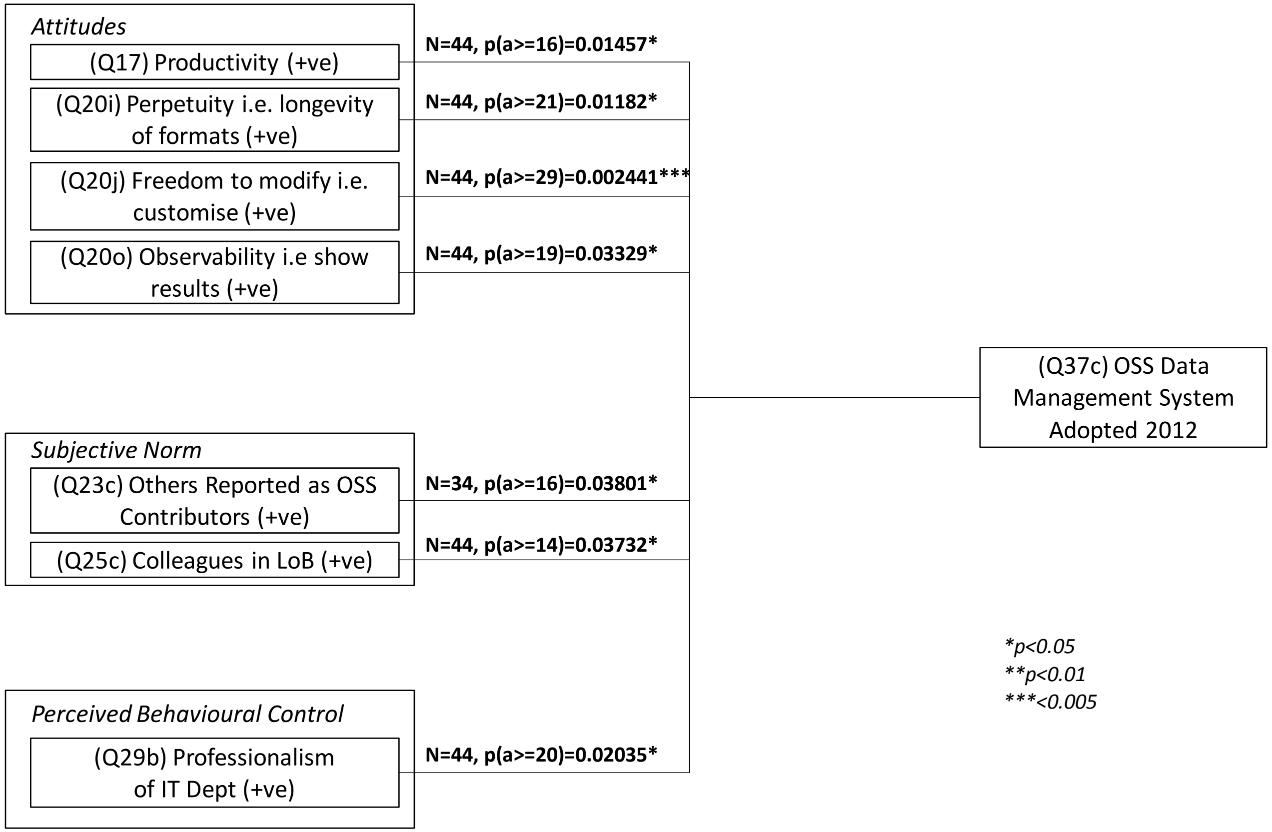
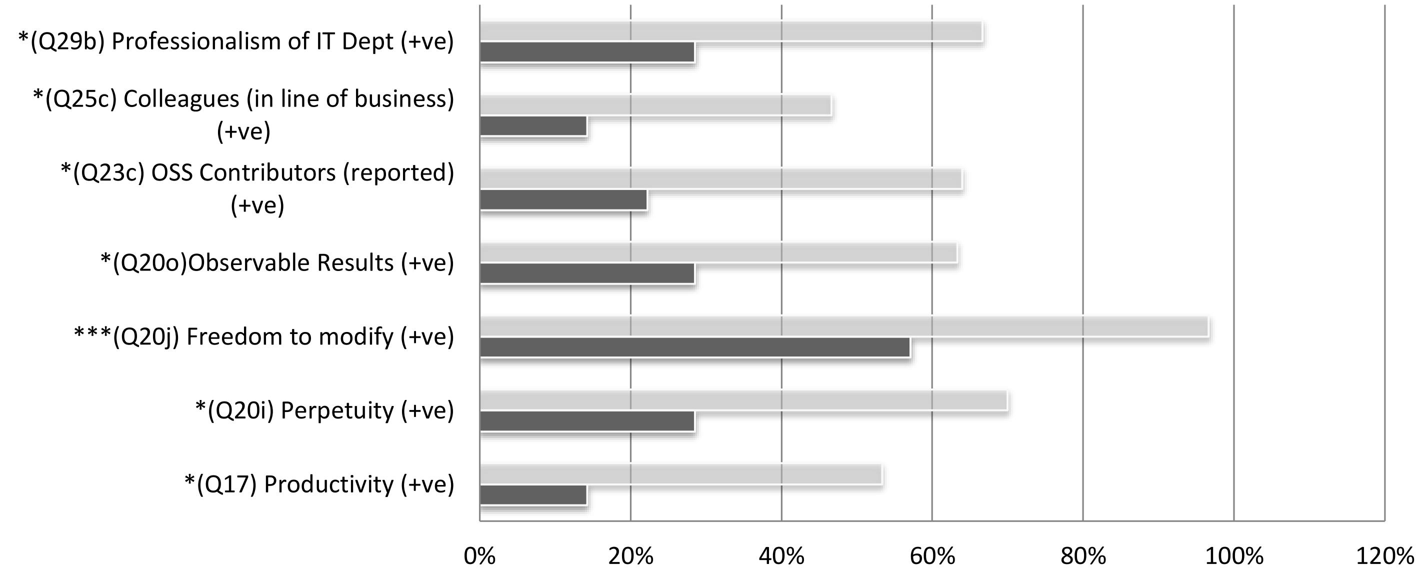


Figure 0.45: Factors Associated with OSS Adoption in the Data Management System Subcategory



	*(Q17) Productivity (+ve)	*(Q20i) Perpetuity (+ve)	***(Q20j) Freedom to modify (+ve)	*(Q20o)Observable Results (+ve)	*(Q23c) OSS Contributors (reported) (+ve)	*(Q25c) Colleagues (in line of business) (+ve)	*(Q29b) Professionalism of IT Dept (+ve)
OSS Database Management System Adopters in 2012	53%	70%	97%	63%	64%	47%	67%
OSS Database Management System Non-adopters in 2012	14%	29%	57%	29%	22%	14%	29%

Figure 0.46: Bar Chart Illustrating Factors Associated with OSS Adoption in the Database Management System Subcategory

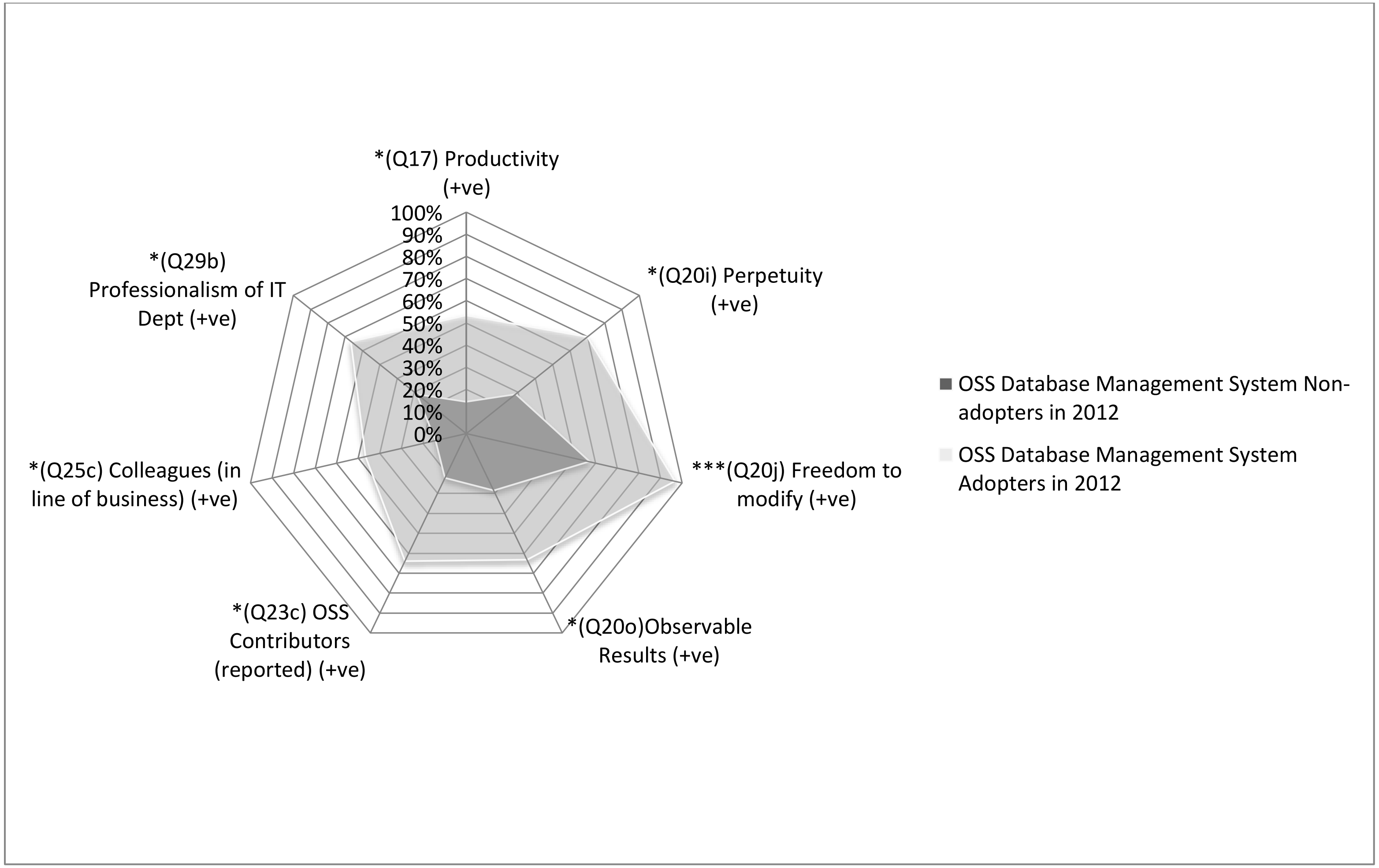


Figure 0.47: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Database Management Systems Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show ten statistically significant factors for intention to adopt OSS of this category of software in 2013. Most notably factors with a confidence level of greater than 99% and positively associated with OSS adoption in this category were Job Performance and Freedom to modify. All of the remaining factors were shown to be greater than 95% confidence level and only one was negatively associated with OSS adoption in this category, which was Second Best Perception.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as (a) Intention to Adopt OSS and (b) No Intention to Adopt OSS agree that the specified factors are important in terms of this category of software.

Similarly, Figure xyz, represents the ten factors in a radar diagram which illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) intend to adopt this category of OSS in 2012and (b) do not, in terms of statistically significant factors

Table 0.23: Analysis of Factors Associated with Intention to Adopt OSS in Database Management System Subcategory

	Sample (N)	No Intention to Adopt OSS Database Management System in 2013			Intention to Adopt OSS Database Management System in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	42	13	3	23%	29	16	55%		0.04344
(Q18) Category Killer	42	13	5	38%	29	11	38%		0.26741
*(Q20a) Security (+ve)	42	13	6	46%	29	23	79%	*p(a>=23)=0.03864	0.03194
(Q20b) Cost	42	13	11	85%	29	24	83%		0.34335
(Q20c) Quality	42	13	4	31%	29	17	59%		0.06894
(20d) Flexibility	42	13	6	46%	29	22	76%		0.05067
(Q20e) Technologically Disruptive	42	13	11	85%	29	19	66%		0.14128
(Q20f) Relative Advantage	42	13	7	54%	29	18	62%		0.23313
**(Q20g) Job Performance (+ve)	42	13	4	31%	29	22	76%	**p(a>=22)=0.007575	0.00670
(Q20h) Transparency	42	13	6	46%	29	20	69%		0.10321
*(Q20i) Perpetuity (+ve)	42	13	5	38%	29	21	72%	*p(a>=21)=0.04075	0.03318
*(Q20j) Freedom to modify (+ve)	42	13	9	69%	29	29	100%	**p(a>=29)=0.006388	0.00639
(Q20k) Speed	42	13	5	38%	29	19	66%		0.07288
(Q20l) Knowledge Creation	42	13	8	62%	29	21	72%		0.21647
(Q20m) Creativity & Innovation	42	13	8	62%	29	21	72%		0.21647
(Q20n) Vendor Lock-in	42	13	11	85%	29	28	97%		0.19704
(Q20o)Observable Results	42	13	5	38%	29	18	62%		0.09966
(Q20p) Ideological Compatibility	42	13	9	69%	29	21	72%		0.27752
(Q21a) Unsustainable Business Model	42	13	9	69%	29	15	52%		0.15679
*(Q21b) Second Best Perception (-ve)	42	13	11	85%	29	13	45%	*p(a<=13)=0.01697	0.01497
(Q21c) Reliability (no better than propietary alternatives)	42	13	8	62%	29	14	48%		0.19428
(Q21d) Preference for building proprietary software skills	42	13	7	54%	29	13	45%		0.22666
(Q21e) Most OSS project fail to attract participants	42	13	7	54%	29	14	48%		0.24726
(Q21f) Hidden costs and questionable returns	42	13	10	77%	29	16	55%		0.11656
(Q21g) OSS commercial contracts not free (of charge)	42	13	6	46%	29	19	66%		0.13497
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	36	11	8	73%	25	24	96%		0.07003
(Q23b) Reported others success stories	36	11	8	73%	25	23	92%		0.13130
(Q23c) OSS Contributors (reported)	31	8	2	25%	23	15	65%		0.05177
(Q24a) Personal Identification with OSS Community	42	13	3	23%	29	10	34%		0.22449
(Q24b) Network Effects	42	13	5	38%	29	17	59%		0.12999
*(Q24c) Internal Politics (+ve)	42	13	0	0%	29	8	28%	*p(a>=8)=0.03636	0.03636
(Q24d) External Politics	42	13	2	15%	29	6	21%		0.31392
(Q24e) Organisational Culture	42	13	2	15%	29	9	31%		0.18249
(Q24f) Champion or Sponsor	42	13	9	69%	29	16	55%		0.19054
(Q24g) Commitment to local consultants/suppliers	42	13	1	8%	29	8	28%		0.12514
(Q24h) Lack of legally responsible third party	42	13	0	0%	29	4	14%		0.21220
(Q25a) Friends and Acquaintances	42	13	5	38%	29	13	45%		0.24694
(Q25b) OSS Contributors (influence)	42	13	6	46%	29	21	72%		0.07464
(Q25c) Colleagues (in line of business)	42	13	3	23%	29	14	48%		0.08710
*(Q25d) Colleagues (in IT Dept) (+ve)	42	13	3	23%	29	19	66%	*p(a>=19)=0.01278	0.01115
(Q25e) Colleagues (in Line of Business)	42	13	1	8%	29	8	28%		0.12514
(Q25f) Competitors	42	13	1	8%	29	1	3%		0.43786
(Q25g) Third Party Partners	42	13	0	0%	29	5	17%		0.13960
(Q25h) Suppliers	42	13	0	0%	29	2	7%		0.47154
(Q25i) Customers	42	13	1	8%	29	3	10%		0.42439
(Q25j) Government	42	13	6	46%	29	11	38%		0.23313
(Q25k) The Media	42	13	0	0%	29	7	24%		0.05785
(Q25l) The General Public	42	13	1	8%	29	6	21%		0.22890
Perceived Behavioural Control (PBC)									
*(Q27) Easy to implement (+ve)	42	13	2	15%	29	15	52%	*p(a>=15)=0.02742	0.02376
(Q28) Respondent's decision to adopt	42	13	5	38%	29	4	14%		0.06855
(Q29a) Set of Standards (Specifying Proprietary Software)	42	13	6	46%	29	18	62%		0.16785
(Q29b) Professionalism of IT Dept	42	13	5	38%	29	19	66%		0.07288
(Q29c) Availability of Resources, Expertise and Familiarity	42	13	5	38%	29	19	66%		0.07288
(Q29d) Availability of Training	42	13	5	38%	29	14	48%		0.22342
(Q29e) Availability of Time	42	13	5	38%	29	15	52%		0.19428
(Q29f) Internal OSS Installed Base	42	13	5	38%	29	16	55%		0.16227
(Q29g) Inertia (i.e. level of acceptance)	42	13	1	8%	29	5	17%		0.29430
(Q29h) Conservative Management	42	13	0	0%	29	4	14%		0.21220
(Q29i) Availability of Commercial Support	42	13	4	31%	29	10	34%		0.27093
(Q29j) Trial-ability (i.e. ability to demo capability)	42	13	7	54%	29	16	55%		0.26066
(Q30a) Unacceptable License Terms	42	13	5	38%	29	15	52%		0.19428
(Q30b) Overwhelming number of patches and upgrades	42	13	8	62%	29	19	66%		0.26125
(Q30c) Lack of Technical Support	42	13	11	85%	29	26	90%		0.33504
(Q30d) Complexity	42	13	11	85%	29	20	69%		0.18249
(Q30e) Proprietary Volume Purchase Agreement	42	13	9	69%	29	19	66%		0.27093
(30f) Lack of Resource	42	13	11	85%	29	23	79%		0.31392
(Q30g) Switching Costs	42	13	11	85%	29	21	72%		0.22752
(Q30h) Set of Standards	42	13	10	77%	29	21	72%		0.28677
(Q30i) Lack of Relevance	42	13	8	62%	29	18	62%		0.26741
*(Q32) Past Implementation (+ve)	42	13	0	0%	29	9	31%	*p(a>=9)=0.02246	0.02246
*(Q33) Organisation is Active OSS User (+ve)	42	13	1	8%	29	13	45%	*p(a>=13)=0.01816	0.01669
*p value<0.05									
**p value<0.01									
***p value<0.005									

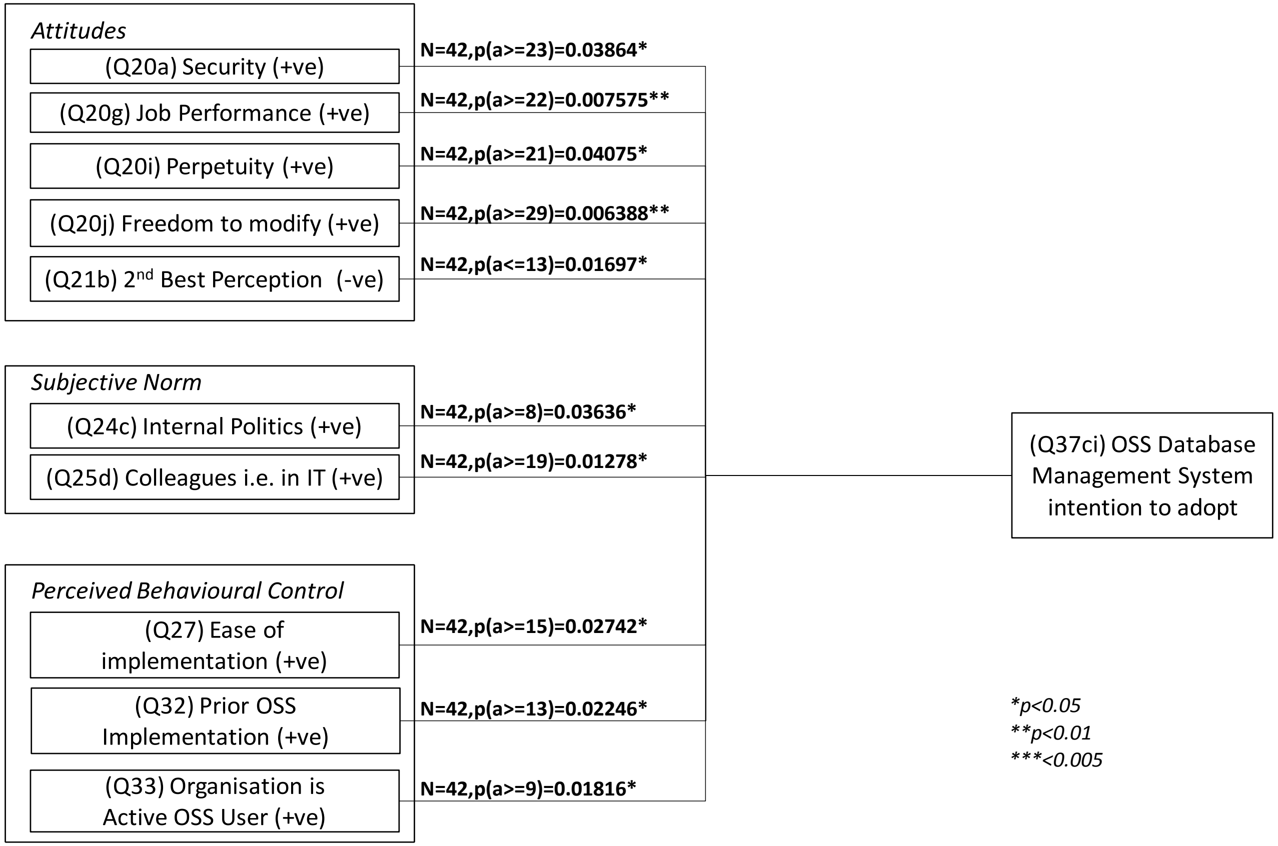
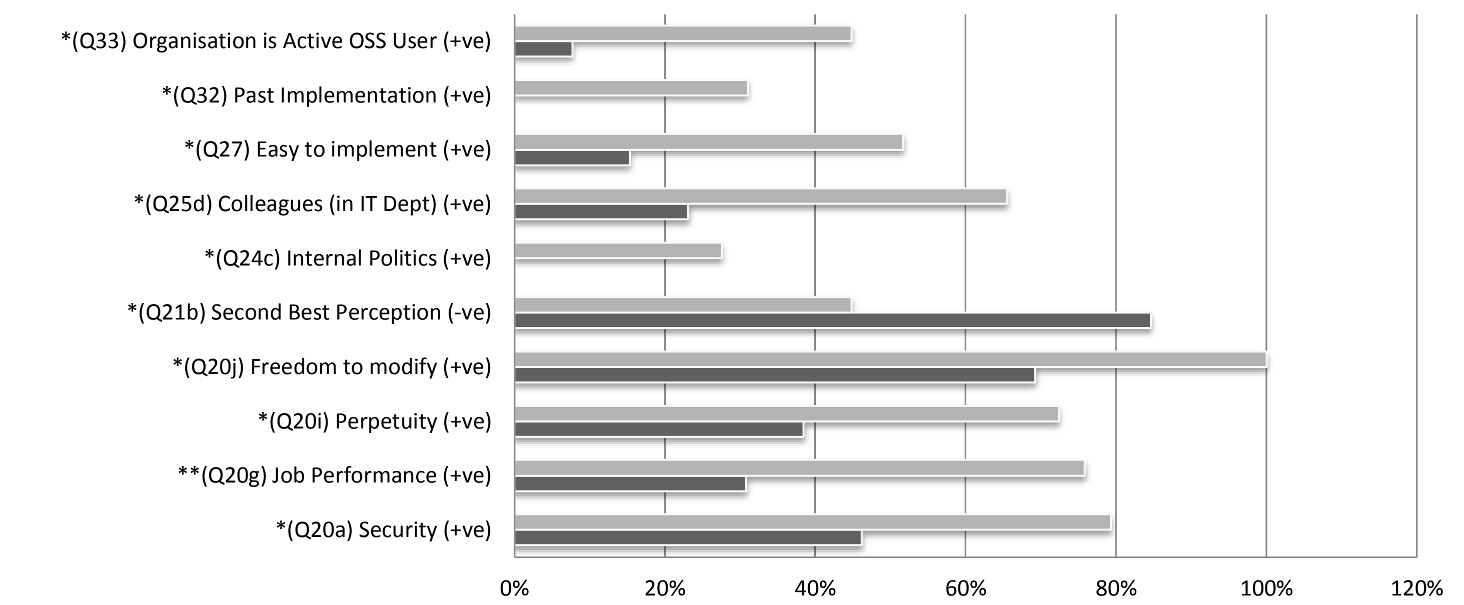


Figure 0.48: Factors Associated with the Intention to Adopt OSS in the Database Management System Subcategory



	*(Q20a) Security (+ve)	**(Q20g) Job Performance (+ve)	*(Q20i) Perpetuity (+ve)	*(Q20j) Freedom to modify (+ve)	*(Q21b) Second Best Perception (-ve)	*(Q24c) Internal Politics (+ve)	*(Q25d) Colleagues (in IT Dept) (+ve)	*(Q27) Easy to implement (+ve)	*(Q32) Past Implementation (+ve)	*(Q33) Organisation is Active OSS User (+ve)
■ Intention to Adopt OSS Database Management System in 2013	79%	76%	72%	100%	45%	28%	66%	52%	31%	45%
■ No Intention to Adopt OSS Database Management System in 2013	46%	31%	38%	69%	85%	0%	23%	15%	0%	8%

Figure 0.49: Bar Chart Illustrating Factors Associated with Intention to Adopt OSS in the Database Management System Subcategory

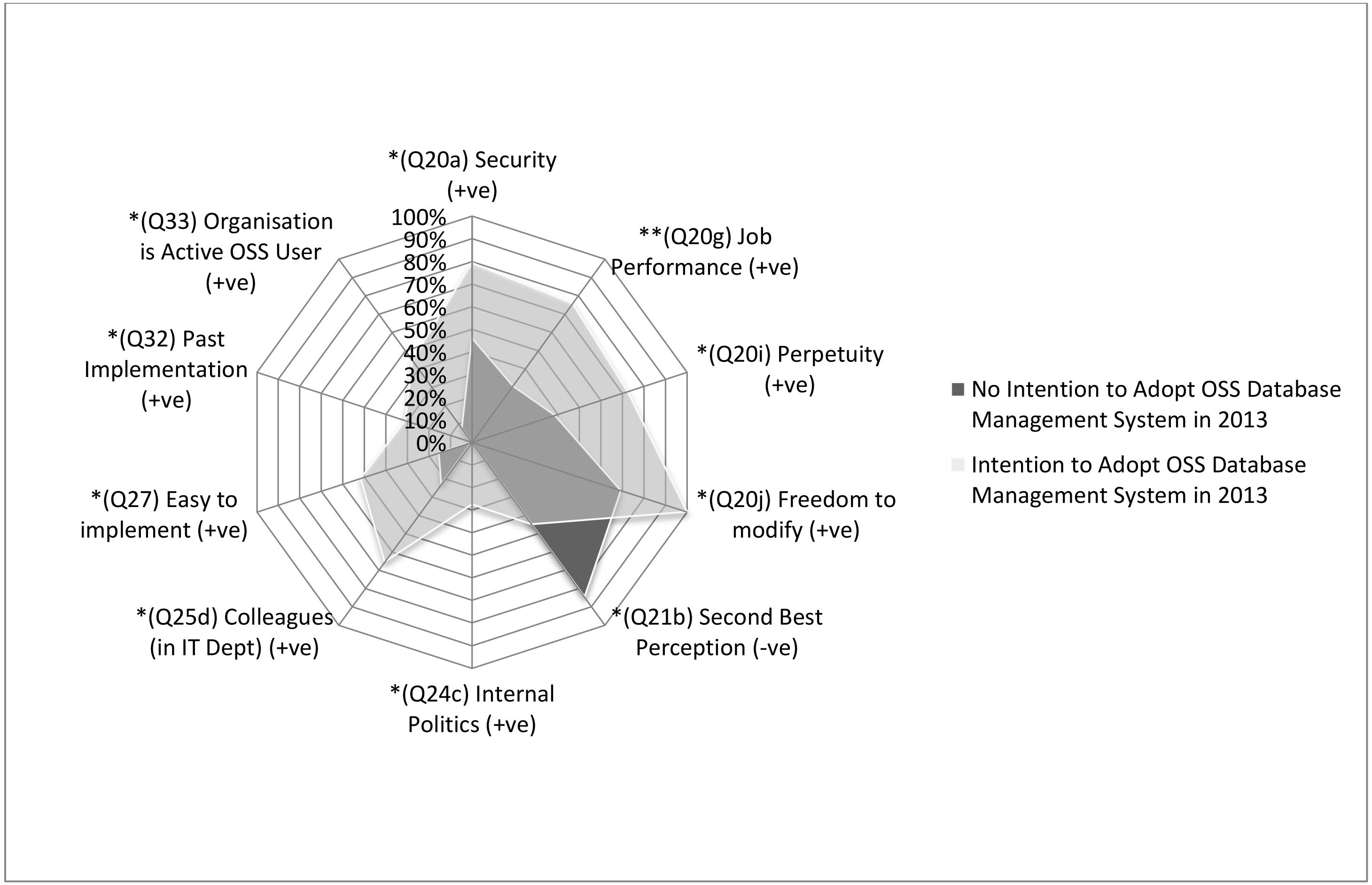
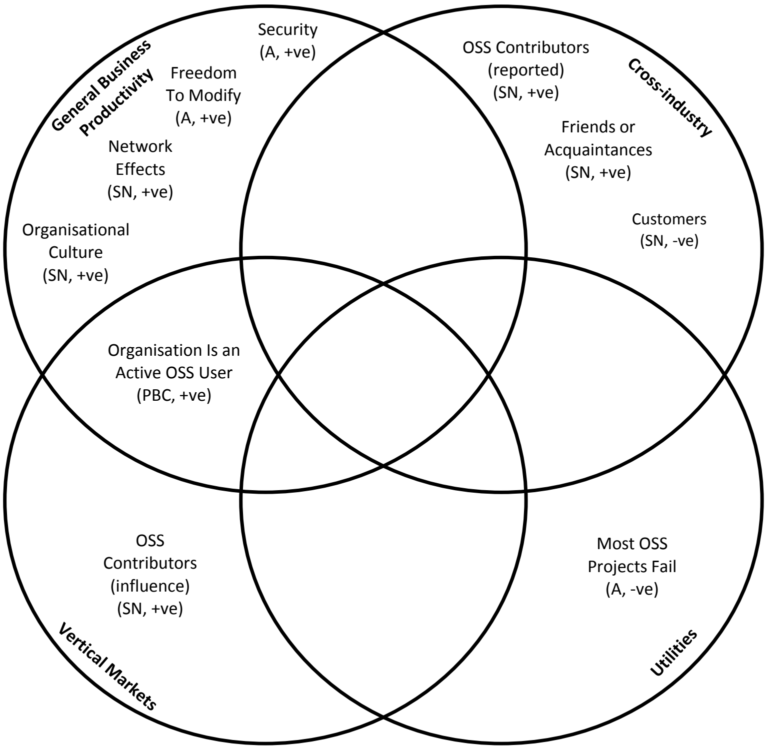


Figure 0.50: Radar Graph Illustrating Differences in Responses for Factors Associated with Intention to Adopt OSS in the Database Management Systems Subcategory

Applications Software

The diagram below summarises the statistically significant factors, the TPB construct and whether the factors were driving (+ve) or inhibiting (-ve) the organisational OSS adoption behaviour in 2012 (by NAPCS applications software subcategory).



Syntax: Factor identified as statistically significant, (TPB Construct, identified as Driving or Inhibiting OSS)
Key: Attitude (A), Subjective Norm (SN), Perceived Behavioural Control (PBC), Driving (+ve) and Inhibiting (-ve) OSS Adoption

Figure 0.51: Comprehensive Summary of Driving/Inhibiting Factors for OSS Adoption (by Applications Subcategory)

The diagram below summarises the same information for intention to adopt OSS in 2013 (by applications subcategory).

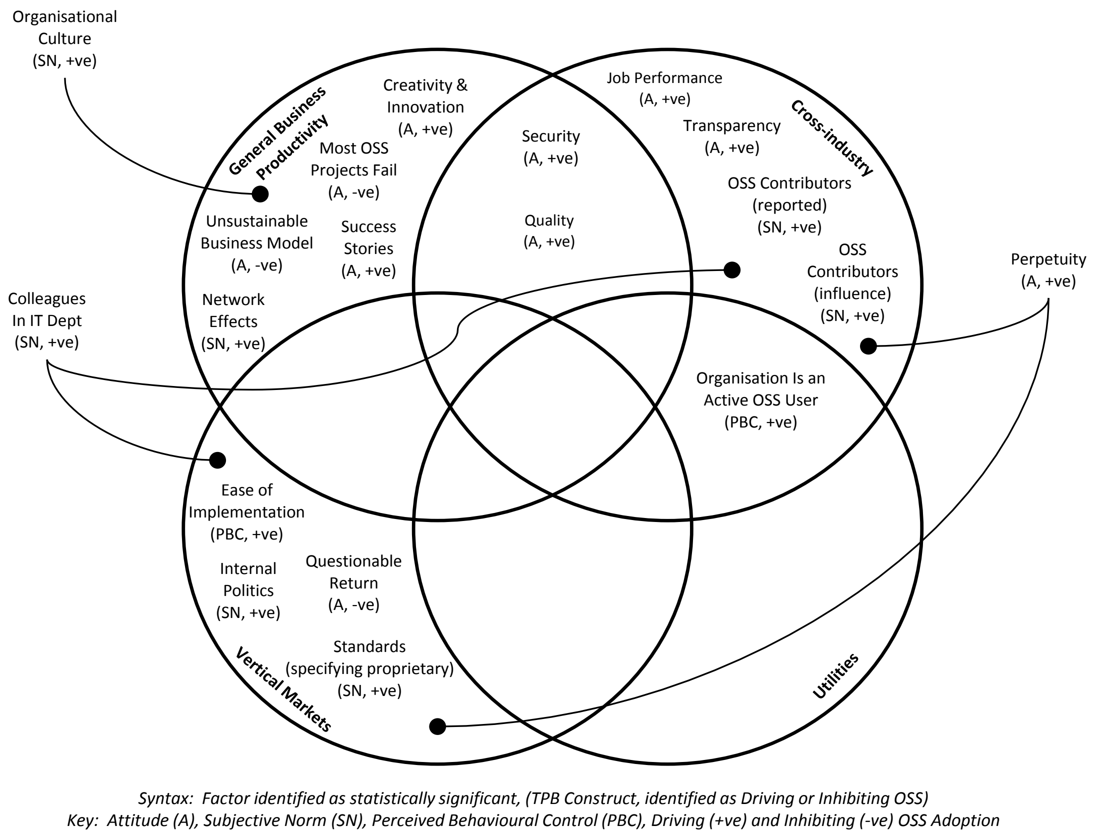


Figure 0.52: Comprehensive Summary of Driving/Inhibiting Factors for Intention to Adopt OSS in 2013 (by Application Subcategory)

The remaining sections detail the analysis of factors for the various organisational OSS adoption behaviours (by applications subcategory).

General Business Productivity

Adoption 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show five statistically significant factors for reported OSS adoption of this category of software in 2012. All of the factors were found to be of 95% confidence level. Additionally the factors were shown to be driving (i.e. positively associated with OSS adoption) and were specifically (a) within the attitude construct; Security and Freedom to Modify (b) with the subjective norm construct Network Effects and Organisational Culture and (c) within the subjective norm construct Organisation is an Active OSS user. No inhibiting factors were found for this software category.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below represents the same factors which illustrate the difference in salient beliefs between respondents who describe themselves as (a) those who intend to adopt OSS in this year and (b) those who do not, in terms of statistically significant factors.

Table 0.24: Analysis of Factors Associated with OSS Adoption in General Business Productivity Subcategory

	Sample (N)	OSS General Business Productivity Non-adopters in 2012			OSS General Business Productivity Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	44	22	9	41%	22	9	41%		0.24033
(Q18) Category Killer	44	22	6	27%	22	9	41%		0.16143
*(Q20a) Security (+ve)	44	22	11	50%	22	19	86%	*p(a>=19)=0.01085	0.00945
(Q20b) Cost	44	22	16	73%	22	20	91%		0.09725
(Q20c) Quality	44	22	8	36%	22	14	64%		0.04860
(20d) Flexibility	44	22	13	59%	22	15	68%		0.20357
(Q20e) Technologically Disruptive	44	22	15	68%	22	15	68%		0.25301
(Q20f) Relative Advantage	44	22	11	50%	22	15	68%		0.11686
(Q20g) Job Performance	44	22	13	59%	22	14	64%		0.23175
(Q20h) Transparency	44	22	12	55%	22	14	64%		0.20085
(Q20i) Perpetuity	44	22	12	55%	22	13	59%		0.22831
*(Q20j) Freedom to modify (+ve)	44	22	16	73%	22	21	95%	*p(a>=21)=0.04729	0.04284
(Q20k) Speed	44	22	13	59%	22	12	55%		0.22831
(Q20l) Knowledge Creation	44	22	14	64%	22	15	68%		0.23720
(Q20m) Creativity & Innovation	44	22	14	64%	22	17	77%		0.16220
(Q20n) Vendor Lock-in	44	22	18	82%	22	21	95%		0.14818
(Q20o)Observable Results	44	22	11	50%	22	12	55%		0.22665
(Q20p) Ideological Compatibility	44	22	13	59%	22	18	82%		0.07009
(Q21a) Unsustainable Business Model	44	22	15	68%	22	10	45%		0.07828
(Q21b) Second Best Perception	44	22	13	59%	22	13	59%		0.24033
(Q21c) Reliability (no better than propietary alternatives)	44	22	12	55%	22	12	55%		0.23745
(Q21d) Preference for building proprietary software skills	44	22	13	59%	22	8	36%		0.07903
(Q21e) Most OSS project fail to attract participants	44	22	13	59%	22	9	41%		0.11759
(Q21f) Hidden costs and questionable returns	44	22	15	68%	22	14	64%		0.23720
(Q21g) OSS commercial contracts not free (of charge)	44	22	13	59%	22	14	64%		0.23175
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	42	22	18	82%	20	19	95%		0.17198
(Q23b) Reported others success stories	42	22	18	82%	20	19	95%		0.17198
(Q23c) OSS Contributors (reported)	40	22	16	73%	18	12	67%		0.24792
(Q24a) Personal Identification with OSS Community	44	22	6	27%	22	7	32%		0.24511
*(Q24b) Network Effects (+ve)	44	22	7	32%	22	15	68%	*p(a>=15)=0.01683	0.01382
(Q24c) Internal Politics	44	22	5	23%	22	3	14%		0.22882
(Q24d) External Politics	44	22	5	23%	22	2	9%		0.15874
*(Q24e) Organisational Culture (+ve)	44	22	2	9%	22	8	36%	*p(a>=8)=0.03444	0.02977
(Q24f) Champion or Sponsor	44	22	14	64%	22	11	50%		0.16012
(Q24g) Commitment to local consultants/suppliers	44	22	6	27%	22	3	14%		0.16208
(Q24h) Lack of legally responsible third party	44	22	1	5%	22	3	14%		0.24957
(Q25a) Friends and Acquaintances	44	22	8	36%	22	10	45%		0.20085
(Q25b) OSS Contributors (influence)	44	22	11	50%	22	15	68%		0.11686
(Q25c) Colleagues (in line of business)	44	22	7	32%	22	9	41%		0.20357
(Q25d) Colleagues (in IT Dept)	44	22	9	41%	22	13	59%		0.11759
(Q25e) Colleagues (in Line of Business)	44	22	6	27%	22	3	14%		0.16208
(Q25f) Competitors	44	22	1	5%	22	1	5%		0.51163
(Q25g) Third Party Partners	44	22	3	14%	22	2	9%		0.32757
(Q25h) Suppliers	44	22	1	5%	22	1	5%		0.51163
(Q25i) Customers	44	22	1	5%	22	4	18%		0.14818
(Q25j) Government	44	22	9	41%	22	7	32%		0.20357
(Q25k) The Media	44	22	2	9%	22	5	23%		0.15874
(Q25l) The General Public	44	22	3	14%	22	4	18%		0.29397
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	44	22	8	36%	22	9	41%		0.23175
(Q28) Respondent's decision to adopt	44	22	5	23%	22	4	18%		0.27172
(Q29a) Set of Standards (Specifying Proprietary Software)	44	22	13	59%	22	10	45%		0.15982
(Q29b) Professionalism of IT Dept	44	22	14	64%	22	10	45%		0.11742
(Q29c) Availability of Resources, Expertise and Familiarity	44	22	13	59%	22	11	50%		0.19926
(Q29d) Availability of Training	44	22	11	50%	22	8	36%		0.16012
(Q29e) Availability of Time	44	22	11	50%	22	9	41%		0.19926
(Q29f) Internal OSS Installed Base	44	22	8	36%	22	12	55%		0.11742
(Q29g) Inertia (i.e. level of acceptance)	44	22	1	5%	22	5	23%		0.08207
(Q29h) Conservative Management	44	22	1	5%	22	3	14%		0.24957
(Q29i) Availability of Commercial Support	44	22	6	27%	22	7	32%		0.24511
(Q29j) Trial-ability (i.e. ability to demo capability)	44	22	10	45%	22	12	55%		0.19873
(Q30a) Unacceptable License Terms	44	22	9	41%	22	11	50%		0.19926
(Q30b) Overwhelming number of patches and upgrades	44	22	14	64%	22	14	64%		0.24538
(Q30c) Lack of Technical Support	44	22	19	86%	22	20	91%		0.32757
(Q30d) Complexity	44	22	17	77%	22	15	68%		0.21294
(Q30e) Proprietary Volume Purchase Agreement	44	22	15	68%	22	14	64%		0.23720
(30f) Lack of Resource	44	22	17	77%	22	18	82%		0.27172
(Q30g) Switching Costs	44	22	16	73%	22	16	73%		0.26396
(Q30h) Set of Standards	44	22	15	68%	22	16	73%		0.24511
(Q30i) Lack of Relevance	44	22	13	59%	22	14	64%		0.23175
(Q32) Past Implementation	44	22	4	18%	22	7	32%		0.16266
*(Q33) Organisation is Active OSS User (+ve)	44	22	4	18%	22	11	50%	*p(a>=11)=0.02731	0.02244
*p value<0.05									
**p value<0.01									
***p value<0.005									

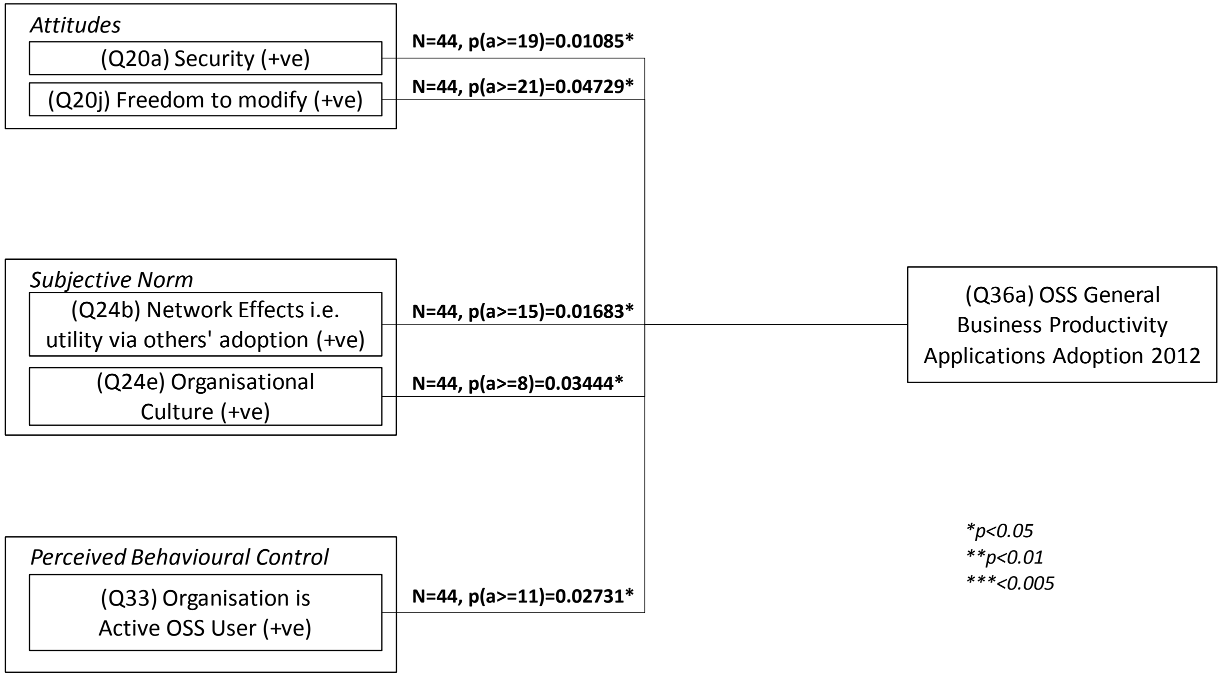
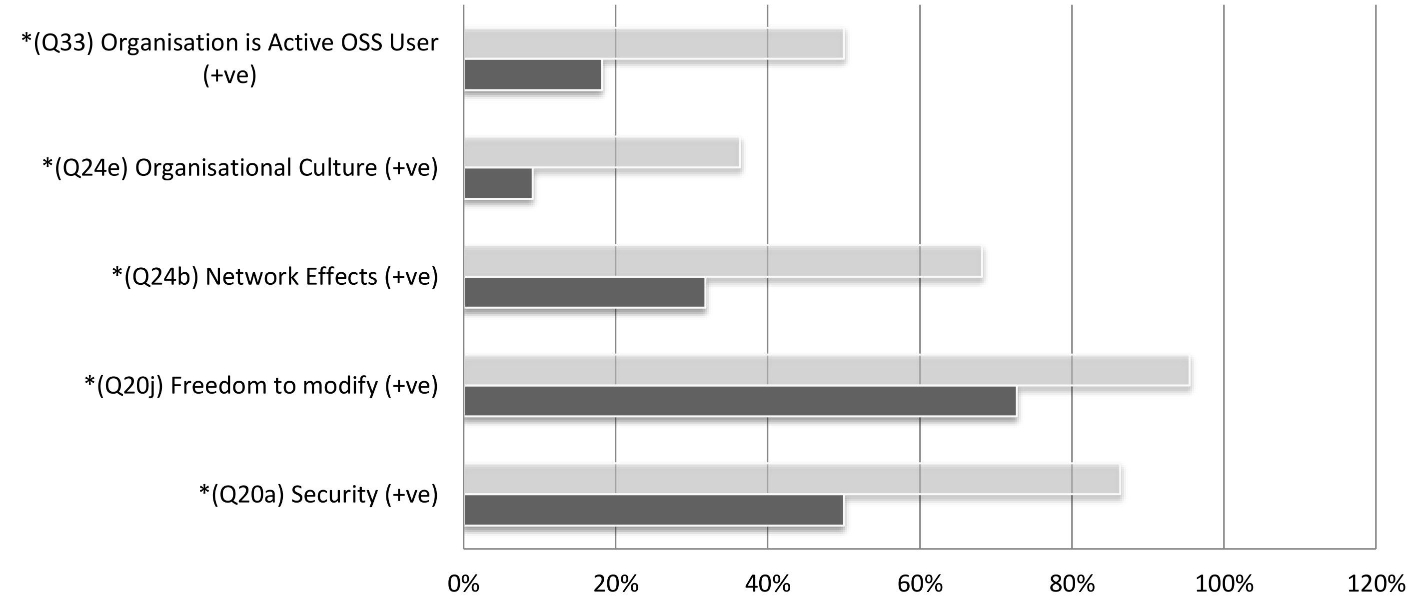


Figure 0.53: Factors Associated with OSS Adoption in the General Business Productivity Subcategory



	*(Q20a) Security (+ve)	*(Q20j) Freedom to modify (+ve)	*(Q24b) Network Effects (+ve)	*(Q24e) Organisational Culture (+ve)	*(Q33) Organisation is Active OSS User (+ve)
OSS General Business Productivity Adopters in 2012	86%	95%	68%	36%	50%
OSS General Business Productivity Non-adopters in 2012	50%	73%	32%	9%	18%

Figure 0.54: Bar Chart Illustrating Factors Associated with OSS Adoption in the General Business Productivity Subcategory

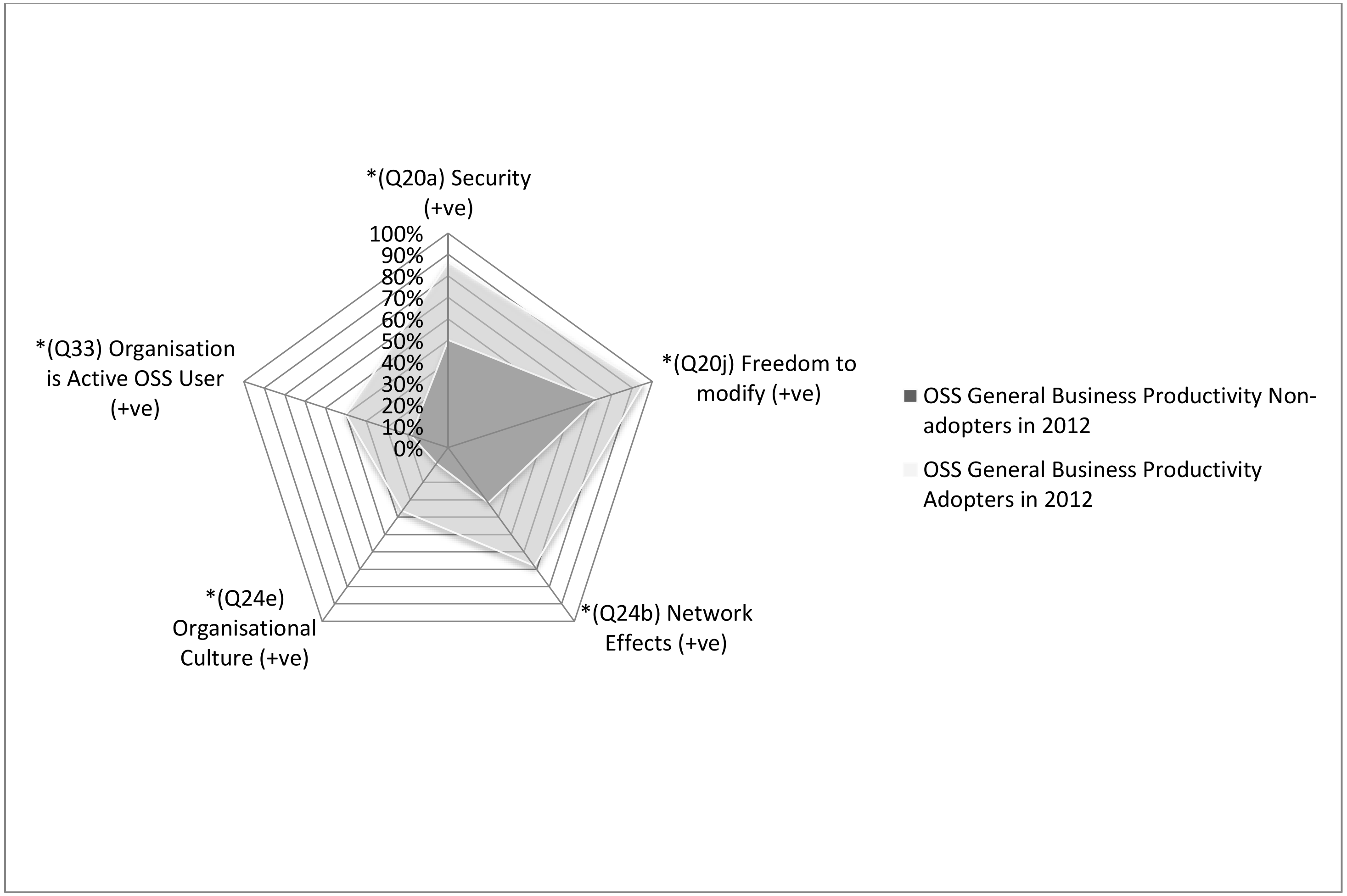


Figure 0.55: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the General Business Productivity Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show eight statistically significant factors for intention to adopt OSS of this category of software in 2013. All of the eight factors were shown to be greater than 95% confidence level and only two were found to be negatively associated with OSS adoption in this category, which were Attitude factors of Unsustainable Business Model and Most OSS Projects Fail. The remaining factors which were positively associated with OSS adoption in this category were Security, Quality, Creativity and Innovation in the attitude construct and Success Stories, Network Effects and Organisational Culture in the subjective norm category. There were no perceived behavioural control factors which were found to be statistically significant.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as (a) Intention to Adopt OSS and (b) No Intention to Adopt OSS agree that the specified factors are important in terms of this category of software.

Similarly, Figure xyz, represents the eight factors in a radar diagram which illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) intend to adopt this category of OSS in 2012and (b) do not, in terms of statistically significant factors

Table 0.25: Analysis of Factors Associated with Intention to Adopt OSS in General Business Productivity Category

	Sample (N)	No Intention to Adopt OSS General Business Productivity in 2013			Intention to Adopt OSS General Business Productivity in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	43	18	7	39%	25	11	44%		0.23317
(Q18) Category Killer	43	18	7	39%	25	8	32%		0.22715
*(Q20a) Security (+ve)	43	18	9	50%	25	20	80%	*p(a>=20)=0.04103	0.03296
(Q20b) Cost	43	18	13	72%	25	22	88%		0.13590
*(Q20c) Quality (+ve)	43	18	6	33%	25	16	64%	*p(a>=16)=0.04640	0.03605
(20d) Flexibility	43	18	10	56%	25	18	72%		0.13881
(Q20e) Technologically Disruptive	43	18	13	72%	25	18	72%		0.26851
(Q20f) Relative Advantage	43	18	9	50%	25	17	68%		0.12486
(Q20g) Job Performance	43	18	10	56%	25	16	64%		0.21226
(Q20h) Transparency	43	18	10	56%	25	17	68%		0.17847
(Q20i) Perpetuity	43	18	11	61%	25	14	56%		0.23317
(Q20j) Freedom to modify	43	18	14	78%	25	23	92%		0.15058
(Q20k) Speed	43	18	11	61%	25	14	56%		0.23317
(Q20l) Knowledge Creation	43	18	12	67%	25	17	68%		0.25617
*(Q20m) Creativity & Innovation (+ve)	43	18	10	56%	25	21	84%	*p(a>=21)=0.04429	0.03609
(Q20n) Vendor Lock-in	43	18	15	83%	25	24	96%		0.16530
(Q20o)Observable Results	43	18	9	50%	25	13	52%		0.24033
(Q20p) Ideological Compatibility	43	18	12	67%	25	18	72%		0.24397
*(Q21a) Unsustainable Business Model (-ve)	43	18	14	78%	25	11	44%	*p(a<=11)=0.02735	0.02242
(Q21b) Second Best Perception	43	18	11	61%	25	13	52%		0.20675
(Q21c) Reliability (no better than propietary alternatives)	43	18	11	61%	25	11	44%		0.13483
(Q21d) Preference for building proprietary software skills	43	18	11	61%	25	9	36%		0.06768
*(Q21e) Most OSS project fail to attract participants (-ve)	43	18	12	67%	25	8	32%	*p(a<=8)=0.02580	0.02090
(Q21f) Hidden costs and questionable returns	43	18	14	78%	25	14	56%		0.09001
(Q21g) OSS commercial contracts not free (of charge)	43	18	12	67%	25	15	60%		0.22883
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	38	14	11	79%	24	23	96%		0.11835
*(Q23b) Reported others success stories (+ve)	38	14	9	64%	24	23	96%	*p(a>=23)=0.01849	0.01740
(Q23c) OSS Contributors (reported)	38	13	4	31%	25	13	52%		0.12919
(Q24a) Personal Identification with OSS Community	43	18	6	33%	25	7	28%		0.24397
*(Q24b) Network Effects (+ve)	43	18	6	33%	25	17	68%	*p(a>=17)=0.02580	0.02090
(Q24c) Internal Politics	43	18	3	17%	25	5	20%		0.29898
(Q24d) External Politics	43	18	3	17%	25	5	20%		0.29898
*(Q24e) Organisational Culture (+ve)	43	18	1	6%	25	9	36%	*p(a>=9)=0.02088	0.01918
(Q24f) Champion or Sponsor	43	18	10	56%	25	15	60%		0.23512
(Q24g) Commitment to local consultants/suppliers	43	18	4	22%	25	5	20%		0.28830
(Q24h) Lack of legally responsible third party	43	18	1	6%	25	3	12%		0.33547
(Q25a) Friends and Acquaintances	43	18	7	39%	25	11	44%		0.23317
(Q25b) OSS Contributors (influence)	43	18	10	56%	25	16	64%		0.21226
(Q25c) Colleagues (in line of business)	43	18	6	33%	25	10	40%		0.22883
(Q25d) Colleagues (in IT Dept)	43	18	7	39%	25	16	64%		0.06768
(Q25e) Colleagues (in Line of Business)	43	18	5	28%	25	4	16%		0.19220
(Q25f) Competitors	43	18	1	6%	25	1	4%		0.49834
(Q25g) Third Party Partners	43	18	2	11%	25	3	12%		0.36557
(Q25h) Suppliers	43	18	0	0%	25	2	8%		0.33223
(Q25i) Customers	43	18	1	6%	25	4	16%		0.23655
(Q25j) Government	43	18	8	44%	25	9	36%		0.21226
(Q25k) The Media	43	18	2	11%	25	4	16%		0.31747
(Q25l) The General Public	43	18	2	11%	25	5	20%		0.25226
Perceived Behavioral Control (PBC)									
(Q27) Easy to implement	43	18	5	28%	25	11	44%		0.14402
(Q28) Respondent's decision to adopt	43	18	6	33%	25	3	12%		0.07571
(Q29a) Set of Standards (Specifying Proprietary Software)	43	18	11	61%	25	13	52%		0.20675
(Q29b) Professionalism of IT Dept	43	18	12	67%	25	13	52%		0.15869
(Q29c) Availability of Resources, Expertise and Familiarity	43	18	12	67%	25	12	48%		0.12060
(Q29d) Availability of Training	43	18	10	56%	25	9	36%		0.11168
(Q29e) Availability of Time	43	18	10	56%	25	10	40%		0.14891
(Q29f) Internal OSS Installed Base	43	18	8	44%	25	12	48%		0.23690
(Q29g) Inertia (i.e. level of acceptance)	43	18	1	6%	25	5	20%		0.15687
(Q29h) Conservative Management	43	18	1	6%	25	3	12%		0.33547
(Q29i) Availability of Commercial Support	43	18	5	28%	25	9	36%		0.22333
(Q29j) Trial-ability (i.e. ability to demo capability)	43	18	7	39%	25	16	64%		0.06768
(Q30a) Unacceptable License Terms	43	18	7	39%	25	13	52%		0.17229
(Q30b) Overwhelming number of patches and upgrades	43	18	10	56%	25	18	72%		0.13881
(Q30c) Lack of Technical Support	43	18	15	83%	25	24	96%		0.16530
(Q30d) Complexity	43	18	14	78%	25	18	72%		0.25573
(Q30e) Proprietary Volume Purchase Agreement	43	18	13	72%	25	16	64%		0.22333
(30f) Lack of Resource	43	18	13	72%	25	22	88%		0.13590
(Q30g) Switching Costs	43	18	13	72%	25	20	80%		0.23742
(Q30h) Set of Standards	43	18	11	61%	25	20	80%		0.11023
(Q30i) Lack of Relevance	43	18	12	67%	25	15	60%		0.22883
(Q32) Past Implementation	43	18	3	17%	25	6	24%		0.25627
(Q33) Organisation is Active OSS User	43	18	3	17%	25	11	44%		0.04641
*p value<0.05									
**p value<0.01									
***p value<0.005									

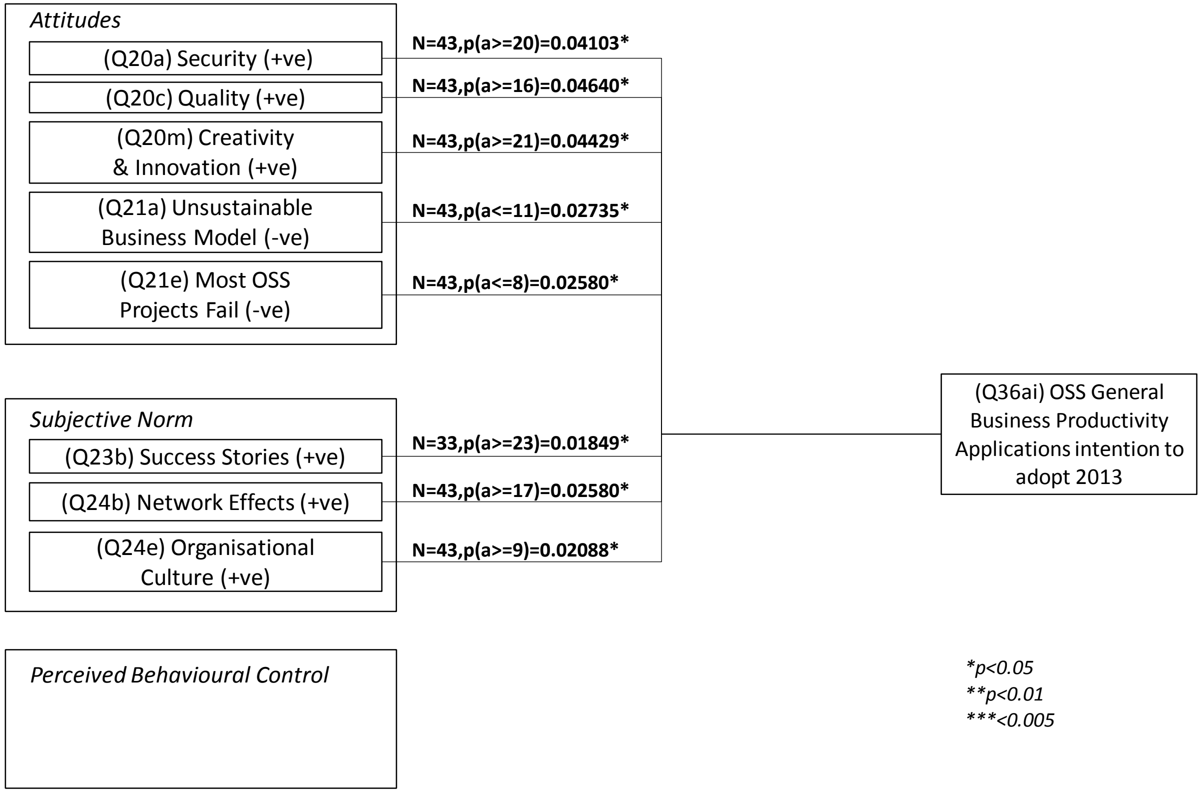
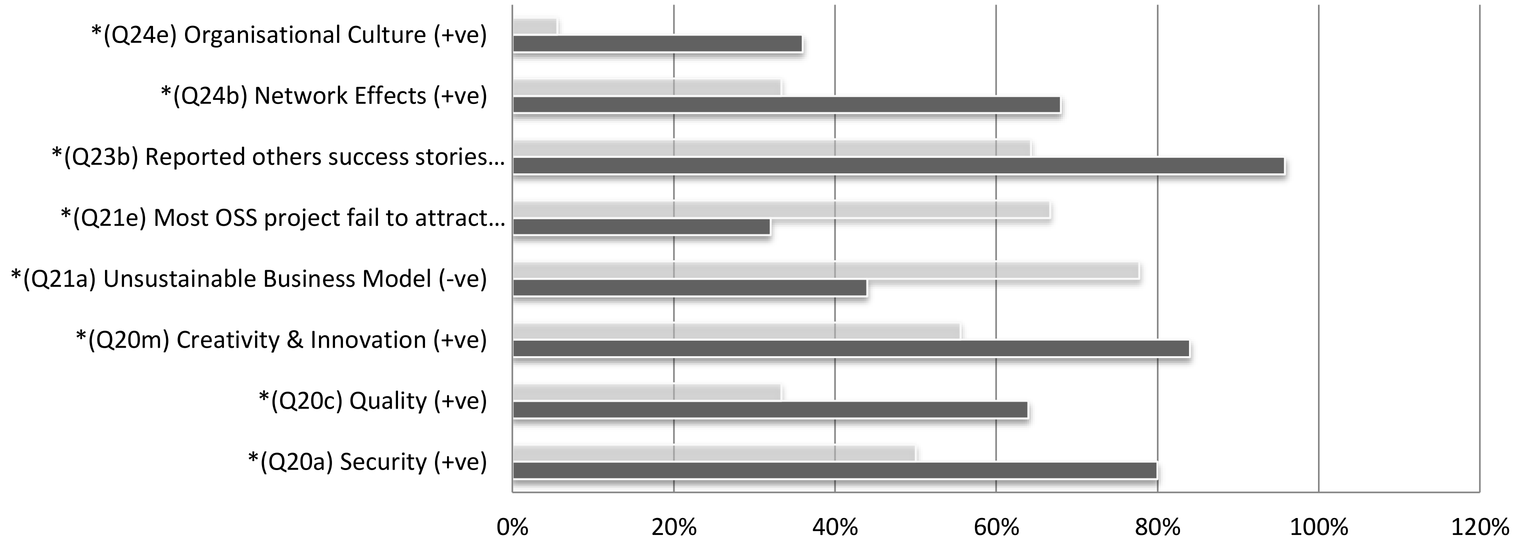


Figure 0.56: Factors Associated with Intention to Adopt OSS in the General Business Productivity Subcategory



	*(Q20a) Security (+ve)	*(Q20c) Quality (+ve)	*(Q20m) Creativity & Innovation (+ve)	*(Q21a) Unsustainable Business Model (-ve)	*(Q21e) Most OSS project fail to attract participants (-ve)	*(Q23b) Reported others success stories (+ve)	*(Q24b) Network Effects (+ve)	*(Q24e) Organisational Culture (+ve)
No Intention to Adopt OSS General Business Productivity in 2013	50%	33%	56%	78%	67%	64%	33%	6%
Intention to Adopt OSS General Business Productivity in 2013	80%	64%	84%	44%	32%	96%	68%	36%

Figure 0.57: Bar Chart Illustrating Factors Associated with Intention to Adopt OSS in the General Business Productivity Subcategory

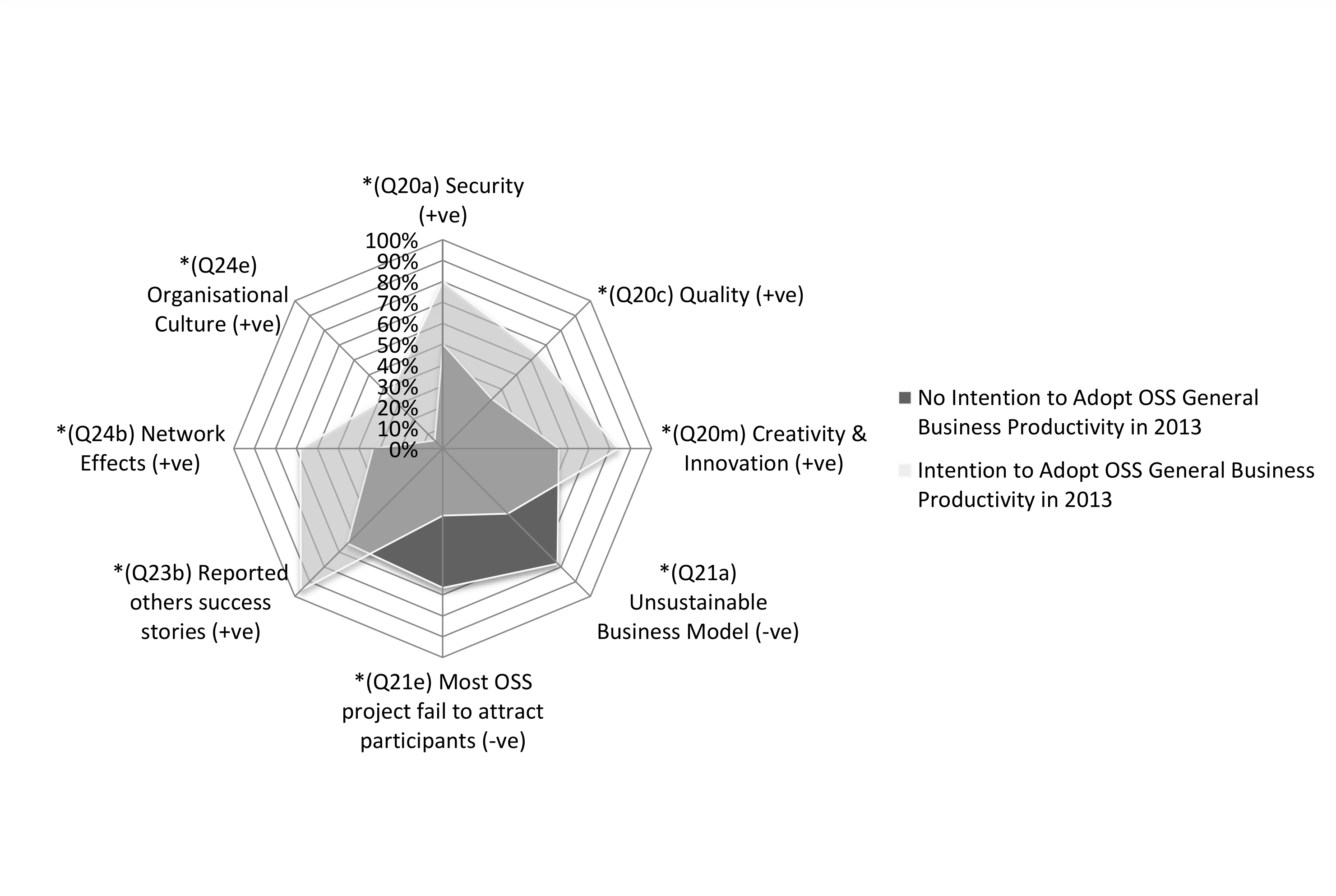


Figure 0.58: Radar Graph Illustrating Differences in Responses for Factors Associated with Intention to Adopt OSS in the General Business Productivity Subcategory

Cross-industry

Adoption 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show three statistically significant factors for reported OSS adoption of this category of software in 2012. All of the factors were found to be of greater than 95% confidence level and within the subjective norm construct. Additionally, two of the factors were driving (i.e. positively associated with the OSS adoption category) and were specifically; OSS Contributors (reported) and Friends and Acquaintances. Furthermore, a single statistically significant factor was found to be inhibiting OSS adoption (i.e. negatively associated), specifically Customers. No statistically significant factors were shown from the Attitude or Perceived Behavioural Control constructs for this software category.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below shows the same factors which illustrates the difference in salient beliefs between respondents who describe themselves as those who have (a) adopted this category of OSS in 2012and (b) have not, in terms of statistically significant factors

Table 0.26: Analysis of Factors Associated with OSS Adoption in the Cross-industry Subcategory

	Sample (N)	OSS Cross-industry Non-adopters in 2012			OSS Cross-industry Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	44	25	10	40%	19	8	42%		0.23997
(Q18) Category Killer	44	25	10	40%	19	5	26%		0.16532
(Q20a) Security	44	25	16	64%	19	14	74%		0.20665
(Q20b) Cost	44	25	20	80%	19	16	84%		0.29048
(Q20c) Quality	44	25	11	44%	19	11	58%		0.16012
(20d) Flexibility	44	25	17	68%	19	11	58%		0.19617
(Q20e) Technologically Disruptive	44	25	17	68%	19	13	68%		0.25527
(Q20f) Relative Advantage	44	25	14	56%	19	12	63%		0.21816
(Q20g) Job Performance	44	25	15	60%	19	12	63%		0.23997
(Q20h) Transparency	44	25	13	52%	19	13	68%		0.13705
(Q20i) Perpetuity	44	25	12	48%	19	13	68%		0.10015
(Q20j) Freedom to modify	44	25	21	84%	19	16	84%		0.31988
(Q20k) Speed	44	25	15	60%	19	10	53%		0.21433
(Q20l) Knowledge Creation	44	25	16	64%	19	13	68%		0.24109
(Q20m) Creativity & Innovation	44	25	19	76%	19	12	63%		0.17189
(Q20n) Vendor Lock-in	44	25	23	92%	19	16	84%		0.26768
(Q20o)Observable Results	44	25	14	56%	19	9	47%		0.20459
(Q20p) Ideological Compatibility	44	25	19	76%	19	12	63%		0.17189
(Q21a) Unsustainable Business Model	44	25	14	56%	19	11	58%		0.23913
(Q21b) Second Best Perception	44	25	16	64%	19	10	53%		0.18331
(Q21c) Reliability (no better than propietary alternatives)	44	25	15	60%	19	9	47%		0.17147
(Q21d) Preference for building proprietary software skills	44	25	12	48%	19	9	47%		0.23869
(Q21e) Most OSS project fail to attract participants	44	25	11	44%	19	11	58%		0.16012
(Q21f) Hidden costs and questionable returns	44	25	16	64%	19	13	68%		0.24109
(Q21g) OSS commercial contracts not free (of charge)	44	25	15	60%	19	12	63%		0.23997
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	38	21	19	90%	17	15	88%		0.38691
(Q23b) Reported others success stories	38	21	17	81%	17	15	88%		0.29484
*(Q23c) OSS Contributors (reported) (+ve)	34	19	7	37%	15	11	73%	*p(a>=11)=0.03739	0.03121
(Q24a) Personal Identification with OSS Community	44	25	8	32%	19	5	26%		0.24225
(Q24b) Network Effects	44	25	12	48%	19	10	53%		0.22831
(Q24c) Internal Politics	44	25	5	20%	19	3	16%		0.29048
(Q24d) External Politics	44	25	5	20%	19	2	11%		0.23708
(Q24e) Organisational Culture	44	25	7	28%	19	3	16%		0.18773
(Q24f) Champion or Sponsor	44	25	15	60%	19	10	53%		0.21433
(Q24g) Commitment to local consultants/suppliers	44	25	6	24%	19	3	16%		0.24207
(Q24h) Lack of legally responsible third party	44	25	2	8%	19	2	11%		0.37790
*(Q25a) Friends and Acquaintances (+ve)	44	25	7	28%	19	11	58%	*p(a>=11)=0.04551	0.03529
(Q25b) OSS Contributors (influence)	44	25	13	52%	19	13	68%		0.13705
(Q25c) Colleagues (in line of business)	44	25	10	40%	19	6	32%		0.21283
(Q25d) Colleagues (in IT Dept)	44	25	10	40%	19	12	63%		0.07828
(Q25e) Colleagues (in Line of Business)	44	25	6	24%	19	3	16%		0.24207
(Q25f) Competitors	44	25	2	8%	19	0	0%		0.31712
(Q25g) Third Party Partners	44	25	4	16%	19	1	5%		0.22132
(Q25h) Suppliers	44	25	2	8%	19	0	0%		0.31712
*(Q25i) Customers (+ve)	44	25	5	20%	19	0	0%	*p(a<=0)=0.04892	0.04892
(Q25j) Government	44	25	9	36%	19	7	37%		0.24703
(Q25k) The Media	44	25	4	16%	19	3	16%		0.31988
(Q25l) The General Public	44	25	4	16%	19	3	16%		0.31988
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	44	25	11	44%	19	6	32%		0.17620
(Q28) Respondent's decision to adopt	44	25	6	24%	19	3	16%		0.24207
(Q29a) Set of Standards (Specifying Proprietary Software)	44	25	11	44%	19	12	63%		0.11160
(Q29b) Professionalism of IT Dept	44	25	13	52%	19	11	58%		0.22319
(Q29c) Availability of Resources, Expertise and Familiarity	44	25	12	48%	19	12	63%		0.14879
(Q29d) Availability of Training	44	25	10	40%	19	9	47%		0.21433
(Q29e) Availability of Time	44	25	11	44%	19	9	47%		0.23382
(Q29f) Internal OSS Installed Base	44	25	13	52%	19	7	37%		0.14879
(Q29g) Inertia (i.e. level of acceptance)	44	25	3	12%	19	3	16%		0.31572
(Q29h) Conservative Management	44	25	3	12%	19	1	5%		0.32191
(Q29i) Availability of Commercial Support	44	25	7	28%	19	6	32%		0.25122
(Q29j) Trial-ability (i.e. ability to demo capability)	44	25	13	52%	19	9	47%		0.22831
(Q30a) Unacceptable License Terms	44	25	11	44%	19	9	47%		0.23382
(Q30b) Overwhelming number of patches and upgrades	44	25	16	64%	19	12	63%		0.24703
(Q30c) Lack of Technical Support	44	25	22	88%	19	17	89%		0.36215
(Q30d) Complexity	44	25	19	76%	19	13	68%		0.22783
(Q30e) Proprietary Volume Purchase Agreement	44	25	17	68%	19	12	63%		0.23704
(30f) Lack of Resource	44	25	20	80%	19	15	79%		0.29048
(Q30g) Switching Costs	44	25	19	76%	19	13	68%		0.22783
(Q30h) Set of Standards	44	25	15	60%	19	16	84%		0.06101
(Q30i) Lack of Relevance	44	25	13	52%	19	14	74%		0.08810
(Q32) Past Implementation	44	25	5	20%	19	6	32%		0.18796
(Q33) Organisation is Active OSS User	44	25	7	28%	19	8	42%		0.15803
*p value<0.05									
**p value<0.01									
***p value<0.005									

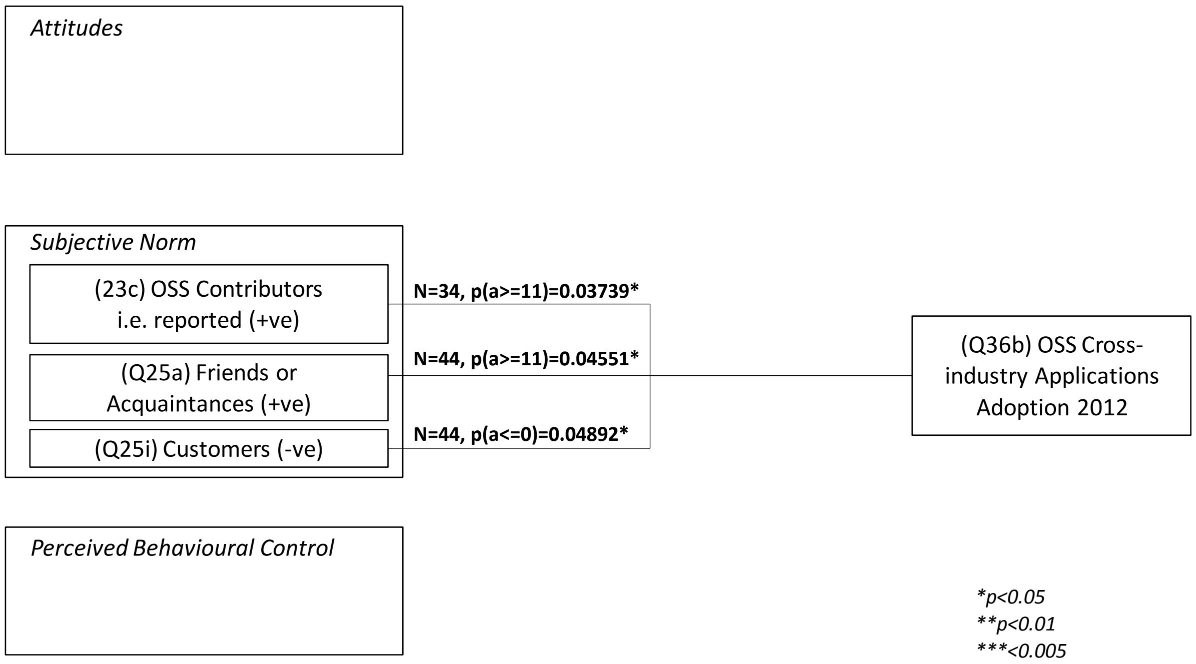
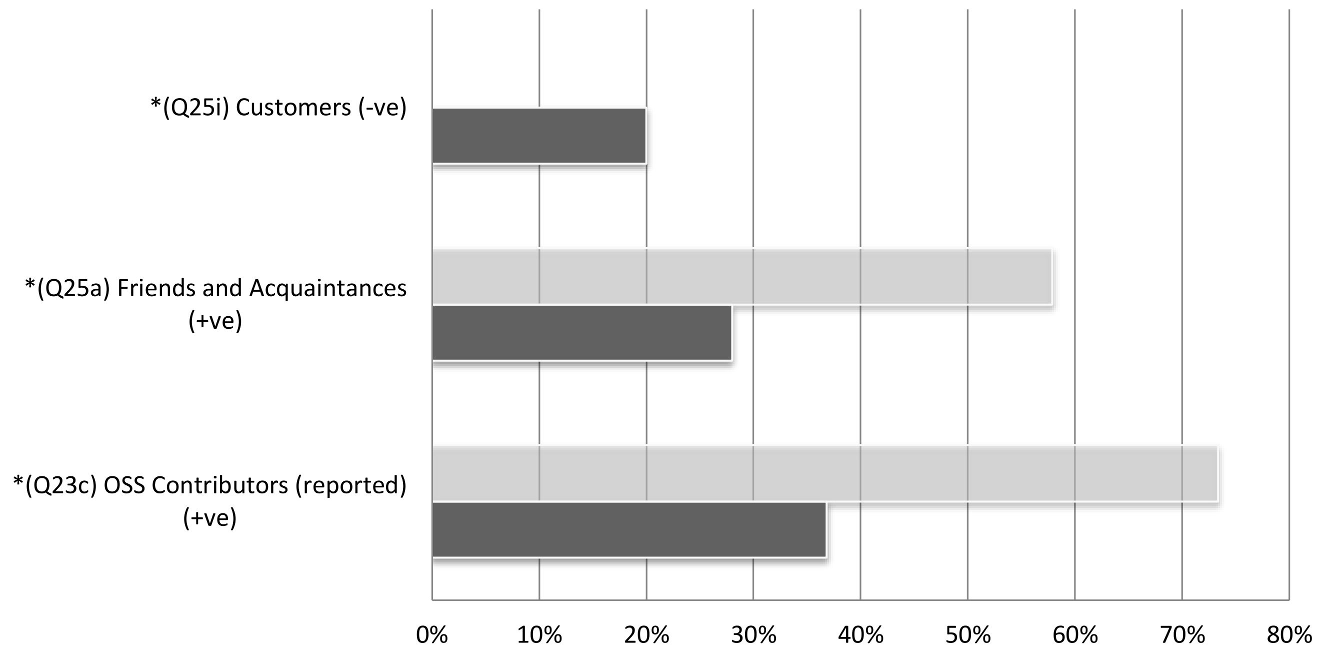


Figure 0.59: Factors Associated with OSS Adoption in the Cross-industry Subcategory



	*(Q23c) OSS Contributors (reported) (+ve)	*(Q25a) Friends and Acquaintances (+ve)	*(Q25i) Customers (-ve)
OSS Cross-industry Adopters in 2012	73%	58%	0%
OSS Cross-industry Non-adopters in 2012	37%	28%	20%

Figure 0.60: Bar Chart Illustrating Factors Associated with OSS Adoption in the Cross-industry Subcategory

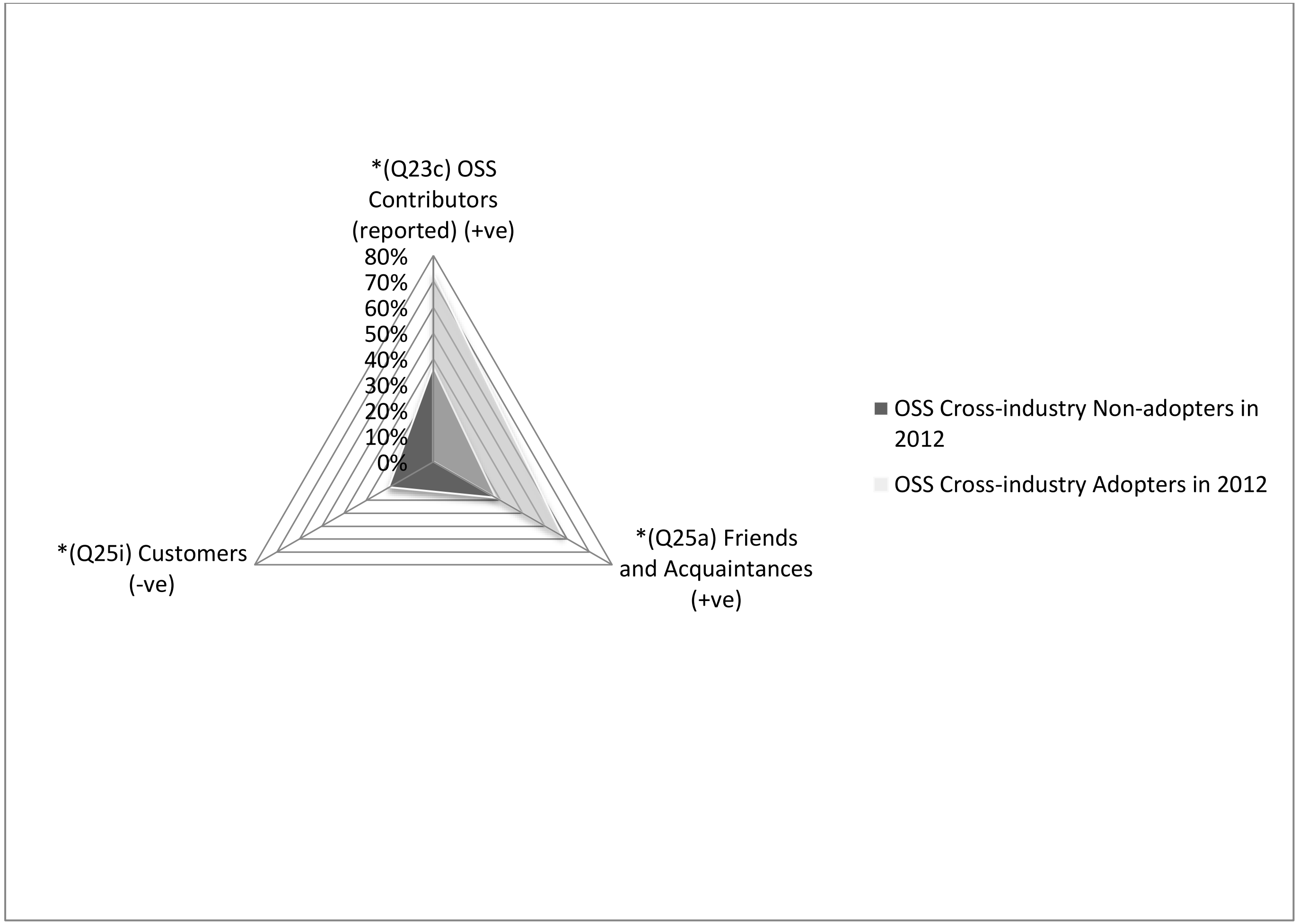


Figure 0.61: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in theCross-industry Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show nine statistically significant factors for intention to adopt OSS of this category of software in 2013. Most notably, the factor Organisation is an Active User was found to be greater than 99% confidence level. All of the remaining eight factors were shown to be greater than 95% confidence level and none were found to be negatively associated with OSS adoption in this category. The factors shown to be associated with the attitude construct and OSS adoption in this category were; Security, Quality, Job Performance, Transparency and Perpetuity. Similarly, the factors shown to be associated with the subjective norm construct were, OSS contributors (reported), OSS Contributors (influence) and Colleagues in IT. Finally, Organisation is an Active OSS User was also associated with the Perceived Behavioural Control construct.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as (a) Intention to Adopt OSS and (b) No Intention to Adopt OSS agree that the specified factors are important in terms of this category of software.

Similarly, Figure xyz, represents the nine factors in a radar diagram which illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) intend to adopt this category of OSS in 2012and (b) do not, in terms of statistically significant factors

Table 0.27: Analysis of Factors Associated with Intention to Adopt OSS in the Cross-industry Subcategory

	Sample (N)	No Intention to Adopt OSS Cross-industry in 2013			Intention to Adopt OSS Cross-industry in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	42	16	4	25%	26	13	50%		0.07433
(Q18) Category Killer	42	16	7	44%	26	7	27%		0.14236
*(Q20a) Security (+ve)	42	16	7	44%	26	20	77%	*p(a>=20)=0.03274	0.02669
(Q20b) Cost	42	16	13	81%	26	21	81%		0.31210
*(Q20c) Quality (+ve)	42	16	4	25%	26	16	62%	*p(a>=16)=0.02261	0.01882
(20d) Flexibility	42	16	8	50%	26	18	69%		0.12075
(Q20e) Technologically Disruptive	42	16	11	69%	26	18	69%		0.26741
(Q20f) Relative Advantage	42	16	7	44%	26	17	65%		0.10106
*(Q20g) Job Performance (+ve)	42	16	6	38%	26	18	69%	*p(a>=18)=0.04479	0.03537
(Q20h) Transparency (+ve)	42	16	6	38%	26	19	73%	*p(a>=19)=0.02514	0.02068
(Q20i) Perpetuity (+ve)	42	16	6	38%	26	18	69%	*p(a>=18)=0.04479	0.03537
(Q20j) Freedom to modify	42	16	13	81%	26	23	88%		0.27756
(Q20k) Speed	42	16	9	56%	26	15	58%		0.24990
(Q20l) Knowledge Creation	42	16	9	56%	26	18	69%		0.18113
(Q20m) Creativity & Innovation	42	16	12	75%	26	18	69%		0.25713
(Q20n) Vendor Lock-in	42	16	14	88%	26	23	88%		0.36677
(Q20o)Observable Results	42	16	7	44%	26	15	58%		0.17203
(Q20p) Ideological Compatibility	42	16	10	63%	26	18	69%		0.23668
(Q21a) Unsustainable Business Model	42	16	12	75%	26	13	50%		0.07433
(Q21b) Second Best Perception	42	16	12	75%	26	12	46%		0.04970
(Q21c) Reliability (no better than propietary alternatives)	42	16	11	69%	26	11	42%		0.06568
(Q21d) Preference for building proprietary software skills	42	16	10	63%	26	10	38%		0.08279
(Q21e) Most OSS project fail to attract participants	42	16	10	63%	26	11	42%		0.11495
(Q21f) Hidden costs and questionable returns	42	16	13	81%	26	14	54%		0.05481
(Q21g) OSS commercial contracts not free (of charge)	42	16	9	56%	26	16	62%		0.23862
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	37	13	11	85%	24	22	92%		0.32596
(Q23b) Reported others success stories	37	13	9	69%	24	22	92%		0.08489
*(Q23c) OSS Contributors (reported) (+ve)	33	12	3	25%	21	15	71%	*p(a>=15)=0.01288	0.01151
(Q24a) Personal Identification with OSS Community	42	16	5	31%	26	7	27%		0.25983
(Q24b) Network Effects	42	16	6	38%	26	15	58%		0.11495
(Q24c) Internal Politics	42	16	2	13%	26	6	23%		0.23407
(Q24d) External Politics	42	16	3	19%	26	5	19%		0.31210
(Q24e) Organisational Culture	42	16	3	19%	26	6	23%		0.28915
(Q24f) Champion or Sponsor	42	16	9	56%	26	14	54%		0.24729
(Q24g) Commitment to local consultants/suppliers	42	16	3	19%	26	6	23%		0.28915
(Q24h) Lack of legally responsible third party	42	16	1	6%	26	3	12%		0.37166
(Q25a) Friends and Acquaintances	42	16	5	31%	26	13	50%		0.12844
*(Q25b) OSS Contributors (influence) (+ve)	42	16	6	38%	26	19	73%	*p(a>=19)=0.02514	0.02068
(Q25c) Colleagues (in line of business)	42	16	4	25%	26	11	42%		0.14251
*(Q25d) Colleagues (in IT Dept) (+ve)	42	16	4	25%	26	17	65%	*p(a>=17)=0.01234	0.01056
(Q25e) Colleagues (in Line of Business)	42	16	2	13%	26	7	27%		0.17703
(Q25f) Competitors	42	16	1	6%	26	1	4%		0.48316
(Q25g) Third Party Partners	42	16	1	6%	26	4	15%		0.28119
(Q25h) Suppliers	42	16	0	0%	26	2	8%		0.37747
(Q25i) Customers	42	16	1	6%	26	3	12%		0.37166
(Q25j) Government	42	16	7	44%	26	10	38%		0.23862
(Q25k) The Media	42	16	0	0%	26	5	19%		0.07733
(Q25l) The General Public	42	16	2	13%	26	5	19%		0.29259
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	42	16	3	19%	26	12	46%		0.05481
(Q28) Respondent's decision to adopt	42	16	5	31%	26	4	15%		0.14645
(Q29a) Set of Standards (Specifying Proprietary Software)	42	16	8	50%	26	16	62%		0.19328
(Q29b) Professionalism of IT Dept	42	16	9	56%	26	16	62%		0.23862
(Q29c) Availability of Resources, Expertise and Familiarity	42	16	7	44%	26	16	62%		0.13601
(Q29d) Availability of Training	42	16	7	44%	26	12	46%		0.24729
(Q29e) Availability of Time	42	16	7	44%	26	12	46%		0.24729
(Q29f) Internal OSS Installed Base	42	16	8	50%	26	11	42%		0.22256
(Q29g) Inertia (i.e. level of acceptance)	42	16	2	13%	26	4	15%		0.34199
(Q29h) Conservative Management	42	16	1	6%	26	3	12%		0.37166
(Q29i) Availability of Commercial Support	42	16	5	31%	26	9	35%		0.25819
(Q29j) Trial-ability (i.e. ability to demo capability)	42	16	7	44%	26	15	58%		0.17203
(Q30a) Unacceptable License Terms	42	16	7	44%	26	12	46%		0.24729
(Q30b) Overwhelming number of patches and upgrades	42	16	12	75%	26	16	62%		0.18289
(Q30c) Lack of Technical Support	42	16	14	88%	26	24	92%		0.34843
(Q30d) Complexity	42	16	14	88%	26	18	69%		0.12741
(Q30e) Proprietary Volume Purchase Agreement	42	16	12	75%	26	16	62%		0.18289
(30f) Lack of Resource	42	16	14	88%	26	20	77%		0.23407
(Q30g) Switching Costs	42	16	13	81%	26	18	69%		0.20438
(Q30h) Set of Standards	42	16	10	63%	26	21	81%		0.12306
(Q30i) Lack of Relevance	42	16	10	63%	26	16	62%		0.25546
(Q32) Past Implementation	42	16	1	6%	26	7	27%		0.08917
*(Q33) Organisation is Active OSS User (+ve)	42	16	1	6%	26	12	46%	**p(a>=12)=0.006463	0.00606
*p value<0.05									
**p value<0.01									
***p value<0.005									

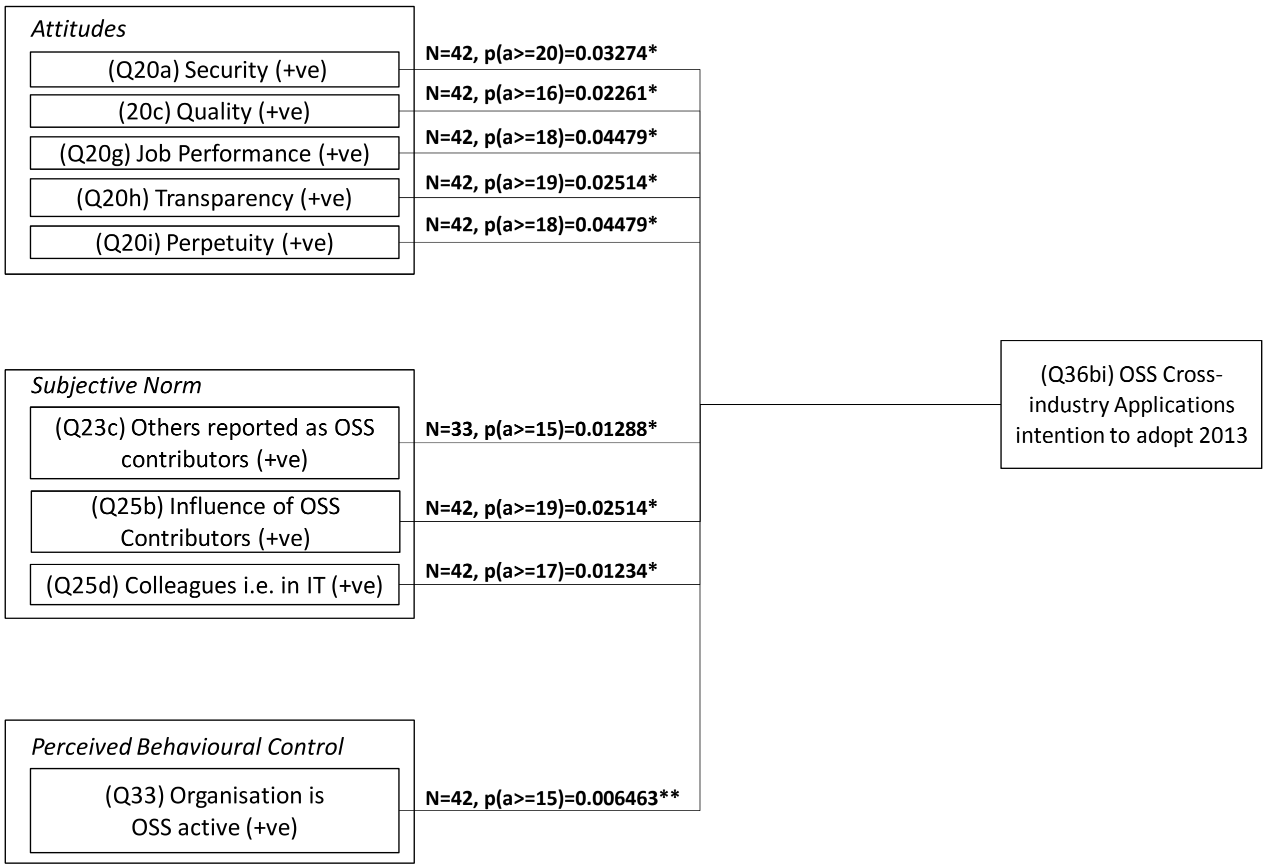
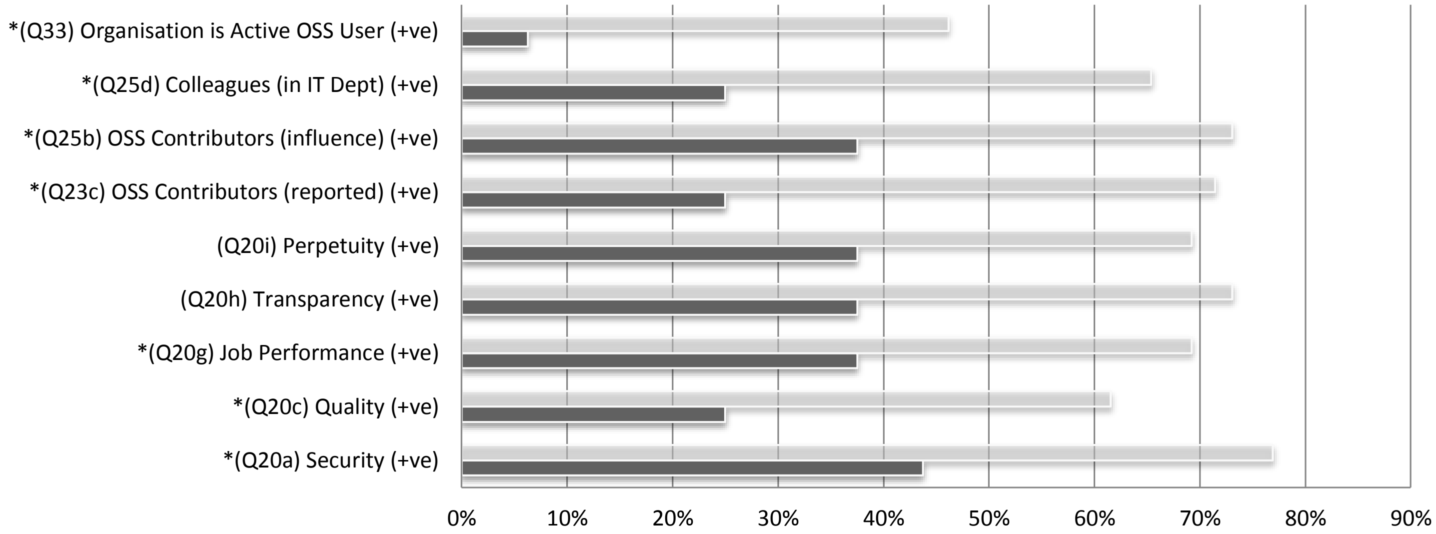


Figure 0.62: Factors Associated with Intention to Adopt OSS in the Cross-industry Subcategory



	*(Q20a) Security (+ve)	*(Q20c) Quality (+ve)	*(Q20g) Job Performance (+ve)	(Q20h) Transparency (+ve)	(Q20i) Perpetuity (+ve)	*(Q23c) OSS Contributors (reported) (+ve)	*(Q25b) OSS Contributors (influence) (+ve)	*(Q25d) Colleagues (in IT Dept) (+ve)	*(Q33) Organisation is Active OSS User (+ve)
Intention to Adopt OSS General Business Productivity in 2013	77%	62%	69%	73%	69%	71%	73%	65%	46%
No Intention to Adopt OSS General Business Productivity in 2013	44%	25%	38%	38%	38%	25%	38%	25%	6%

Figure 0.63: Bar Chart Illustrating Factors Associated with OSS Adoption in the General Business Productivity Subcategory

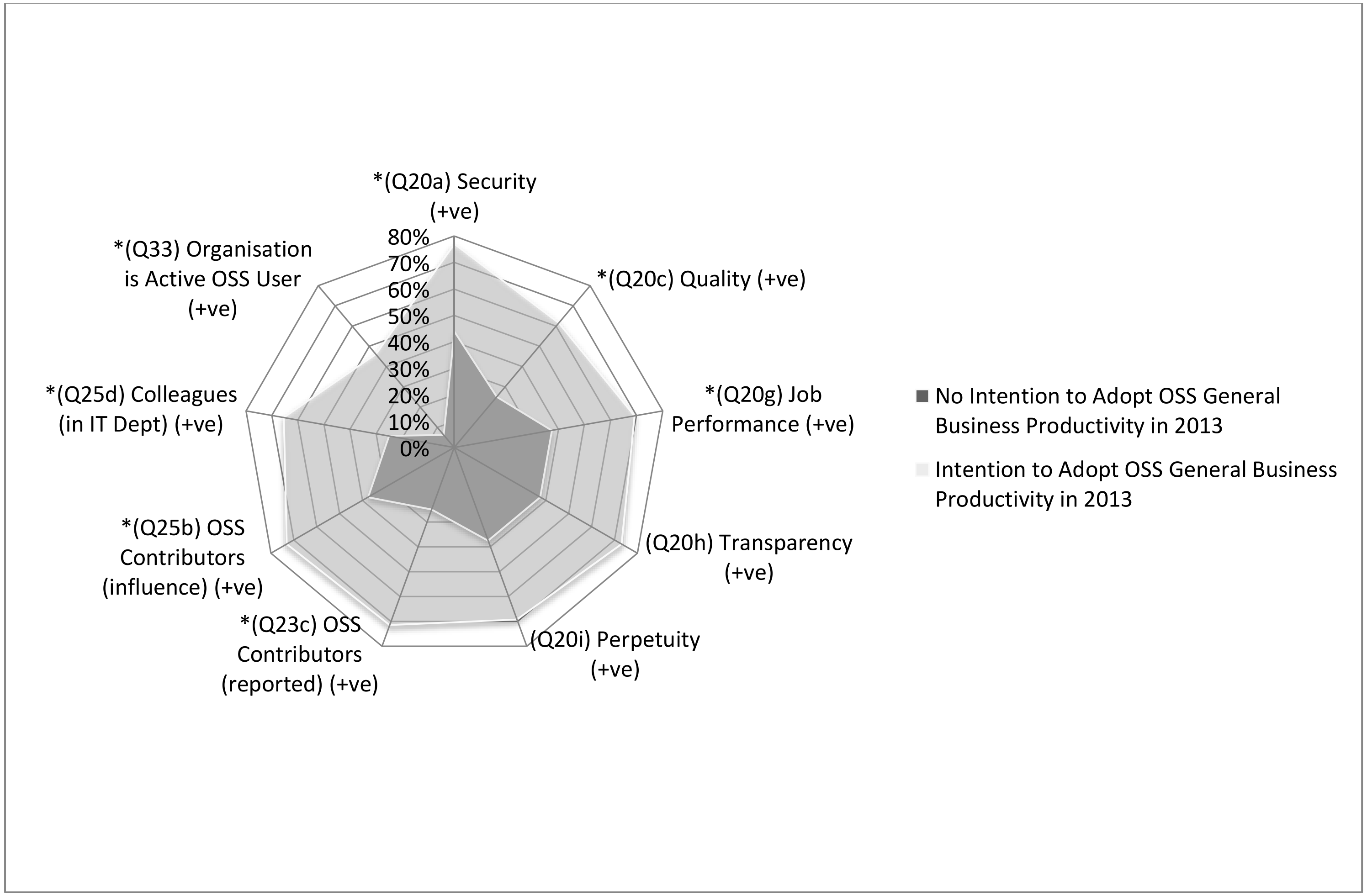


Figure 0.64: Radar Graph Illustrating Differences in Responses for Factors Associated with Intention to Adopt OSS in the General Business Productivity Subcategory

Utilities

Adoption 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show a single statistically significant factor for reported OSS adoption of this category of software in 2012. The Most OSS Projects Fail factor was found to be inhibiting (i.e. negatively associated with OSS adoption in this category) and with a greater than 95% confidence level in the Attitude construct. No statistically significant factors were shown from the Subjective Norm or Perceived Behavioural Control constructs for this software category.

Figure xyz, represents the same factor in a bar chart format which compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factor is important to organisational OSS adoption of this category of software.

Table 0.28: Analysis of Factors Associated with OSS Adoption in the Utilities Subcategory

	Sample (N)	OSS Utilities Non-adopters in 2012			OSS Utilities Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	44	10	2	20%	34	16	47%		0.09633
(Q18) Category Killer	44	10	3	30%	34	12	35%		0.28621
(Q20a) Security	44	10	6	60%	34	24	71%		0.23954
(Q20b) Cost	44	10	8	80%	34	28	82%		0.34148
(Q20c) Quality	44	10	5	50%	34	17	50%		0.27949
(20d) Flexibility	44	10	7	70%	34	21	62%		0.26723
(Q20e) Technologically Disruptive	44	10	8	80%	34	22	65%		0.21466
(Q20f) Relative Advantage	44	10	6	60%	34	20	59%		0.28393
(Q20g) Job Performance	44	10	6	60%	34	21	62%		0.28393
(Q20h) Transparency	44	10	6	60%	34	20	59%		0.28393
(Q20i) Perpetuity	44	10	5	50%	34	20	59%		0.24898
(Q20j) Freedom to modify	44	10	8	80%	34	29	85%		0.32676
(Q20k) Speed	44	10	5	50%	34	20	59%		0.24898
(Q20l) Knowledge Creation	44	10	7	70%	34	22	65%		0.28621
(Q20m) Creativity & Innovation	44	10	8	80%	34	23	68%		0.24799
(Q20n) Vendor Lock-in	44	10	8	80%	34	31	91%		0.24795
(Q20o)Observable Results	44	10	4	40%	34	19	56%		0.19365
(Q20p) Ideological Compatibility	44	10	6	60%	34	25	74%		0.21217
(Q21a) Unsustainable Business Model	44	10	8	80%	34	17	50%		0.07454
(Q21b) Second Best Perception	44	10	8	80%	34	18	53%		0.09633
(Q21c) Reliability (no better than propietary alternatives)	44	10	7	70%	34	17	50%		0.15902
(Q21d) Preference for building proprietary software skills	44	10	7	70%	34	14	41%		0.08299
*(Q21e) Most OSS project fail to attract participants (-ve)	44	10	8	80%	34	14	41%	*p(a<=14)=0.03444	0.02977
(Q21f) Hidden costs and questionable returns	44	10	9	90%	34	20	59%		0.06054
(Q21g) OSS commercial contracts not free (of charge)	44	10	7	70%	34	20	59%		0.24337
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	40	10	8	80%	30	27	90%		0.27766
(Q23b) Reported others success stories	40	10	8	80%	30	26	87%		0.32129
(Q23c) OSS Contributors (reported)	36	10	8	80%	26	16	62%		0.19097
(Q24a) Personal Identification with OSS Community	44	10	5	50%	34	8	24%		0.08813
(Q24b) Network Effects	44	10	5	50%	34	17	50%		0.27949
(Q24c) Internal Politics	44	10	2	20%	34	6	18%		0.34148
(Q24d) External Politics	44	10	1	10%	34	6	18%		0.35096
(Q24e) Organisational Culture	44	10	2	20%	34	8	24%		0.32928
(Q24f) Champion or Sponsor	44	10	6	60%	34	19	56%		0.27665
(Q24g) Commitment to local consultants/suppliers	44	10	3	30%	34	6	18%		0.22765
(Q24h) Lack of legally responsible third party	44	10	1	10%	34	3	9%		0.44081
(Q25a) Friends and Acquaintances	44	10	5	50%	34	13	38%		0.22714
(Q25b) OSS Contributors (influence)	44	10	4	40%	34	22	65%		0.11185
(Q25c) Colleagues (in line of business)	44	10	3	30%	34	13	38%		0.26723
(Q25d) Colleagues (in IT Dept)	44	10	3	30%	34	19	56%		0.10585
(Q25e) Colleagues (in Line of Business)	44	10	2	20%	34	7	21%		0.34148
(Q25f) Competitors	44	10	1	10%	34	1	3%		0.35941
(Q25g) Third Party Partners	44	10	1	10%	34	4	12%		0.42703
(Q25h) Suppliers	44	10	0	0%	34	2	6%		0.59302
(Q25i) Customers	44	10	1	10%	34	4	12%		0.42703
(Q25j) Government	44	10	2	20%	34	14	41%		0.15032
(Q25k) The Media	44	10	0	0%	34	7	21%		0.14038
(Q25l) The General Public	44	10	0	0%	34	7	21%		0.14038
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	44	10	2	20%	34	15	44%		0.12168
(Q28) Respondent's decision to adopt	44	10	2	20%	34	7	21%		0.34148
(Q29a) Set of Standards (Specifying Proprietary Software)	44	10	6	60%	34	17	50%		0.24349
(Q29b) Professionalism of IT Dept	44	10	5	50%	34	19	56%		0.26558
(Q29c) Availability of Resources, Expertise and Familiarity	44	10	6	60%	34	18	53%		0.26282
(Q29d) Availability of Training	44	10	6	60%	34	13	38%		0.13832
(Q29e) Availability of Time	44	10	6	60%	34	14	41%		0.16599
(Q29f) Internal OSS Installed Base	44	10	6	60%	34	14	41%		0.16599
(Q29g) Inertia (i.e. level of acceptance)	44	10	1	10%	34	5	15%		0.39418
(Q29h) Conservative Management	44	10	1	10%	34	3	9%		0.44081
(Q29i) Availability of Commercial Support	44	10	4	40%	34	9	26%		0.21217
(Q29j) Trial-ability (i.e. ability to demo capability)	44	10	4	40%	34	18	53%		0.21997
(Q30a) Unacceptable License Terms	44	10	6	60%	34	14	41%		0.16599
(Q30b) Overwhelming number of patches and upgrades	44	10	8	80%	34	20	59%		0.15032
(Q30c) Lack of Technical Support	44	10	9	90%	34	30	88%		0.42703
(Q30d) Complexity	44	10	9	90%	34	23	68%		0.13565
(Q30e) Proprietary Volume Purchase Agreement	44	10	7	70%	34	22	65%		0.28621
(30f) Lack of Resource	44	10	9	90%	34	26	76%		0.25611
(Q30g) Switching Costs	44	10	7	70%	34	25	74%		0.29843
(Q30h) Set of Standards	44	10	8	80%	34	23	68%		0.24799
(Q30i) Lack of Relevance	44	10	8	80%	34	19	56%		0.12168
(Q32) Past Implementation	44	10	1	10%	34	10	29%		0.17098
(Q33) Organisation is Active OSS User	44	10	2	20%	34	13	38%		0.18163
*p value<0.05									
**p value<0.01									
***p value<0.005									

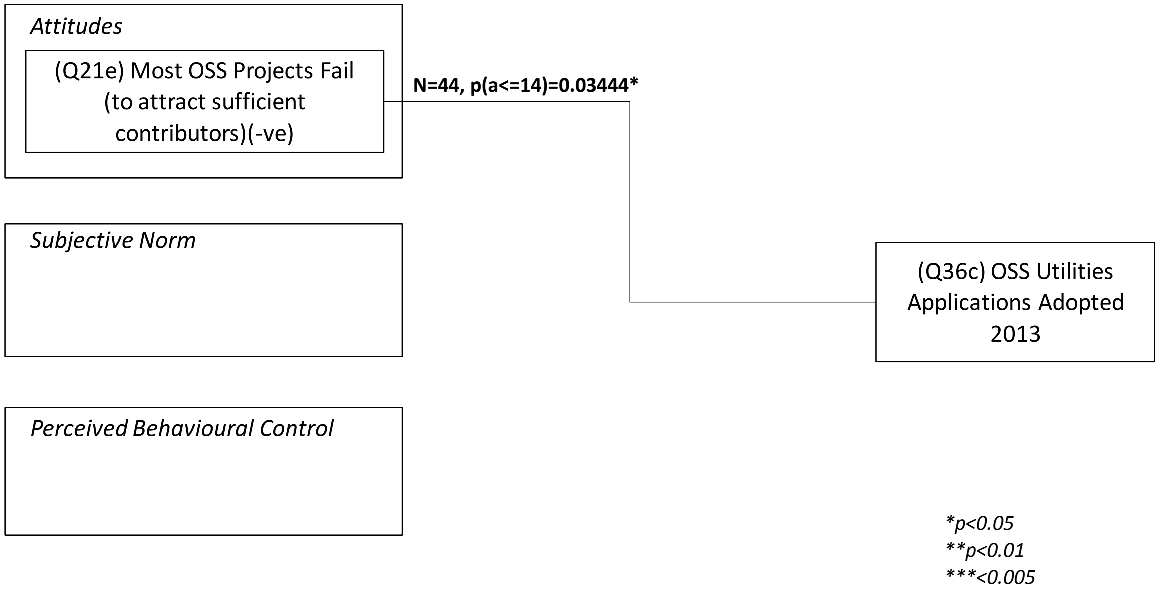
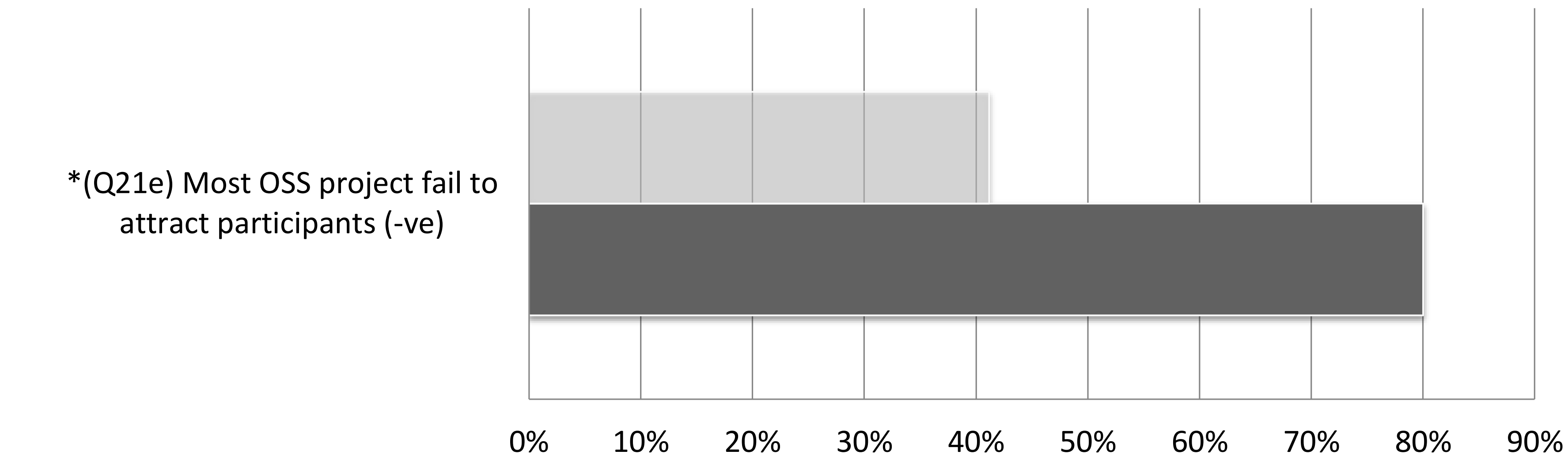


Figure 0.65: Factors Associated with OSS Adoption in the Utilities Subcategory



	*(Q21e) Most OSS project fail to attract participants (-ve)
OSS Utilities Adopters in 2012	41%
OSS Utilities Non-adopters in 2012	80%

Figure 0.66: Bar Chart Illustrating Factors Associated with OSS Adoption in the Utilities Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show a single statistically significant factor for intention to adopt OSS of this category of software in 2013 in the perceived behavioural control construct. The factor Organisation is an Active User was found to be greater than 95% confidence level and positively associated with OSS adoption (i.e driving). No factors were found in the attitude or subjective norm TPB constructs.

Figure xyz, represents the same factor in a bar chart format which compares the extent to which respondents who describe themselves as (a) Intention to Adopt OSS and (b) No Intention to Adopt OSS agree that the specified factor is important in terms of this category of software.

Table 0.29: Analysis of Factors Associated with Intention to Adopt OSS in the Utilities Subcategory

	Sample (N)	No Intention to Adopt Utilities in 2013			Intention to Adopt OSS Utilities in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	43	7	4	57%	36	14	39%		0.21841
(Q18) Category Killer	43	7	4	57%	36	11	31%		0.13877
(Q20a) Security	43	7	4	57%	36	25	69%		0.26829
(Q20b) Cost	43	7	5	71%	36	30	83%		0.28208
(Q20c) Quality	43	7	4	57%	36	18	50%		0.30192
(20d) Flexibility	43	7	6	86%	36	22	61%		0.17537
(Q20e) Technologically Disruptive	43	7	6	86%	36	25	69%		0.27419
(Q20f) Relative Advantage	43	7	4	57%	36	22	61%		0.31548
(Q20g) Job Performance	43	7	5	71%	36	21	58%		0.27762
(Q20h) Transparency	43	7	6	86%	36	21	58%		0.14698
(Q20i) Perpetuity	43	7	6	86%	36	19	53%		0.09893
(Q20j) Freedom to modify	43	7	6	86%	36	31	86%		0.43287
(Q20k) Speed	43	7	5	71%	36	20	56%		0.25226
(Q20l) Knowledge Creation	43	7	6	86%	36	23	64%		0.20638
(Q20m) Creativity & Innovation	43	7	6	86%	36	25	69%		0.27419
(Q20n) Vendor Lock-in	43	7	6	86%	36	33	92%		0.40499
(Q20o)Observable Results	43	7	5	71%	36	17	47%		0.17161
(Q20p) Ideological Compatibility	43	7	3	43%	36	27	75%		0.09008
(Q21a) Unsustainable Business Model	43	7	5	71%	36	20	56%		0.25226
(Q21b) Second Best Perception	43	7	6	86%	36	18	50%		0.07936
(Q21c) Reliability (no better than propietary alternatives)	43	7	4	57%	36	18	50%		0.30192
(Q21d) Preference for building proprietary software skills	43	7	4	57%	36	16	44%		0.26628
(Q21e) Most OSS project fail to attract participants	43	7	4	57%	36	16	44%		0.26628
(Q21f) Hidden costs and questionable returns	43	7	6	86%	36	22	61%		0.17537
(Q21g) OSS commercial contracts not free (of charge)	43	7	4	57%	36	23	64%		0.30499
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	38	6	5	83%	32	29	91%		0.40317
(Q23b) Reported others success stories	38	6	4	67%	32	28	88%		0.19539
(Q23c) OSS Contributors (reported)	35	7	5	71%	28	16	57%		0.27537
(Q24a) Personal Identification with OSS Community	43	7	3	43%	36	10	28%		0.24323
(Q24b) Network Effects	43	7	4	57%	36	19	53%		0.31327
(Q24c) Internal Politics	43	7	0	0%	36	8	22%		0.20868
(Q24d) External Politics	43	7	2	29%	36	6	17%		0.28208
(Q24e) Organisational Culture	43	7	1	14%	36	9	25%		0.34371
(Q24f) Champion or Sponsor	43	7	6	86%	36	19	53%		0.09893
(Q24g) Commitment to local consultants/suppliers	43	7	3	43%	36	6	17%		0.12089
(Q24h) Lack of legally responsible third party	43	7	0	0%	36	4	11%		0.47731
(Q25a) Friends and Acquaintances	43	7	5	71%	36	13	36%		0.07977
(Q25b) OSS Contributors (influence)	43	7	4	57%	36	22	61%		0.31548
(Q25c) Colleagues (in line of business)	43	7	4	57%	36	12	33%		0.16520
(Q25d) Colleagues (in IT Dept)	43	7	3	43%	36	20	56%		0.26628
(Q25e) Colleagues (in Line of Business)	43	7	2	29%	36	7	19%		0.31086
(Q25f) Competitors	43	7	1	14%	36	1	3%		0.27907
(Q25g) Third Party Partners	43	7	0	0%	36	5	14%		0.39164
(Q25h) Suppliers	43	7	0	0%	36	2	6%		0.69767
(Q25i) Customers	43	7	0	0%	36	5	14%		0.39164
(Q25j) Government	43	7	3	43%	36	14	39%		0.31548
(Q25k) The Media	43	7	0	0%	36	6	17%		0.31950
(Q25l) The General Public	43	7	0	0%	36	7	19%		0.25905
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	43	7	1	14%	36	15	42%		0.14698
(Q28) Respondent's decision to adopt	43	7	2	29%	36	7	19%		0.31086
(Q29a) Set of Standards (Specifying Proprietary Software)	43	7	5	71%	36	19	53%		0.22555
(Q29b) Professionalism of IT Dept	43	7	4	57%	36	21	58%		0.32033
(Q29c) Availability of Resources, Expertise and Familiarity	43	7	4	57%	36	20	56%		0.31953
(Q29d) Availability of Training	43	7	4	57%	36	15	42%		0.24345
(Q29e) Availability of Time	43	7	4	57%	36	16	44%		0.26628
(Q29f) Internal OSS Installed Base	43	7	4	57%	36	16	44%		0.26628
(Q29g) Inertia (i.e. level of acceptance)	43	7	1	14%	36	5	14%		0.43287
(Q29h) Conservative Management	43	7	1	14%	36	3	8%		0.40499
(Q29i) Availability of Commercial Support	43	7	4	57%	36	10	28%		0.11351
(Q29j) Trial-ability (i.e. ability to demo capability)	43	7	5	71%	36	18	50%		0.19840
(Q30a) Unacceptable License Terms	43	7	2	29%	36	18	50%		0.19840
(Q30b) Overwhelming number of patches and upgrades	43	7	4	57%	36	24	67%		0.28910
(Q30c) Lack of Technical Support	43	7	6	86%	36	33	92%		0.40499
(Q30d) Complexity	43	7	6	86%	36	26	72%		0.30934
(Q30e) Proprietary Volume Purchase Agreement	43	7	4	57%	36	25	69%		0.26829
(30f) Lack of Resource	43	7	6	86%	36	29	81%		0.40297
(Q30g) Switching Costs	43	7	6	86%	36	27	75%		0.34371
(Q30h) Set of Standards	43	7	5	71%	36	26	72%		0.34800
(Q30i) Lack of Relevance	43	7	4	57%	36	23	64%		0.30499
(Q32) Past Implementation	43	7	0	0%	36	9	25%		0.16694
*(Q33) Organisation is Active OSS User (+ve)	43	7	0	0%	36	14	39%	*p(a>=14)=0.04844	0.04844
*p value<0.05									
**p value<0.01									
***p value<0.005									

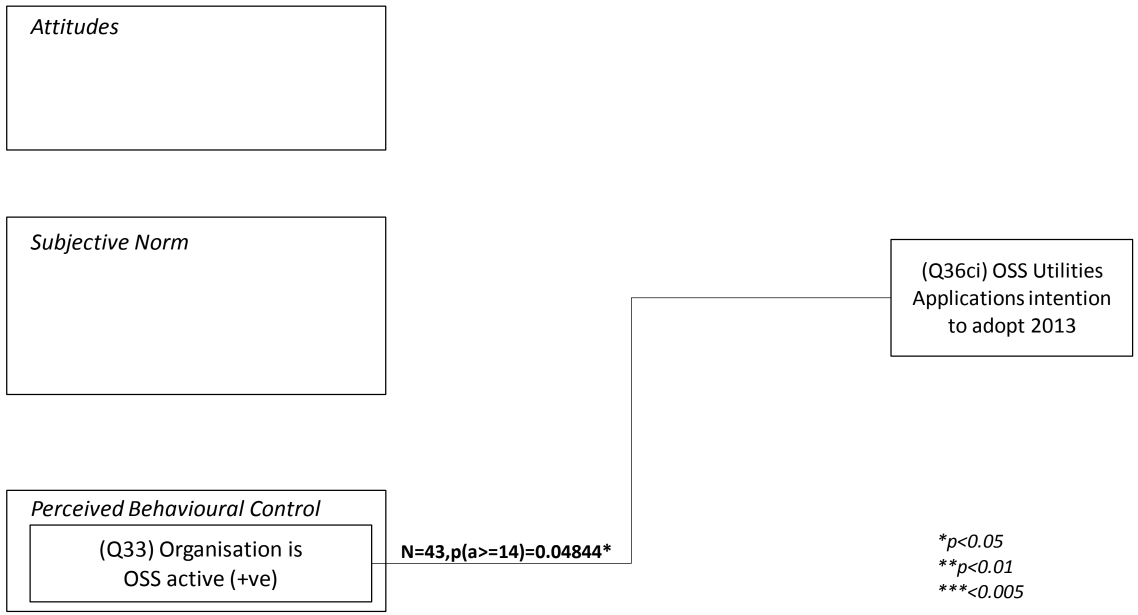


Figure 0.67: Factor Associated with Intention to Adopt OSS in the Utilities Subcategory

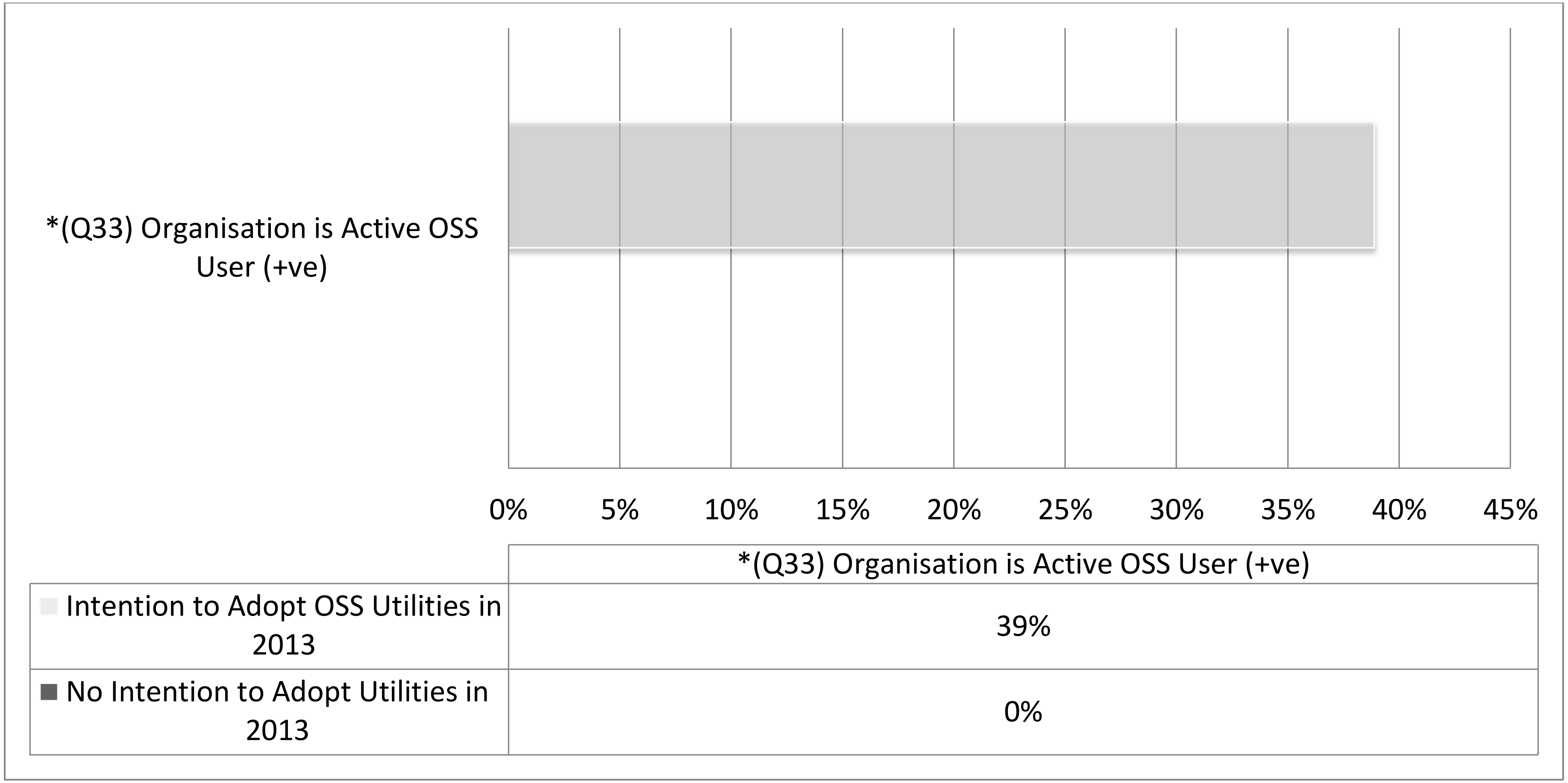


Figure 0.68: Bar Chart Illustrating Factor Associated with Intention to Adopt OSS in the Utilities Subcategory

Vertical Market

Adoption 2012

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption behaviour of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show two statistically significant factors for reported OSS adoption of this category of software in 2012. Both factors were found to be of greater than 95% confidence level and positively associated with OSS adoption in this category of software. In the TPB subjective norm construct the OSS contributors (influence) factor was found to be of significance. Similarly, in the perceived behavioural control construct the Organisation is Active OSS User was found to be statistically significant. No statistically significant factors were shown from the Attitude construct for this software category.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

Table 0.30: Analysis of Factors Associated with OSS Adoption in the Vertical Market Subcategory

	Sample (N)	OSS Vertical Market Non-adopters in 2012			OSS Vertical Market Adopters in 2012			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	43	30	13	43%	13	4	31%		0.20331
(Q18) Category Killer	43	30	10	33%	13	4	31%		0.27408
(Q20a) Security	43	30	19	63%	13	10	77%		0.19933
(Q20b) Cost	43	30	23	77%	13	12	92%		0.18251
(Q20c) Quality	43	30	14	47%	13	8	62%		0.17790
(20d) Flexibility	43	30	20	67%	13	7	54%		0.19442
(Q20e) Technologically Disruptive	43	30	21	70%	13	9	69%		0.27967
(Q20f) Relative Advantage	43	30	18	60%	13	8	62%		0.26430
(Q20g) Job Performance	43	30	18	60%	13	8	62%		0.26430
(Q20h) Transparency	43	30	18	60%	13	8	62%		0.26430
(Q20i) Perpetuity	43	30	15	50%	13	9	69%		0.13855
(Q20j) Freedom to modify	43	30	23	77%	13	13	100%		0.06318
(Q20k) Speed	43	30	15	50%	13	10	77%		0.07292
(Q20l) Knowledge Creation	43	30	19	63%	13	9	69%		0.25776
(Q20m) Creativity & Innovation	43	30	22	73%	13	9	69%		0.27283
(Q20n) Vendor Lock-in	43	30	26	87%	13	12	92%		0.37011
(Q20o)Observable Results	43	30	15	50%	13	7	54%		0.25301
(Q20p) Ideological Compatibility	43	30	20	67%	13	10	77%		0.23493
(Q21a) Unsustainable Business Model	43	30	19	63%	13	6	46%		0.15409
(Q21b) Second Best Perception	43	30	17	57%	13	8	62%		0.25336
(Q21c) Reliability (no better than propietary alternatives)	43	30	14	47%	13	9	69%		0.10825
(Q21d) Preference for building proprietary software skills	43	30	15	50%	13	6	46%		0.25301
(Q21e) Most OSS project fail to attract participants	43	30	13	43%	13	8	62%		0.14651
(Q21f) Hidden costs and questionable returns	43	30	21	70%	13	8	62%		0.23493
(Q21g) OSS commercial contracts not free (of charge)	43	30	17	57%	13	10	77%		0.12916
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	38	27	24	89%	11	10	91%		0.43589
(Q23b) Reported others success stories	38	27	22	81%	11	10	91%		0.32167
(Q23c) OSS Contributors (reported)	34	23	11	48%	11	7	64%		0.20245
(Q24a) Personal Identification with OSS Community	43	30	8	27%	13	5	38%		0.20594
(Q24b) Network Effects	43	30	15	50%	13	7	54%		0.25301
(Q24c) Internal Politics	43	30	4	13%	13	4	31%		0.13513
(Q24d) External Politics	43	30	4	13%	13	3	23%		0.24323
(Q24e) Organisational Culture	43	30	5	17%	13	4	31%		0.18068
(Q24f) Champion or Sponsor	43	30	19	63%	13	5	38%		0.08783
(Q24g) Commitment to local consultants/suppliers	43	30	6	20%	13	3	23%		0.30114
(Q24h) Lack of legally responsible third party	43	30	1	3%	13	3	23%		0.06952
(Q25a) Friends and Acquaintances	43	30	10	33%	13	8	62%		0.06356
*(Q25b) OSS Contributors (influence) (+ve)	43	30	14	47%	13	11	85%	*p(a>=11)=0.02135	0.01865
(Q25c) Colleagues (in line of business)	43	30	9	30%	13	6	46%		0.16202
(Q25d) Colleagues (in IT Dept)	43	30	13	43%	13	9	69%		0.08139
(Q25e) Colleagues (in Line of Business)	43	30	7	23%	13	2	15%		0.28159
(Q25f) Competitors	43	30	1	3%	13	1	8%		0.43189
(Q25g) Third Party Partners	43	30	2	7%	13	3	23%		0.12924
(Q25h) Suppliers	43	30	1	3%	13	1	8%		0.43189
(Q25i) Customers	43	30	2	7%	13	3	23%		0.12924
(Q25j) Government	43	30	11	37%	13	5	38%		0.26512
(Q25k) The Media	43	30	3	10%	13	3	23%		0.19046
(Q25l) The General Public	43	30	4	13%	13	3	23%		0.24323
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	43	30	9	30%	13	7	54%		0.09258
(Q28) Respondent's decision to adopt	43	30	6	20%	13	3	23%		0.30114
(Q29a) Set of Standards (Specifying Proprietary Software)	43	30	14	47%	13	9	69%		0.10825
(Q29b) Professionalism of IT Dept	43	30	16	53%	13	8	62%		0.23381
(Q29c) Availability of Resources, Expertise and Familiarity	43	30	16	53%	13	8	62%		0.23381
(Q29d) Availability of Training	43	30	13	43%	13	6	46%		0.25673
(Q29e) Availability of Time	43	30	14	47%	13	6	46%		0.25979
(Q29f) Internal OSS Installed Base	43	30	12	40%	13	7	54%		0.18542
(Q29g) Inertia (i.e. level of acceptance)	43	30	3	10%	13	3	23%		0.19046
(Q29h) Conservative Management	43	30	1	3%	13	3	23%		0.06952
(Q29i) Availability of Commercial Support	43	30	9	30%	13	4	31%		0.27967
(Q29j) Trial-ability (i.e. ability to demo capability)	43	30	17	57%	13	5	38%		0.14651
(Q30a) Unacceptable License Terms	43	30	13	43%	13	7	54%		0.21394
(Q30b) Overwhelming number of patches and upgrades	43	30	20	67%	13	8	62%		0.25518
(Q30c) Lack of Technical Support	43	30	27	90%	13	12	92%		0.42768
(Q30d) Complexity	43	30	24	80%	13	8	62%		0.13286
(Q30e) Proprietary Volume Purchase Agreement	43	30	21	70%	13	8	62%		0.23493
(30f) Lack of Resource	43	30	24	80%	13	11	85%		0.31939
(Q30g) Switching Costs	43	30	24	80%	13	8	62%		0.13286
(Q30h) Set of Standards	43	30	20	67%	13	11	85%		0.15278
(Q30i) Lack of Relevance	43	30	19	63%	13	8	62%		0.26512
(Q32) Past Implementation	43	30	6	20%	13	4	31%		0.22143
*(Q33) Organisation is Active OSS User (+ve)	43	30	6	20%	13	8	62%	*p(a>=8)=0.01115	0.00975
*p value<0.05									
**p value<0.01									
***p value<0.005									

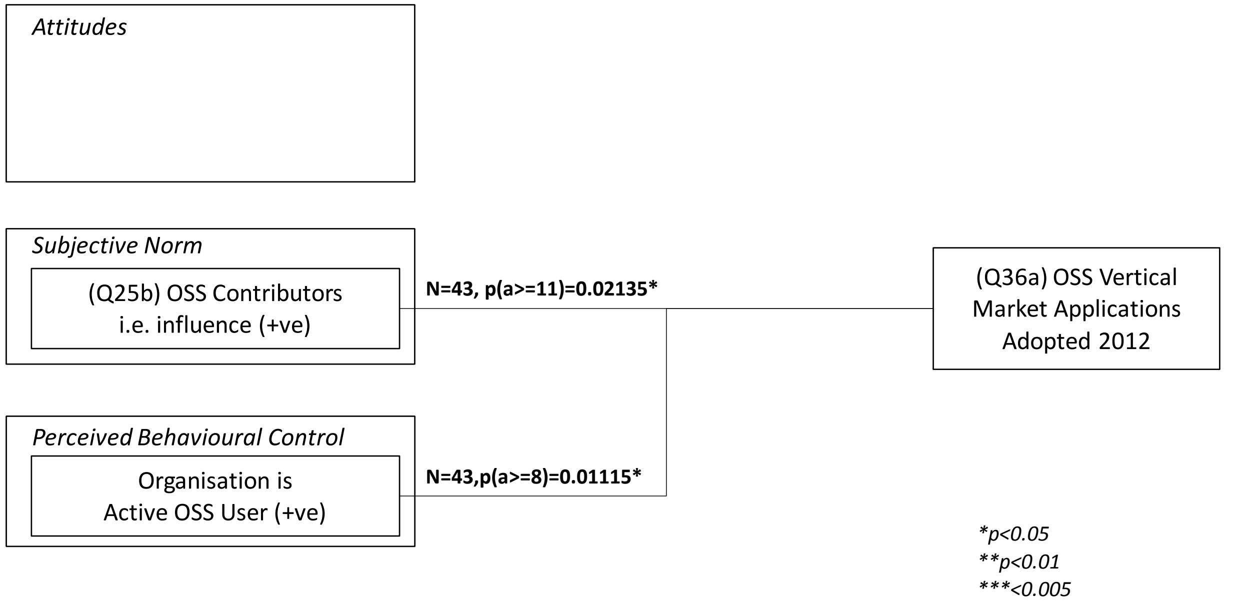
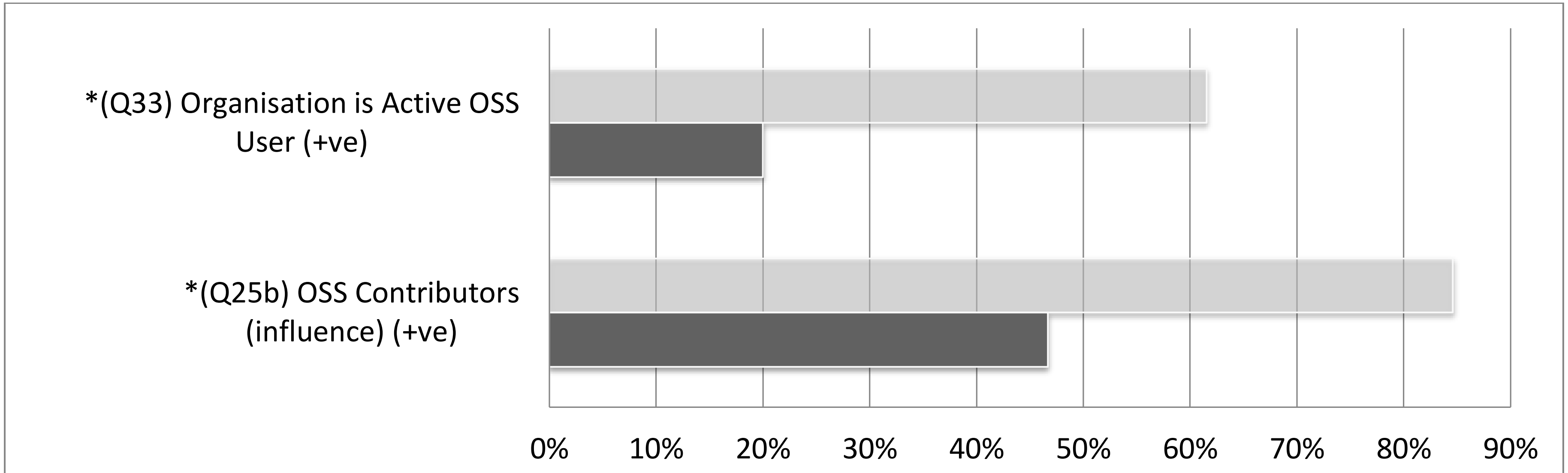


Figure 0.69: Factors Associated with OSS Adoption in the Vertical Market Subcategory



	*(Q25b) OSS Contributors (influence) (+ve)	*(Q33) Organisation is Active OSS User (+ve)
OSS Vertical Market Adopters in 2012	85%	62%
OSS Vertical Market Non-adopters in 2012	47%	20%

Figure 0.70: Bar Chart Illustrating Factors Associated with OSS Adoption in the Vertical Market Subcategory

Intention to Adopt in 2013

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational intention to adopt OSS of the above software category analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show six statistically significant factors for intention to adopt OSS of this category of software in 2013. Most notably, the factor Standards Specifying OSS was found to be greater than 99% confidence level. All of the remaining five factors were shown to be greater than 95% confidence level and one was found to be negatively associated with OSS adoption in this category (i.e. Questionable Return on Investment). The factors shown to be associated with the attitude construct and OSS adoption in this category were; Perpetuity and the aforementioned Questionable Return on Investment. Similarly, the factors shown to be positively associated with the subjective norm construct were Internal Politics and Colleagues in IT. Finally, Ease of Implementation and the aforementioned Standards Specifying OSS factor were also positively associated with OSS adoption in the Perceived Behavioural Control construct.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as (a) Intention to Adopt OSS and (b) No Intention to Adopt OSS agree that the specified factors are important in terms of this category of software.

Similarly, the radar graph below illustrates the difference in salient beliefs between respondents who describe themselves as those who (a) intend to adopt this category of OSS in 2012and (b) do not, in terms of statistically significant factors

Table 0.31: Analysis of Factors Associated with OSS Adoption in the Vertical Market Subcategory

	Sample (N)	No Intention to Adopt Vertical Market in 2013			Intention to Adopt OSS Vertical Market in 2013			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	42	20	9	45%	22	8	36%		0.21090
(Q18) Category Killer	42	20	8	40%	22	6	27%		0.17781
(Q20a) Security	42	20	13	65%	22	15	68%		0.25010
(Q20b) Cost	42	20	15	75%	22	19	86%		0.20229
(Q20c) Quality	42	20	9	45%	22	12	55%		0.20178
(20d) Flexibility	42	20	12	60%	22	15	68%		0.21772
(Q20e) Technologically Disruptive	42	20	15	75%	22	15	68%		0.23911
(Q20f) Relative Advantage	42	20	12	60%	22	13	59%		0.24605
(Q20g) Job Performance	42	20	11	55%	22	14	64%		0.21090
(Q20h) Transparency	42	20	10	50%	22	16	73%		0.08279
*(Q20i) Perpetuity (+ve)	42	20	8	40%	22	16	73%	*p(a>=16)=0.03322	0.02657
(Q20j) Freedom to modify	42	20	15	75%	22	21	95%		0.06502
(Q20k) Speed	42	20	9	45%	22	15	68%		0.08099
(Q20l) Knowledge Creation	42	20	12	60%	22	16	73%		0.17781
(Q20m) Creativity & Innovation	42	20	13	65%	22	17	77%		0.18461
(Q20n) Vendor Lock-in	42	20	17	85%	22	21	95%		0.22407
(Q20o)Observable Results	42	20	11	55%	22	11	50%		0.23061
(Q20p) Ideological Compatibility	42	20	15	75%	22	14	64%		0.19428
(Q21a) Unsustainable Business Model	42	20	13	65%	22	12	55%		0.19684
(Q21b) Second Best Perception	42	20	13	65%	22	11	50%		0.15461
(Q21c) Reliability (no better than propietary alternatives)	42	20	12	60%	22	10	45%		0.15854
(Q21d) Preference for building proprietary software skills	42	20	9	45%	22	10	45%		0.24310
(Q21e) Most OSS project fail to attract participants	42	20	9	45%	22	11	50%		0.23061
*(Q21f) Hidden costs and questionable returns (-ve)	42	20	16	80%	22	11	50%	*p(a<=11)=0.04313	0.03464
(Q21g) OSS commercial contracts not free (of charge)	42	20	11	55%	22	15	68%		0.17203
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	37	18	15	83%	19	18	95%		0.23475
(Q23b) Reported others success stories	37	18	14	78%	19	17	89%		0.22508
(Q23c) OSS Contributors (reported)	33	17	7	41%	16	10	63%		0.13348
(Q24a) Personal Identification with OSS Community	42	20	5	25%	22	7	32%		0.23911
(Q24b) Network Effects	42	20	10	50%	22	12	55%		0.23253
*(Q24c) Internal Politics (+ve)	42	20	1	5%	22	7	32%	*p(a>=7)=0.03161	0.02890
(Q24d) External Politics	42	20	2	10%	22	6	27%		0.12011
(Q24e) Organisational Culture	42	20	2	10%	22	7	32%		0.07267
(Q24f) Champion or Sponsor	42	20	11	55%	22	13	59%		0.23621
(Q24g) Commitment to local consultants/suppliers	42	20	2	10%	22	7	32%		0.07267
(Q24h) Lack of legally responsible third party	42	20	1	5%	22	3	14%		0.27517
(Q25a) Friends and Acquaintances	42	20	7	35%	22	10	45%		0.19684
(Q25b) OSS Contributors (influence)	42	20	10	50%	22	15	68%		0.12373
(Q25c) Colleagues (in line of business)	42	20	5	25%	22	10	45%		0.10160
*(Q25d) Colleagues (in IT Dept) (+ve)	42	20	7	35%	22	15	68%	*p(a>=15)=0.03223	0.02573
(Q25e) Colleagues (in Line of Business)	42	20	5	25%	22	4	18%		0.25435
(Q25f) Competitors	42	20	1	5%	22	1	5%		0.51103
(Q25g) Third Party Partners	42	20	1	5%	22	4	18%		0.17198
(Q25h) Suppliers	42	20	0	0%	22	2	9%		0.26829
(Q25i) Customers	42	20	1	5%	22	4	18%		0.17198
(Q25j) Government	42	20	9	45%	22	8	36%		0.21090
(Q25k) The Media	42	20	2	10%	22	3	14%		0.34396
(Q25l) The General Public	42	20	4	20%	22	3	14%		0.27657
Perceived Behavioural Control (PBC)									
*(Q27) Easy to implement (+ve)	42	20	4	20%	22	11	50%	*p(a>=11)=0.04313	0.03464
(Q28) Respondent's decision to adopt	42	20	5	25%	22	4	18%		0.25435
*(Q29a) Set of Standards (Specifying Proprietary Software) (+ve)	42	20	7	35%	22	17	77%	**p(a>=11)=0.006644	0.00577
(Q29b) Professionalism of IT Dept	42	20	10	50%	22	15	68%		0.12373
(Q29c) Availability of Resources, Expertise and Familiarity	42	20	9	45%	22	14	64%		0.12021
(Q29d) Availability of Training	42	20	7	35%	22	12	55%		0.11220
(Q29e) Availability of Time	42	20	7	35%	22	12	55%		0.11220
(Q29f) Internal OSS Installed Base	42	20	8	40%	22	11	50%		0.19890
(Q29g) Inertia (i.e. level of acceptance)	42	20	2	10%	22	4	18%		0.26495
(Q29h) Conservative Management	42	20	0	0%	22	4	18%		0.06535
(Q29i) Availability of Commercial Support	42	20	5	25%	22	9	41%		0.14589
(Q29j) Trial-ability (i.e. ability to demo capability)	42	20	10	50%	22	12	55%		0.23253
(Q30a) Unacceptable License Terms	42	20	8	40%	22	11	50%		0.19890
(Q30b) Overwhelming number of patches and upgrades	42	20	11	55%	22	16	73%		0.12701
(Q30c) Lack of Technical Support	42	20	17	85%	22	21	95%		0.22407
(Q30d) Complexity	42	20	15	75%	22	16	73%		0.27024
(Q30e) Proprietary Volume Purchase Agreement	42	20	14	70%	22	14	64%		0.23447
(30f) Lack of Resource	42	20	15	75%	22	19	86%		0.20229
(Q30g) Switching Costs	42	20	16	80%	22	16	73%		0.24568
(Q30h) Set of Standards	42	20	12	60%	22	18	82%		0.08333
(Q30i) Lack of Relevance	42	20	12	60%	22	14	64%		0.24192
(Q32) Past Implementation	42	20	4	20%	22	4	18%		0.30027
(Q33) Organisation is Active OSS User	42	20	4	20%	22	10	45%		0.05927
*p value<0.05									
**p value<0.01									
***p value<0.005									

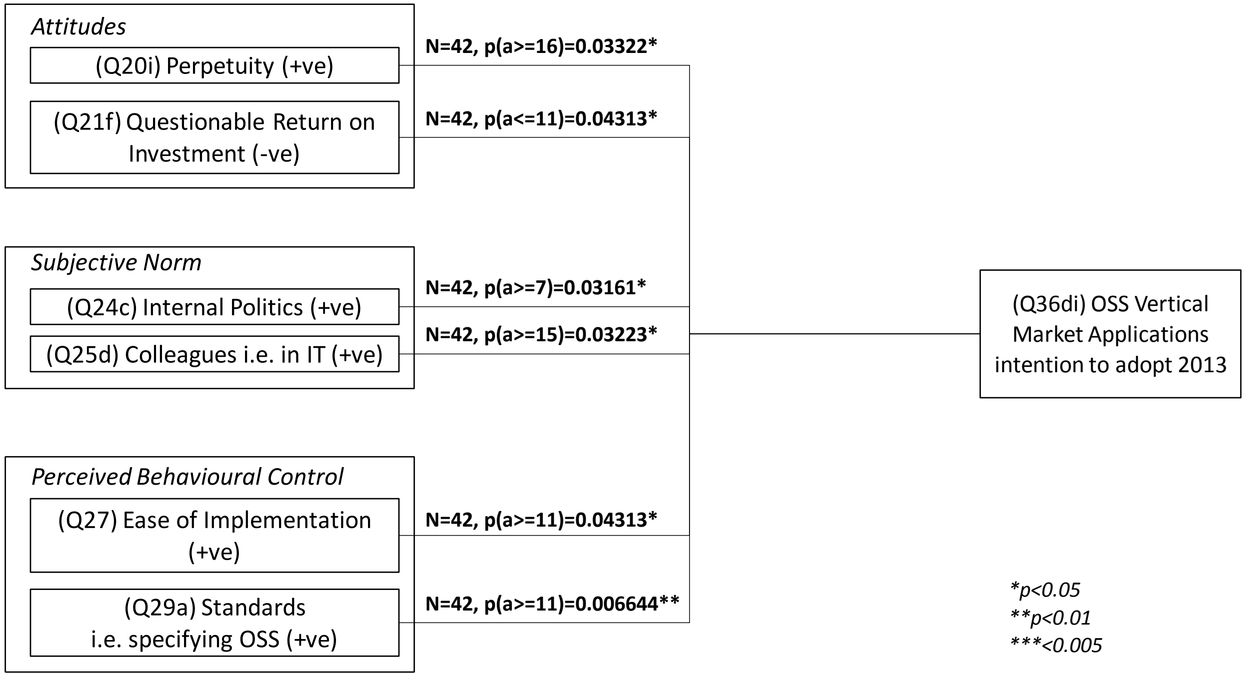
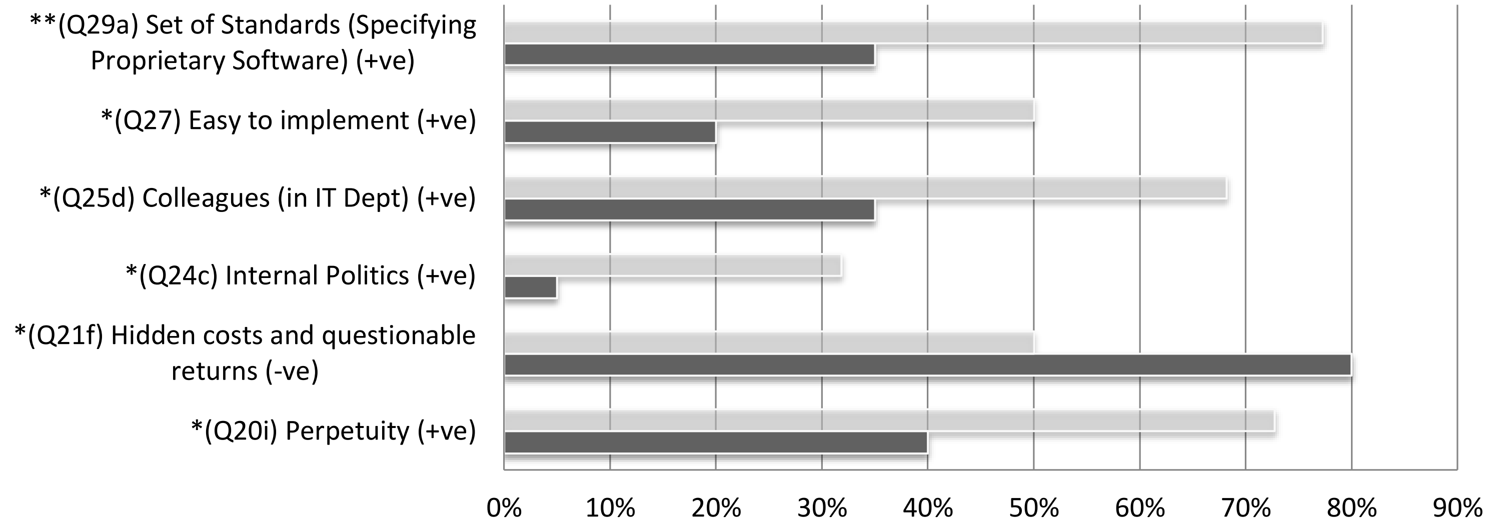


Figure 0.71: Factors Associated with Intention to Adopt OSS in the Vertical Market Subcategory



	*(Q20i) Perpetuity (+ve)	*(Q21f) Hidden costs and questionable returns (-ve)	*(Q24c) Internal Politics (+ve)	*(Q25d) Colleagues (in IT Dept) (+ve)	*(Q27) Easy to implement (+ve)	**(Q29a) Set of Standards (Specifying Proprietary Software) (+ve)
Intention to Adopt OSS Vertical Market in 2013	73%	50%	32%	68%	50%	77%
No Intention to Adopt Vertical Market in 2013	40%	80%	5%	35%	20%	35%

Figure 0.72: Bar Chart Illustrating Factors Associated with Intention to Adopt OSS in the Vertical Market Subcategory

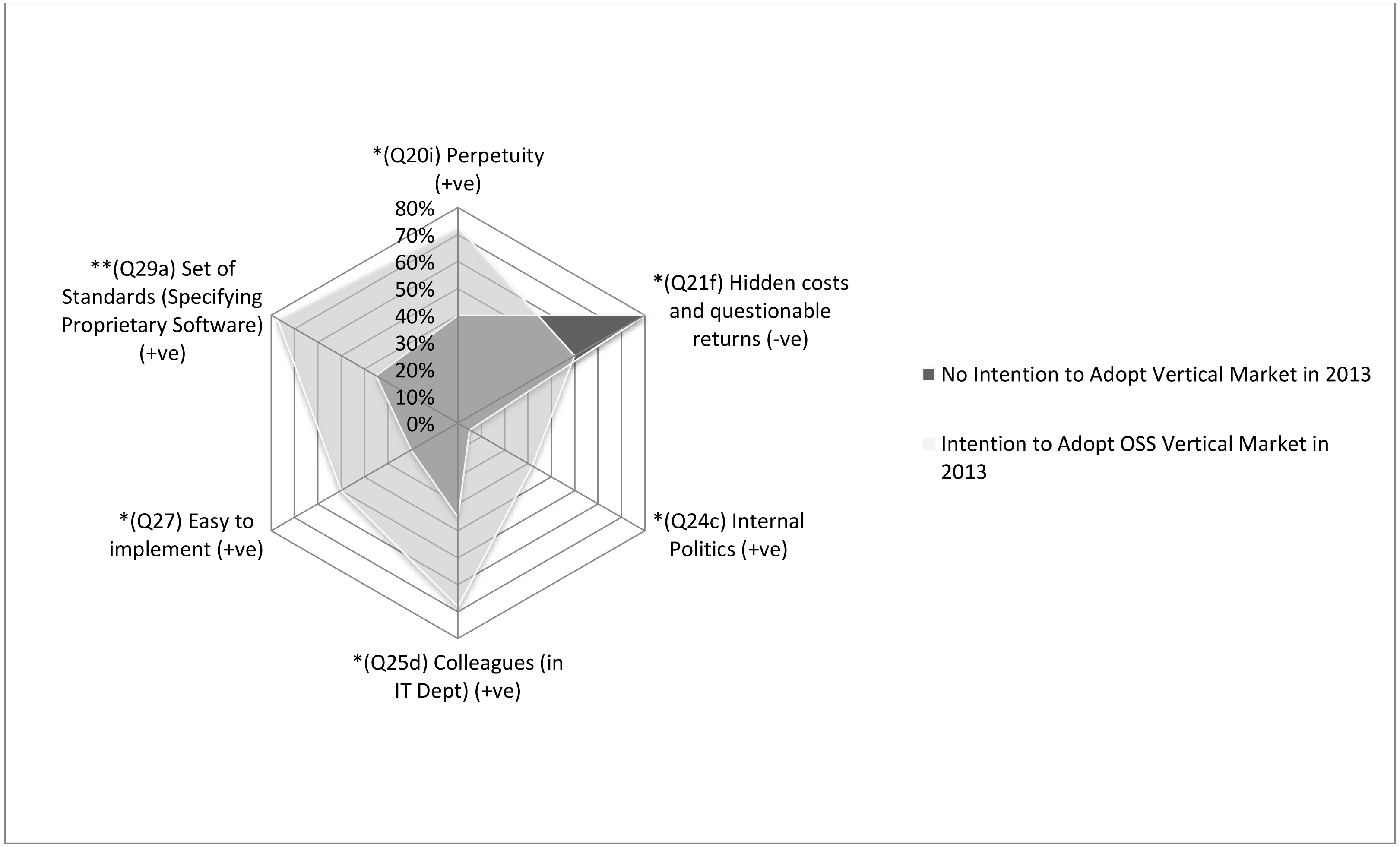


Figure 0.73: Radar Graph Illustrating Differences in Responses for Factors Associated with Intention to Adopt in the Vertical Markets Subcategory

Appendix R: Quantitative Analysis for OSS Adoption Analysis by ITG Adoption Stage

Approval Stage Four (and Beyond)

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption stage in 2012 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show thirteen statistically significant factors for reported OSS adoption of this category of software in 2012. Most notably, the Category Killer factor (attitude) and The Media (subjective norm) factors were shown to be positively associated with this stage of adoption with a greater than 99.5% confidence level. Notably, the Unsustainable Business Model factor from the attitude section was negatively associated to this stage of OSS adoption with a greater than 99% confidence level. Similarly, Organisational Culture (subjective norm), Ease of Implementation and Prior implementation (Perceived Behavioural Control) were positively associated at the same confidence level. Remaining driving factors from all three constructs were also found to be greater than 95% confidence level as shown.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below represents the same factors which illustrate the difference in salient beliefs between respondents who describe themselves as (a) those who intend to adopt OSS in this year and (b) those who do not, in terms of statistically significant factors.

Table 0.32: Analysis of Factors Associated with General OSS Adoption in the Approval Stage (and Beyond)

	Sample (N)	Prior to Approval			Approval (and Beyond)			Fisher Exact Test	Hypergeometric
		Frequency	Agreed	%	Frequency	Agreed	%	One sided p-value	Probability (p)
Attitude (A)									
(Q17) Productive	45	32	11	34%	13	8	62%		0.06810
***(Q18) Category Killer (+ve)	45	32	7	22%	13	9	69%	***p(a>=9)=0.004148	0.00372
*(Q20a) Security (+ve)	45	32	18	56%	13	12	92%	*p(a>=12)=0.01941	0.01777
(Q20b) Cost	45	32	25	78%	13	12	92%		0.20299
(Q20c) Quality	45	32	14	44%	13	8	62%		0.14738
(20d) Flexibility	45	32	19	59%	13	10	77%		0.15364
(Q20e) Technologically Disruptive	45	32	22	69%	13	9	69%		0.27642
(Q20f) Relative Advantage	45	32	18	56%	13	8	62%		0.24883
(Q20g) Job Performance	45	32	17	53%	13	10	77%		0.09429
(Q20h) Transparency	45	32	19	59%	13	8	62%		0.26055
(Q20i) Perpetuity	45	32	18	56%	13	8	62%		0.24883
(Q20j) Freedom to modify	45	32	26	81%	13	12	92%		0.25960
(Q20k) Speed	45	32	16	50%	13	9	69%		0.13558
(Q20l) Knowledge Creation	45	32	19	59%	13	11	85%		0.07857
(Q20m) Creativity & Innovation	45	32	23	72%	13	9	69%		0.27470
(Q20n) Vendor Lock-in	45	32	28	88%	13	12	92%		0.38263
(Q20o)Observable Results	45	32	16	50%	13	7	54%		0.25055
*(Q20p) Ideological Compatibility (+ve)	45	32	19	59%	13	12	92%	*p(a>=12)=0.02989	0.02706
**(Q21a) Unsustainable Business Model (-ve)	45	32	22	69%	13	3	23%	**p(a<=3)=0.006555	0.00582
(Q21b) Second Best Perception	45	32	20	63%	13	6	46%		0.15890
(Q21c) Reliability (no better than propietary alternatives)	45	32	15	47%	13	9	69%		0.10719
(Q21d) Preference for building proprietary software skills	45	32	15	47%	13	6	46%		0.25725
(Q21e) Most OSS project fail to attract participants	45	32	18	56%	13	4	31%		0.08188
*(Q21f) Hidden costs and questionable returns (-ve)	45	32	24	75%	13	5	38%	*p(a<=5)=0.025082	0.02093
(Q21g) OSS commercial contracts not free (of charge)	45	32	19	59%	13	8	62%		0.26055
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	39	27	23	85%	12	12	100%		0.21337
(Q23b) Reported others success stories	39	27	21	78%	12	12	100%		0.09073
(Q23c) OSS Contributors (reported)	34	23	11	48%	11	7	64%		0.20245
(Q24a) Personal Identification with OSS Community	45	32	7	22%	13	6	46%		0.07911
*(Q24b) Network Effects (+ve)	45	32	13	41%	13	10	77%	*p(a>=10)=0.02883	0.02413
(Q24c) Internal Politics	45	32	4	13%	13	4	31%		0.11928
(Q24d) External Politics	45	32	6	19%	13	2	15%		0.32791
**(Q24e) Organisational Culture (+ve)	45	32	4	13%	13	7	54%	**p(a>=7)=0.006744	0.00608
(Q24f) Champion or Sponsor	45	32	18	56%	13	8	62%		0.24883
(Q24g) Commitment to local consultants/suppliers	45	32	7	22%	13	2	15%		0.29626
(Q24h) Lack of legally responsible third party	45	32	2	6%	13	2	15%		0.25966
(Q25a) Friends and Acquaintances	45	32	15	47%	13	4	31%		0.16589
(Q25b) OSS Contributors (influence)	45	32	18	56%	13	9	69%		0.19644
(Q25c) Colleagues (in line of business)	45	32	11	34%	13	6	46%		0.20072
(Q25d) Colleagues (in IT Dept)	45	32	15	47%	13	8	62%		0.17686
(Q25e) Colleagues (in Line of Business)	45	32	5	16%	13	4	31%		0.16248
(Q25f) Competitors	45	32	1	3%	13	1	8%		0.42020
*(Q25g) Third Party Partners (+ve)	45	32	1	3%	13	4	31%	*p(a>=4)=0.01978	0.01873
(Q25h) Suppliers	45	32	1	3%	13	1	8%		0.42020
*(Q25i) Customers (+ve)	45	32	1	3%	13	4	31%	*p(a>=4)=0.01978	0.01873
(Q25j) Government	45	32	11	34%	13	6	46%		0.20072
***(Q25k) The Media (+ve)	45	32	1	3%	13	6	46%	***p(a>=6)=0.001248	0.00121
(Q25l) The General Public	45	32	3	9%	13	4	31%		0.07815
Perceived Behavioural Control (PBC)									
**(Q27) Easy to implement (+ve)	45	32	8	25%	13	9	69%	**p(a>=9)=0.007757	0.00682
(Q28) Respondent's decision to adopt	45	32	19	59%	13	8	62%		0.26055
(Q29a) Set of Standards (Specifying Proprietary Software)	45	32	18	56%	13	6	46%		0.21438
(Q29b) Professionalism of IT Dept	45	32	17	53%	13	8	62%		0.22969
(Q29c) Availability of Resources, Expertise and Familiarity	45	32	16	50%	13	8	62%		0.20500
(Q29d) Availability of Training	45	32	13	41%	13	6	46%		0.24446
(Q29e) Availability of Time	45	32	12	38%	13	8	62%		0.09167
(Q29f) Internal OSS Installed Base	45	32	12	38%	13	9	69%		0.04278
(Q29g) Inertia (i.e. level of acceptance)	45	32	3	9%	13	3	23%		0.17416
(Q29h) Conservative Management	45	32	2	6%	13	2	15%		0.25966
(Q29i) Availability of Commercial Support	45	32	10	31%	13	4	31%		0.27642
(Q29j) Trial-ability (i.e. ability to demo capability)	45	32	14	44%	13	9	69%		0.08188
(Q30a) Unacceptable License Terms	45	32	16	50%	13	4	31%		0.13558
(Q30b) Overwhelming number of patches and upgrades	45	32	23	72%	13	6	46%		0.07444
(Q30c) Lack of Technical Support	45	32	29	91%	13	11	85%		0.31666
(Q30d) Complexity	45	32	25	78%	13	8	62%		0.15062
(Q30e) Proprietary Volume Purchase Agreement	45	32	20	63%	13	9	69%		0.24967
(30f) Lack of Resource	45	32	25	78%	13	11	85%		0.29626
(Q30g) Switching Costs	45	32	25	78%	13	8	62%		0.15062
(Q30h) Set of Standards	45	32	25	78%	13	7	54%		0.07911
(Q30i) Lack of Relevance	45	32	22	69%	13	5	38%		0.04839
**(Q32) Past Implementation (+ve)	45	32	4	13%	13	7	54%	**p(a>=7)=0.006744	0.00608
*(Q33) Organisation is Active OSS User (+ve)	45	32	7	22%	13	8	62%	*p(a>=8)=0.01462	0.01256
*p value<0.05									
**p value<0.01									
***p value<0.005									

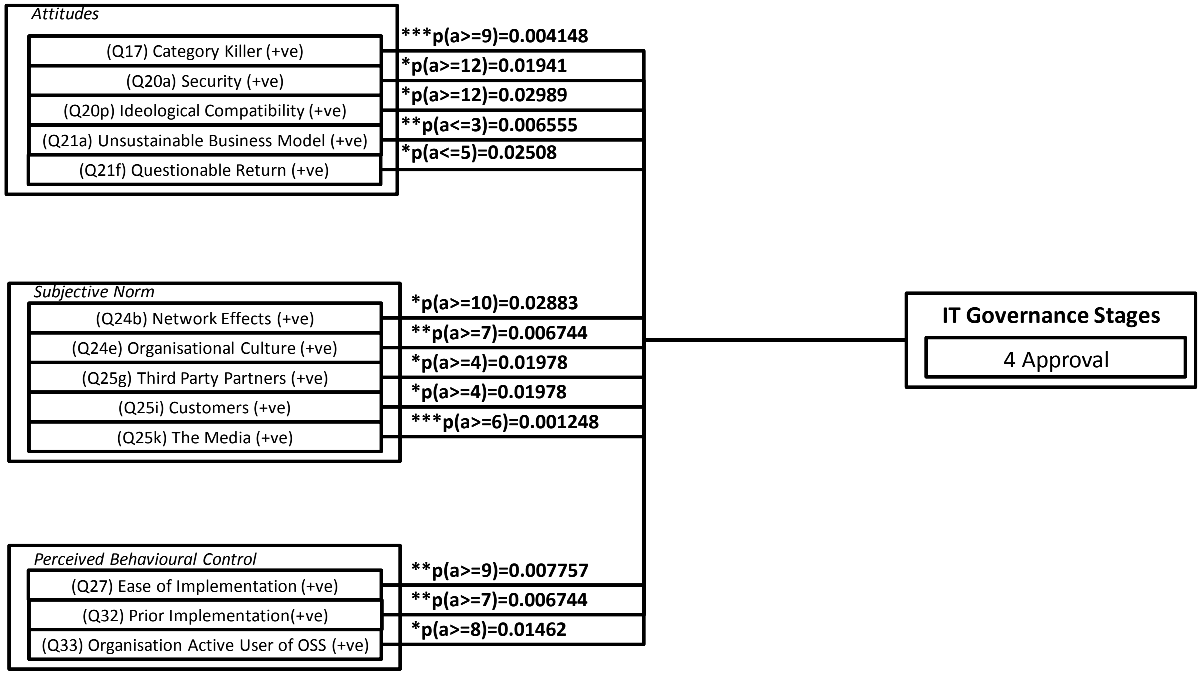
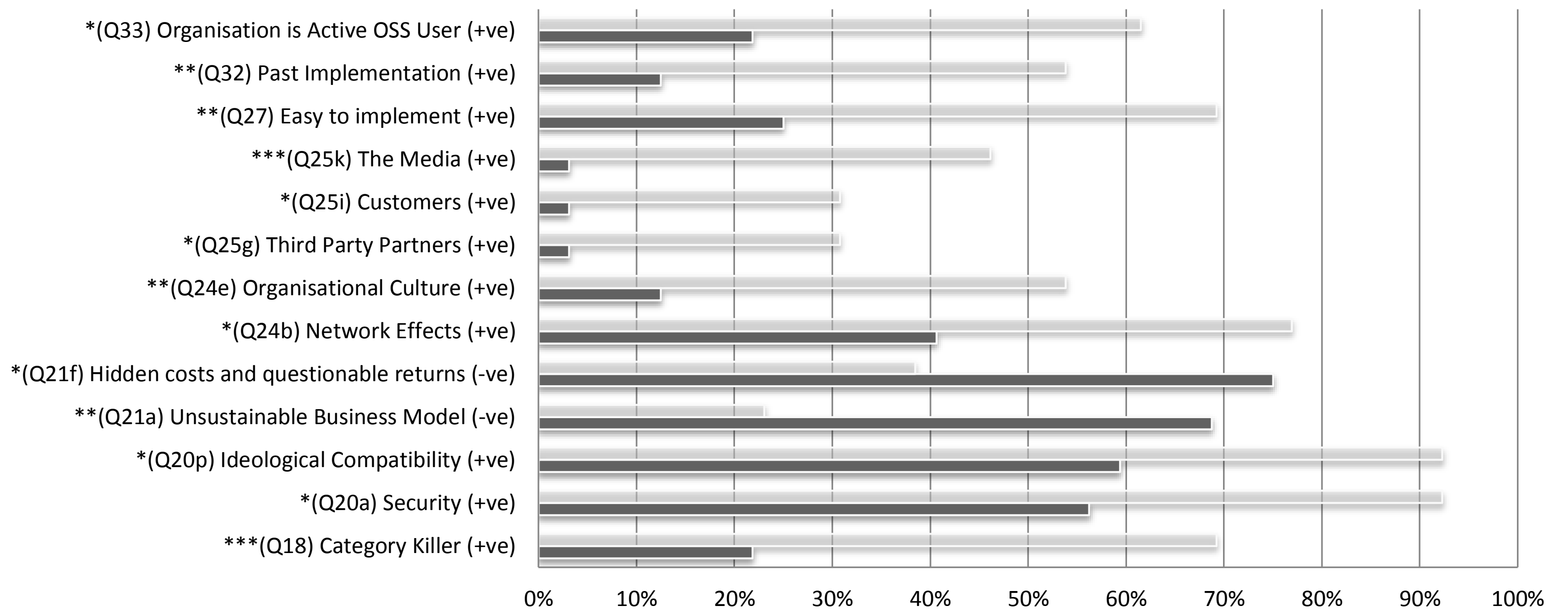


Figure 0.74: Factors Associated with OSS Adoption in the Approval Stage (and Beyond)



	***(Q18) Category Killer (+ve)	*(Q20a) Security (+ve)	*(Q20p) Ideological Compatibility (+ve)	**(Q21a) Unsustainable Business Model (-ve)	*(Q21f) Hidden costs and questionable returns (-ve)	*(Q24b) Network Effects (+ve)	**(Q24e) Organisational Culture (+ve)	*(Q25g) Third Party Partners (+ve)	*(Q25i) Customers (+ve)	***(Q25k) The Media (+ve)	**(Q27) Easy to implement (+ve)	**(Q32) Past Implementation (+ve)	*(Q33) Organisation is Active OSS User (+ve)
Approval (and Beyond)	69%	92%	92%	23%	38%	77%	54%	31%	31%	46%	69%	54%	62%
Prior to Approval	22%	56%	59%	69%	75%	41%	13%	3%	3%	3%	25%	13%	22%

Figure 0.75: Bar Chart Illustrating Factors Associated with General OSS Adoption in the Approval Stage (and Beyond)

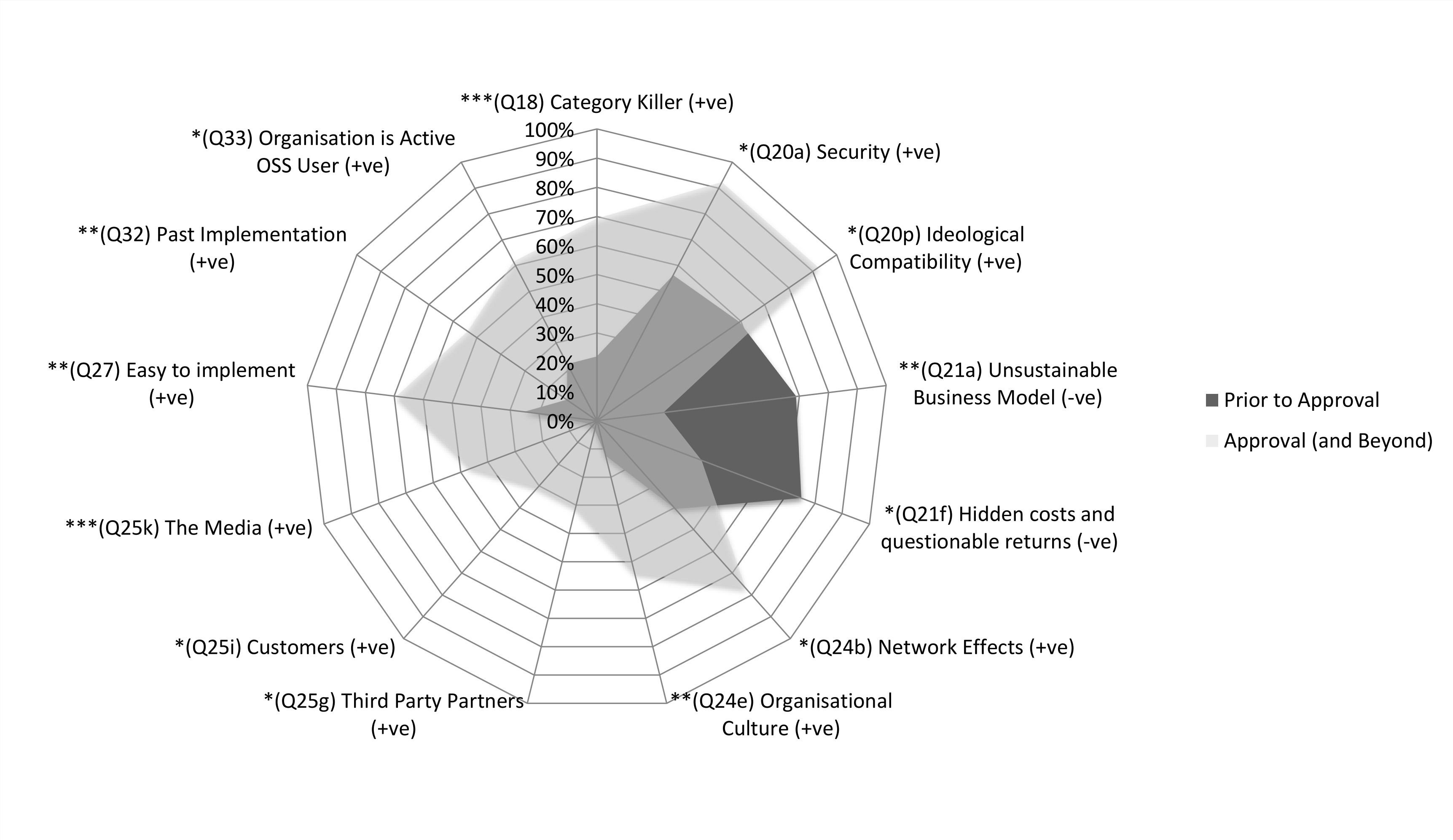


Figure 0.76: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Approval Stage (and Beyond)

Management Stage Three (and Beyond)

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption stage in 2012 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show fourteen statistically significant factors for reported OSS adoption of this category of software in 2012. Most notably, the Category Killer (attitude), The Media (subjective norm), Prior Implementations (perceived behavioural control) and Organisation Active OSS User (perceived behavioural control) factors were all shown to be positively associated with this stage of adoption with a greater than 99.5% confidence level. Notably, the Unsustainable Business Model (attitude) and Security (attitude) were found to be associated to this stage of OSS adoption with a greater than 99% confidence level, negatively and positively respectively. Remaining driving and inhibiting factors from all three constructs were also found to be greater than 95% confidence level as shown.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below represents the same factors which illustrate the difference in salient beliefs between respondents who describe themselves as (a) those who intend to adopt OSS in this year and (b) those who do not, in terms of statistically significant factors.

Table 0.33: Analysis of Factors Associated with General OSS Adoption in the Management Stage (and Beyond)

	Sample (N)	Prior to Management			Management (and Beyond)			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productive	45	30	10	33%	15	9	60%		0.06167
***(Q18) Category Killer (+ve)	45	30	6	20%	15	10	67%	***p(a>=10)=0.003078	0.00276
**(Q20a) Security (+ve)	45	30	16	53%	15	14	93%	**p(a>=14)=0.006775	0.00633
(Q20b) Cost	45	30	23	77%	15	14	93%		0.14167
(Q20c) Quality	45	30	13	43%	15	9	60%		0.14560
(20d) Flexibility	45	30	17	57%	15	12	80%		0.08427
(Q20e) Technologically Disruptive	45	30	20	67%	15	11	73%		0.24577
(Q20f) Relative Advantage	45	30	16	53%	15	10	67%		0.17910
(Q20g) Job Performance	45	30	15	50%	15	12	80%		0.04113
(Q20h) Transparency	45	30	17	57%	15	10	67%		0.20959
(Q20i) Perpetuity	45	30	16	53%	15	10	67%		0.17910
(Q20j) Freedom to modify	45	30	24	80%	15	14	93%		0.19627
(Q20k) Speed	45	30	15	50%	15	10	67%		0.14695
*(Q20l) Knowledge Creation (+ve)	45	30	17	57%	15	13	87%	*p(a>=13)=0.04324	0.03646
(Q20m) Creativity & Innovation	45	30	21	70%	15	11	73%		0.26750
(Q20n) Vendor Lock-in	45	30	26	87%	15	14	93%		0.33646
(Q20o)Observable Results	45	30	15	50%	15	8	53%		0.24247
(Q20p) Ideological Compatibility	45	30	18	60%	15	13	87%		0.05442
*(Q21a) Unsustainable Business Model (-ve)	45	30	21	70%	15	4	27%	*p(a<=4)=0.007071	0.00616
(Q21b) Second Best Perception	45	30	18	60%	15	8	53%		0.22826
(Q21c) Reliability (no better than propietary alternatives)	45	30	13	43%	15	11	73%		0.04332
(Q21d) Preference for building proprietary software skills	45	30	13	43%	15	8	53%		0.20422
(Q21e) Most OSS project fail to attract participants	45	30	16	53%	15	6	40%		0.17680
*(Q21f) Hidden costs and questionable returns (-ve)	45	30	23	77%	15	6	40%	*p(a<=6)=0.01884	0.01576
(Q21g) OSS commercial contracts not free (of charge)	45	30	18	60%	15	9	60%		0.25229
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	39	25	21	84%	14	14	100%		0.15380
(Q23b) Reported others success stories	39	25	19	76%	14	14	100%		0.05428
(Q23c) OSS Contributors (reported)	34	21	9	43%	13	9	69%		0.09536
(Q24a) Personal Identification with OSS Community	45	30	6	20%	15	7	47%		0.05234
*(Q24b) Network Effects (+ve)	45	30	12	40%	15	11	73%	*p(a>=11)=0.03554	0.02868
(Q24c) Internal Politics	45	30	4	13%	15	4	27%		0.17354
(Q24d) External Politics	45	30	6	20%	15	2	13%		0.28924
*(Q24e) Organisational Culture (+ve)	45	30	4	13%	15	7	47%	*p(a>=7)=0.02017	0.01737
(Q24f) Champion or Sponsor	45	30	17	57%	15	9	60%		0.24582
(Q24g) Commitment to local consultants/suppliers	45	30	6	20%	15	3	20%		0.30487
(Q24h) Lack of legally responsible third party	45	30	1	3%	15	3	20%		0.09161
(Q25a) Friends and Acquaintances	45	30	13	43%	15	6	40%		0.24582
(Q25b) OSS Contributors (influence)	45	30	16	53%	15	11	73%		0.11568
(Q25c) Colleagues (in line of business)	45	30	10	33%	15	7	47%		0.17527
(Q25d) Colleagues (in IT Dept)	45	30	13	43%	15	10	67%		0.08736
(Q25e) Colleagues (in Line of Business)	45	30	5	17%	15	4	27%		0.21951
(Q25f) Competitors	45	30	1	3%	15	1	7%		0.45455
*(Q25g) Third Party Partners (+ve)	45	30	1	3%	15	4	27%	*p(a>=4)=0.03598	0.03352
(Q25h) Suppliers	45	30	1	3%	15	1	7%		0.45455
*(Q25i) Customers (+ve)	45	30	1	3%	15	4	27%	*p(a>=4)=0.03598	0.03352
(Q25j) Government	45	30	10	33%	15	7	47%		0.17527
***(Q25k) The Media (+ve)	45	30	1	3%	15	6	40%	***p(a>=6)=0.003451	0.00331
(Q25l) The General Public	45	30	3	10%	15	4	27%		0.12212
Perceived Behavioural Control (PBC)									
*(Q27) Easy to implement (+ve)	45	30	8	27%	15	9	60%	*p(a>=9)=0.03290	0.02656
(Q28) Respondent's decision to adopt	45	30	19	63%	15	8	53%		0.20487
(Q29a) Set of Standards (Specifying Proprietary Software)	45	30	16	53%	15	8	53%		0.24798
(Q29b) Professionalism of IT Dept	45	30	15	50%	15	10	67%		0.14695
(Q29c) Availability of Resources, Expertise and Familiarity	45	30	14	47%	15	10	67%		0.11572
(Q29d) Availability of Training	45	30	12	40%	15	7	47%		0.22826
(Q29e) Availability of Time	45	30	12	40%	15	8	53%		0.17559
(Q29f) Internal OSS Installed Base	45	30	12	40%	15	9	60%		0.11472
(Q29g) Inertia (i.e. level of acceptance)	45	30	2	7%	15	4	27%		0.07290
(Q29h) Conservative Management	45	30	1	3%	15	3	20%		0.09161
(Q29i) Availability of Commercial Support	45	30	9	30%	15	5	33%		0.25747
(Q29j) Trial-ability (i.e. ability to demo capability)	45	30	14	47%	15	9	60%		0.17680
(Q30a) Unacceptable License Terms	45	30	15	50%	15	5	33%		0.14695
(Q30b) Overwhelming number of patches and upgrades	45	30	22	73%	15	7	47%		0.05825
(Q30c) Lack of Technical Support	45	30	27	90%	15	13	87%		0.34892
*(Q30d) Complexity (-ve)	45	30	25	83%	15	8	53%	*p(<=8)=0.03877	0.03189
(Q30e) Proprietary Volume Purchase Agreement	45	30	18	60%	15	11	73%		0.18258
(30f) Lack of Resource	45	30	23	77%	15	13	87%		0.24122
(Q30g) Switching Costs	45	30	23	77%	15	10	67%		0.21257
(Q30h) Set of Standards	45	30	23	77%	15	9	60%		0.13957
(Q30i) Lack of Relevance	45	30	20	67%	15	7	47%		0.11268
***(Q32) Past Implementation (+ve)	45	30	3	10%	15	8	53%	***p(a>=8)=0.002797	0.00257
***(Q33) Organisation is Active OSS User (+ve)	45	30	5	17%	15	10	67%	***p(a>=10)=0.001355	0.00124
*p value<0.05									
**p value<0.01									
***p value<0.005									

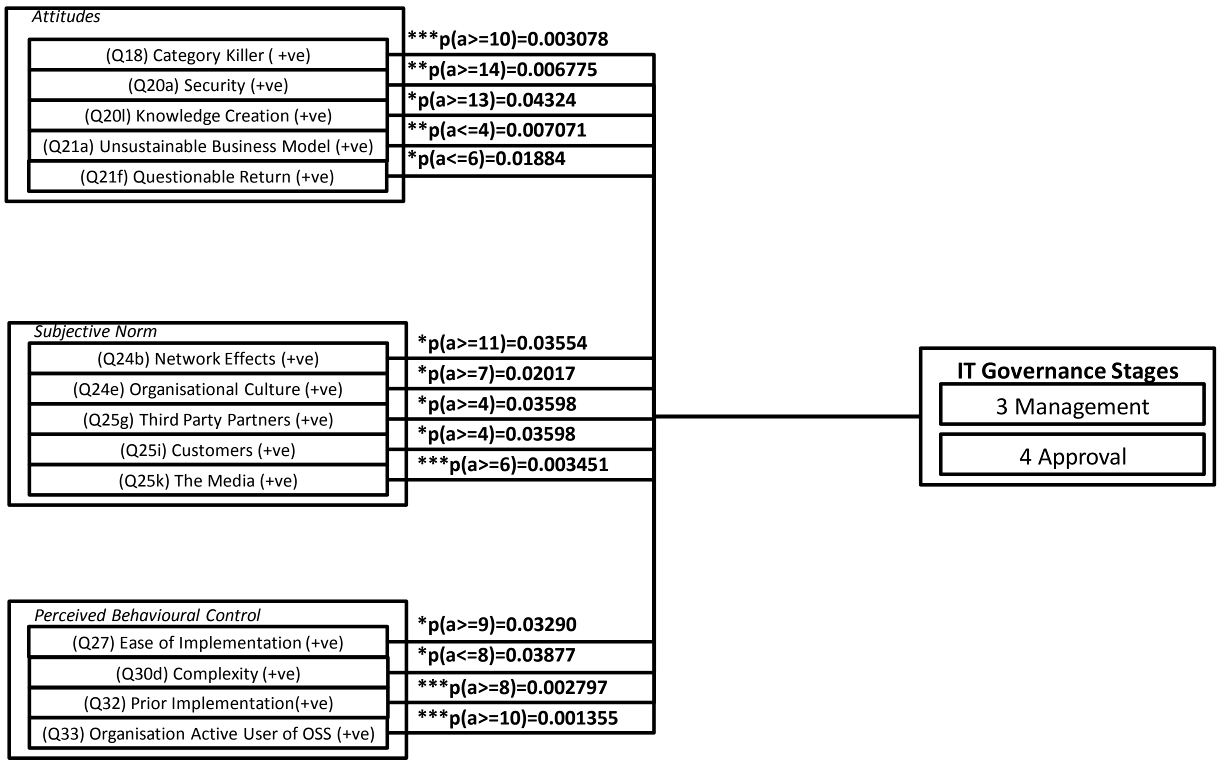
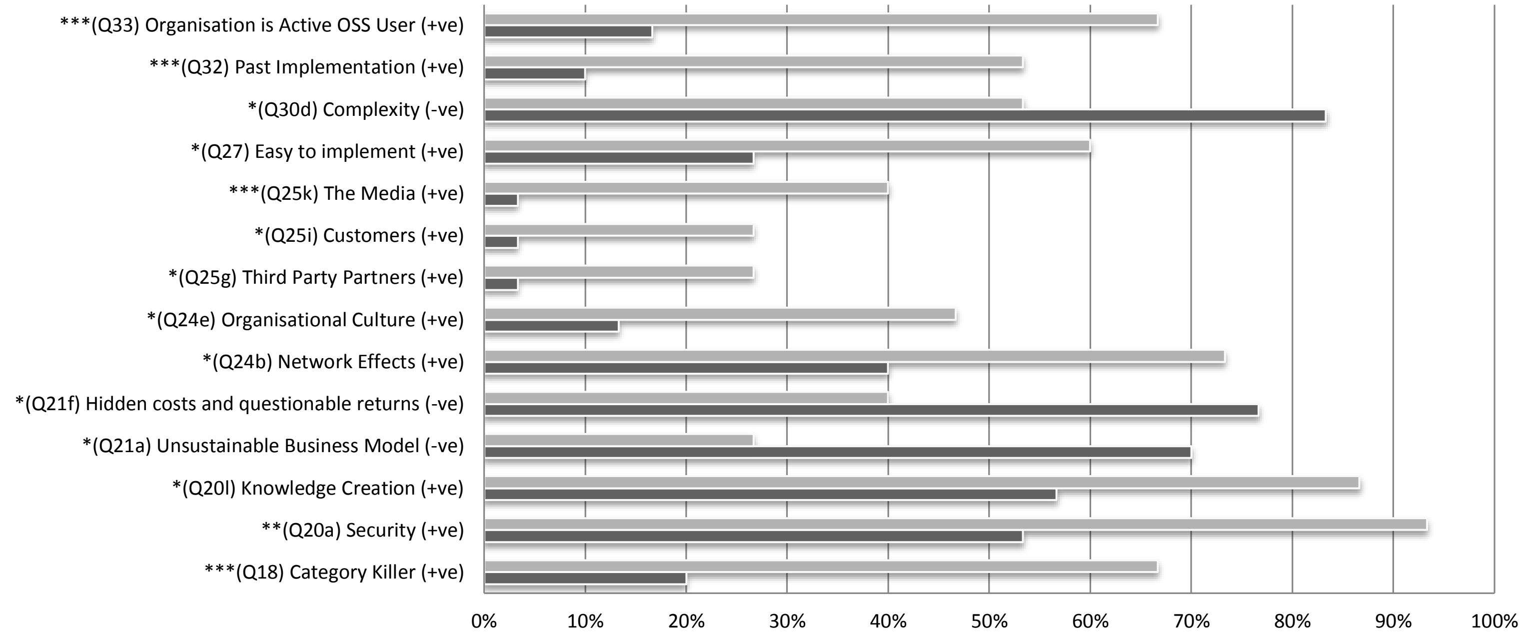


Figure 0.77: Factors Associated with OSS Adoption in the Management Stage (and Beyond)



	***(Q18) Category Killer (+ve)	**(Q20a) Security (+ve)	*(Q20l) Knowledge Creation (+ve)	*(Q21a) Unsustainable Business Model (-ve)	*(Q21f) Hidden costs and questionable returns (-ve)	*(Q24b) Network Effects (+ve)	*(Q24e) Organisational Culture (+ve)	*(Q25g) Third Party Partners (+ve)	*(Q25i) Customers (+ve)	***(Q25k) The Media (+ve)	*(Q27) Easy to implement (+ve)	*(Q30d) Complexity (-ve)	***(Q32) Past Implementation (+ve)	***(Q33) Organisation is Active OSS User (+ve)
Management (and Beyond)	67%	93%	87%	27%	40%	73%	47%	27%	27%	40%	60%	53%	53%	67%
Prior to Management	20%	53%	57%	70%	77%	40%	13%	3%	3%	3%	27%	83%	10%	17%

Figure 0.78: Bar Chart Illustrating Factors Associated with General OSS Adoption in the Management Stage (and Beyond)

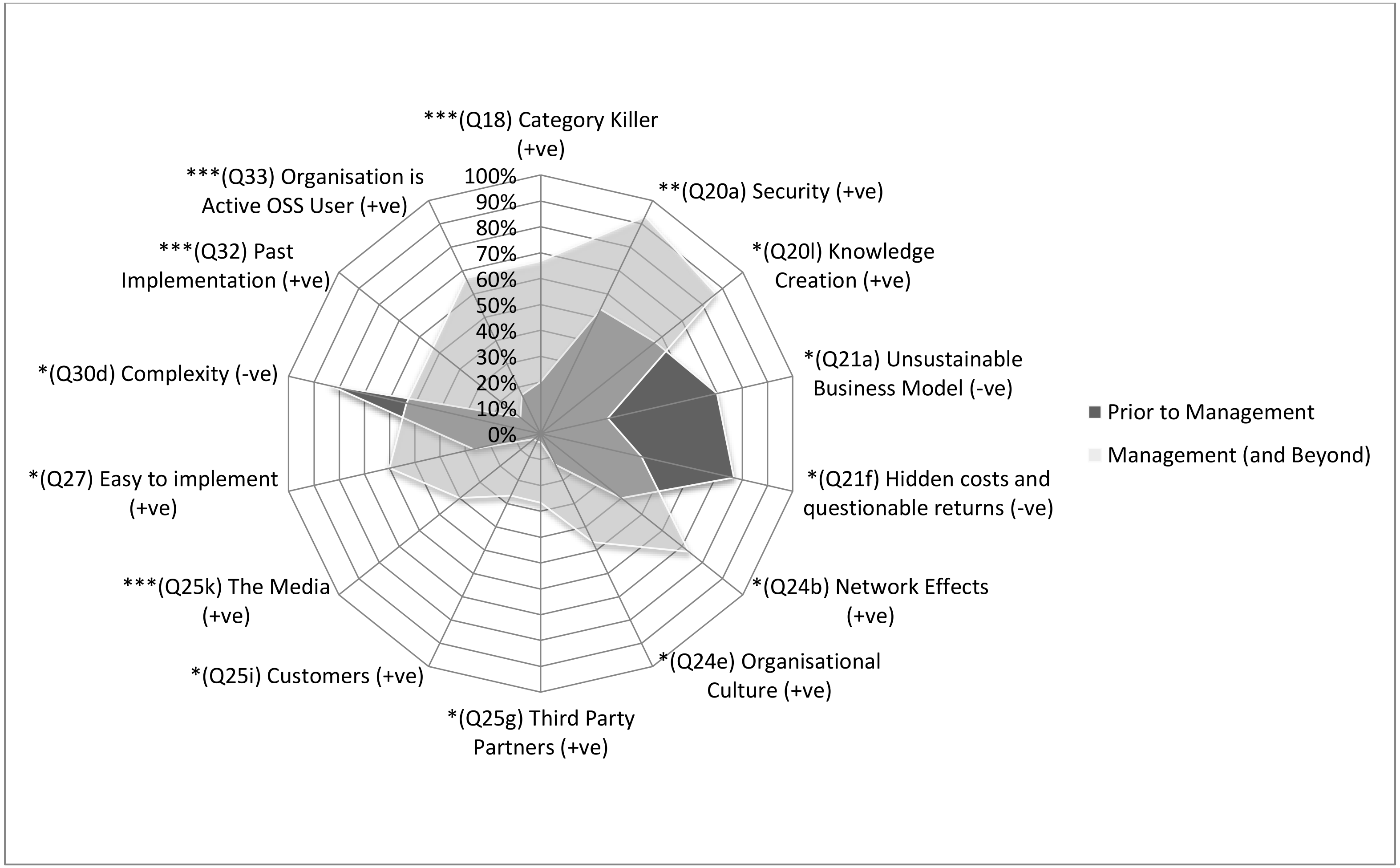


Figure 0.79: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Management Stage (and Beyond)

Development Stage Two (and Beyond)

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption stage in 2012 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show twenty three statistically significant factors for reported OSS adoption of this category of software in 2012. Most notably the; Productivity (attitude), Security (attitude), OSS Success Stories Reported (subjective norm), Organisational Culture (subjective norm) and Organisation Active OSS User (perceived behavioural control) factors were all shown to be positively associated with this stage of adoption with a greater than 99.5% confidence level. Notably, the Unsustainable Business Model (attitude) and Security (attitude) were also found to be positively associated to this stage of OSS adoption with a greater than 99% confidence level. Remaining driving and inhibiting factors from all three constructs were also found to be greater than 95% confidence level as shown, with only the Unsustainable Business Model and Questionable Return on Investment factors found to be negatively associated with this stage of adoption.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below represents the same factors which illustrate the difference in salient beliefs between respondents who describe themselves as (a) those who intend to adopt OSS in this year and (b) those who do not, in terms of statistically significant factors.

Table 0.34: Analysis of Factors Associated with General OSS Adoption in the Development Stage (and Beyond)

	Sample (N)	Prior to Development			Development (and Beyond)			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
(Q17) Productivity (+ve)	45	19	3	16%	26	16	62%	***p(a>=16)=0.002342	0.00211
(Q18) Category Killer	45	19	4	21%	26	12	46%		0.05789
***(Q20a) Security (+ve)	45	19	7	37%	26	23	88%	***p(a>=23)=0.0004063	0.00038
**(Q20b) Cost (+ve)	45	19	12	63%	26	25	96%	**p(a>=25)=0.006428	0.00608
*(Q20c) Quality (+ve)	45	19	5	26%	26	17	65%	*p(a>=17)=0.01046	0.00883
*(20d) Flexibility (+ve)	45	19	9	47%	26	20	77%	*p(a>=20)=0.04186	0.03289
(Q20e) Technologically Disruptive	45	19	11	58%	26	20	77%		0.10428
*(Q20f) Relative Advantage (+ve)	45	19	7	37%	26	19	73%	*p(a>=19)=0.01649	0.01359
*(Q20g) Job Performance (+ve)	45	19	8	42%	26	19	73%	*p(a>=19)=0.03689	0.02898
(Q20h) Transparency (+ve)	45	19	8	42%	26	19	73%	*p(a>=19)=0.03689	0.02898
(Q20i) Perpetuity	45	19	8	42%	26	18	69%		0.04843
*(Q20j) Freedom to modify (+ve)	45	19	13	68%	26	25	96%	*p(a>=25)=0.01666	0.01555
(Q20k) Speed	45	19	8	42%	26	17	65%		0.07450
*(Q20l) Knowledge Creation (+ve)	45	19	9	47%	26	21	81%	*p(a>=21)=0.02130	0.01762
(Q20m) Creativity & Innovation	45	19	12	63%	26	20	77%		0.15890
(Q20n) Vendor Lock-in	45	19	15	79%	26	25	96%		0.08248
(Q20o)Observable Results	45	19	8	42%	26	15	58%		0.14185
*(Q20p) Ideological Compatibility (+ve)	45	19	10	53%	26	21	81%	*p(a>=21)=0.04598	0.03642
*(Q21a) Unsustainable Business Model (-ve)	45	19	14	74%	26	11	42%	*p(a<=11)=0.03588	0.02834
(Q21b) Second Best Perception	45	19	13	68%	26	13	50%		0.11573
(Q21c) Reliability (no better than propietary alternatives)	45	19	11	58%	26	13	50%		0.20831
(Q21d) Preference for building proprietary software skills	45	19	10	53%	26	11	42%		0.18913
(Q21e) Most OSS project fail to attract participants	45	19	11	58%	26	11	42%		0.14185
*(Q21f) Hidden costs and questionable returns (-ve)	45	19	16	84%	26	13	50%	*p(a<=13)=0.01838	0.01559
(Q21g) OSS commercial contracts not free (of charge)	45	19	12	63%	26	15	58%		0.22688
Subjective Norm									
*(Q23a) Reported that others have adopted OSS (+ve)	39	16	12	75%	23	23	100%	*p(a>=23)=0.02213	0.02213
***(Q23b) Reported others success stories (+ve)	39	16	10	63%	23	23	100%	***p(a>=23)=0.002455	0.00245
*(Q23c) OSS Contributors (reported) (+ve)	34	15	5	33%	19	13	68%	*p(a>=13)=0.04502	0.03697
(Q24a) Personal Identification with OSS Community	45	19	3	16%	26	10	38%		0.07050
(Q24b) Network Effects	45	19	7	37%	26	16	62%		0.06501
(Q24c) Internal Politics	45	19	2	11%	26	6	23%		0.18264
(Q24d) External Politics	45	19	3	16%	26	5	19%		0.29571
***(Q24e) Organisational Culture (+ve)	45	19	0	0%	26	11	42%	***p(a>=11)=0.0007612	0.00076
(Q24f) Champion or Sponsor	45	19	9	47%	26	17	65%		0.11837
(Q24g) Commitment to local consultants/suppliers	45	19	4	21%	26	5	19%		0.28772
(Q24h) Lack of legally responsible third party	45	19	1	5%	26	3	12%		0.33155
(Q25a) Friends and Acquaintances	45	19	5	26%	26	14	54%		0.04606
*(Q25b) OSS Contributors (influence) (+ve)	45	19	8	42%	26	19	73%	*p(a>=19)=0.01838	0.02898
(Q25c) Colleagues (in line of business)	45	19	5	26%	26	12	46%		0.10181
**(Q25d) Colleagues (in IT Dept) (+ve)	45	19	5	26%	26	18	69%	**p(a>=18)=0.005089	0.00441
(Q25e) Colleagues (in Line of Business)	45	19	3	16%	26	6	23%		0.25175
(Q25f) Competitors	45	19	1	5%	26	1	4%		0.49899
(Q25g) Third Party Partners	45	19	1	5%	26	4	15%		0.23249
(Q25h) Suppliers	45	19	1	5%	26	1	4%		0.49899
(Q25i) Customers	45	19	1	5%	26	4	15%		0.23249
(Q25j) Government	45	19	6	32%	26	11	42%		0.19004
*(Q25k) The Media (+ve)	45	19	0	0%	26	7	27%	*p(a>=7)=0.01450	0.01450
(Q25l) The General Public	45	19	1	5%	26	6	23%		0.09640
Perceived Behavioural Control (PBC)									
*(Q27) Easy to implement (+ve)	45	19	4	21%	26	13	50%	*p(a>=13)=0.04632	0.03655
(Q28) Respondent's decision to adopt	45	19	6	32%	26	3	12%		0.07961
(Q29a) Set of Standards (Specifying Proprietary Software)	45	19	8	42%	26	16	62%		0.10639
(Q29b) Professionalism of IT Dept	45	19	10	53%	26	15	58%		0.22516
(Q29c) Availability of Resources, Expertise and Familiarity	45	19	9	47%	26	15	58%		0.18913
(Q29d) Availability of Training	45	19	8	42%	26	11	42%		0.23949
(Q29e) Availability of Time	45	19	8	42%	26	12	46%		0.23028
(Q29f) Internal OSS Installed Base	45	19	6	32%	26	15	58%		0.05555
(Q29g) Inertia (i.e. level of acceptance)	45	19	1	5%	26	5	19%		0.15345
(Q29h) Conservative Management	45	19	1	5%	26	3	12%		0.33155
(Q29i) Availability of Commercial Support	45	19	4	21%	26	10	38%		0.12338
(Q29j) Trial-ability (i.e. ability to demo capability)	45	19	8	42%	26	15	58%		0.14185
(Q30a) Unacceptable License Terms	45	19	8	42%	26	12	46%		0.23028
(Q30b) Overwhelming number of patches and upgrades	45	19	12	63%	26	17	65%		0.24348
(Q30c) Lack of Technical Support	45	19	16	84%	26	24	92%		0.25776
(Q30d) Complexity	45	19	16	84%	26	17	65%		0.10527
(Q30e) Proprietary Volume Purchase Agreement	45	19	14	74%	26	15	58%		0.13894
(30f) Lack of Resource	45	19	15	79%	26	21	81%		0.28772
(Q30g) Switching Costs	45	19	15	79%	26	18	69%		0.21055
(Q30h) Set of Standards	45	19	12	63%	26	20	77%		0.15890
(Q30i) Lack of Relevance	45	19	12	63%	26	15	58%		0.22688
*(Q32) Past Implementation (+ve)	45	19	1	5%	26	10	38%	*p(a>=10)=0.01070	0.00994
**(Q33) Organisation is Active OSS User (+ve)	45	19	0	0%	26	15	58%	***p(a>=15)=0.00002240	0.00002
*p value<0.05									
**p value<0.01									
***p value<0.005									

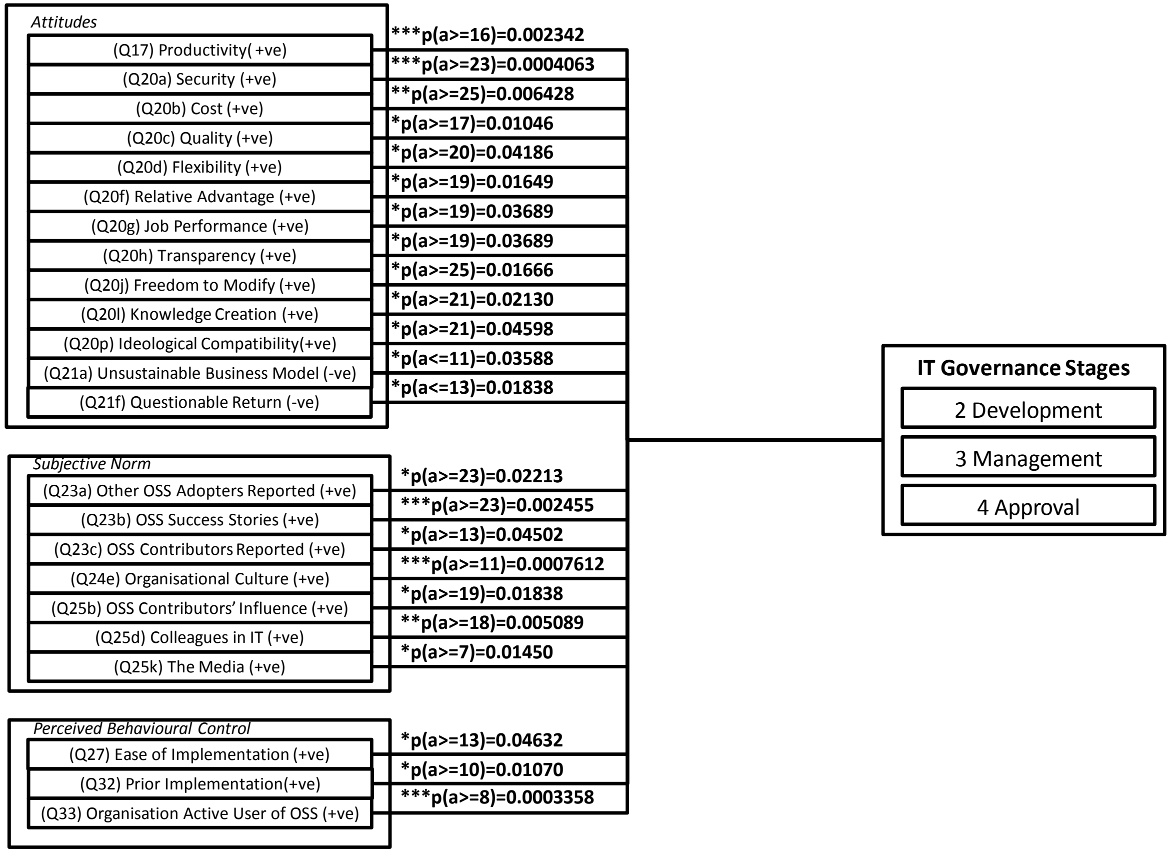
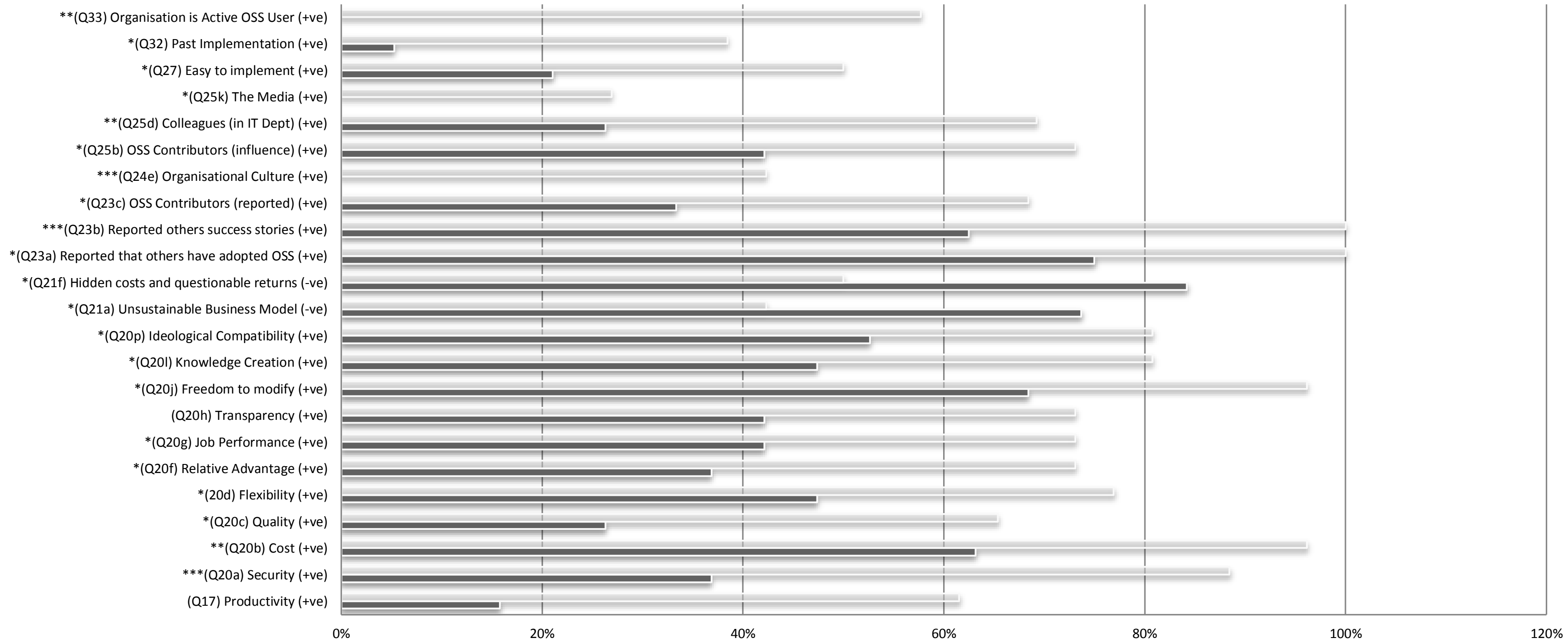


Figure 0.80: Factors Associated with OSS Adoption in the Development Stage (and Beyond)



	(Q17) Productivity (+ve)	***(Q20a) Security (+ve)	**(Q20b) Cost (+ve)	*(Q20c) Quality (+ve)	*(20d) Flexibility (+ve)	*(Q20f) Relative Advantage (+ve)	*(Q20g) Job Performance (+ve)	(Q20h) Transparency (+ve)	*(Q20j) Freedom to modify (+ve)	*(Q20l) Knowledge Creation (+ve)	*(Q20p) Ideological Compatibility (+ve)	*(Q21a) Unsustainable Business Model (-ve)	*(Q21f) Hidden costs and questionable returns (-ve)	*(Q23a) Reported that others have adopted OSS (+ve)	***(Q23b) Reported others success stories (+ve)	*(Q23c) OSS Contributors (reported) (+ve)	***(Q24e) Organisational Culture (+ve)	*(Q25b) OSS Contributors (influence) (+ve)	**(Q25d) Colleagues (in IT Dept) (+ve)	*(Q25k) The Media (+ve)	*(Q27) Easy to implement (+ve)	*(Q32) Past Implementation (+ve)	**(Q33) Organisation is Active OSS User (+ve)
Development (and Beyond)	62%	88%	96%	65%	77%	73%	73%	73%	96%	81%	81%	42%	50%	100%	100%	68%	42%	73%	69%	27%	50%	38%	58%
Prior to Development	16%	37%	63%	26%	47%	37%	42%	42%	68%	47%	53%	74%	84%	75%	63%	33%	0%	42%	26%	0%	21%	5%	0%

Figure 0.81: Bar Chart Illustrating Factors Associated with General OSS Adoption in the Development Stage (and Beyond)

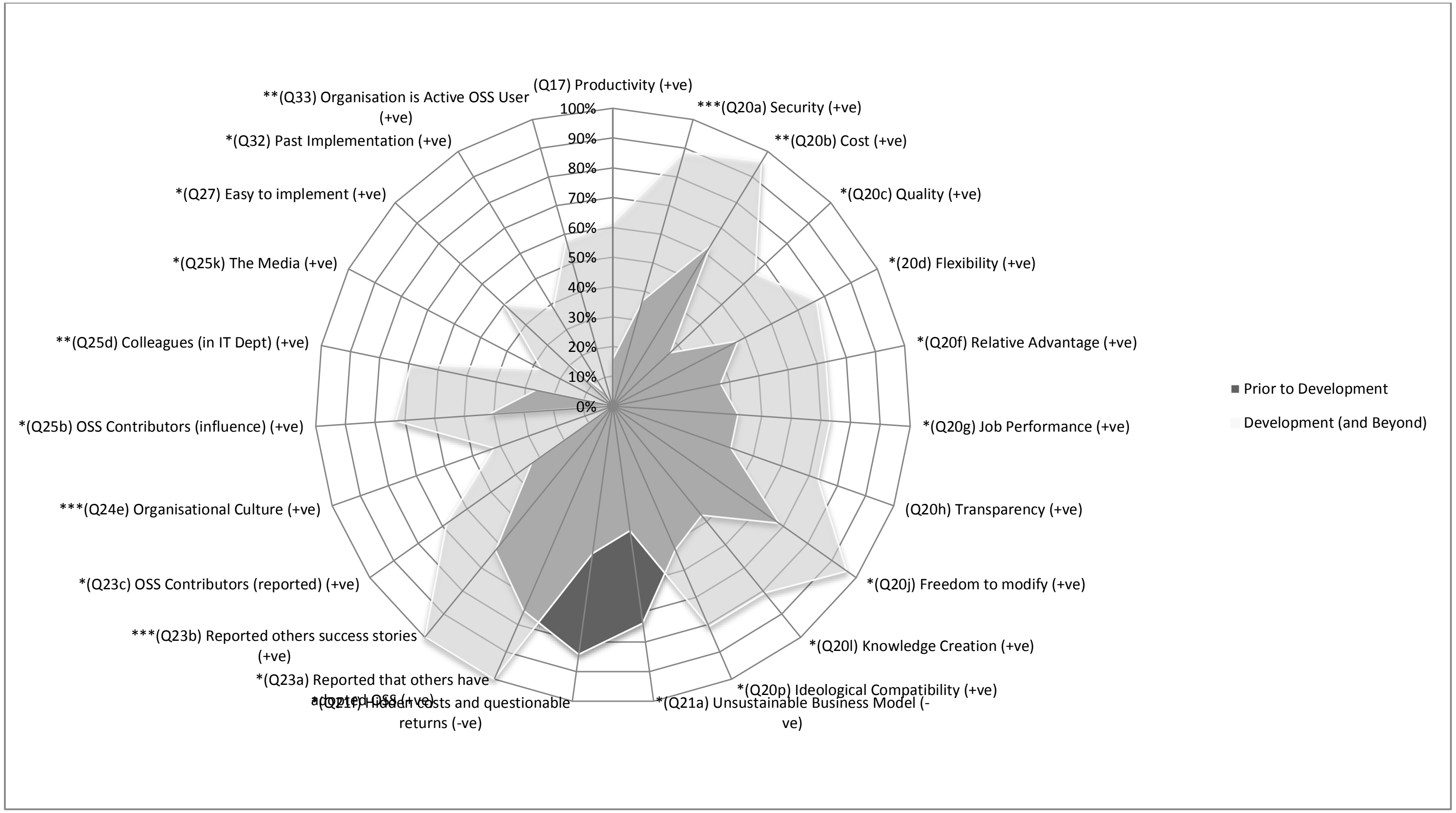


Figure 0.82: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Development Stage (and Beyond)

Initiation Stage Two (and Beyond)

The table below illustrates the independent variables (or driving/inhibiting factors) and the degree to which they were established to have a statistically significant relationship to the self-reported organisational OSS adoption stage in 2012 analysed via the previously described Fisher Exact Test procedure.

The diagram below shows the significant factors and is categorised into three TPB constructs (i.e. attitude, subjective norm and perceived behavioural control). The testing condition was set to a p-value of greater than 95% as before. The results show eight statistically significant factors for reported OSS adoption of this category of software in 2012. Most notably the Organisation Active OSS User (perceived behavioural control) factor was shown to be positively associated with this stage of adoption with a greater than 99.5% confidence level. Notably, the Second Best Perception factor was also found to be negatively associated to this stage of OSS adoption with a greater than 99% confidence level. Remaining driving factors also found to be greater than 95% confidence level were shown to be Productivity (attitude), Organisational Culture (subjective norm), OSS Contributors' Influence, and Colleagues in IT, with only the Questionable Return (attitude) factor found to be negatively associated with this stage of adoption.

The bar chart below represents the same factors and compares the extent to which respondents who describe themselves as OSS Adopters and OSS Non-adopters agree that the specified factors are important to organisational OSS adoption of this category of software.

The radar graph below represents the same factors which illustrate the difference in salient beliefs between respondents who describe themselves as (a) those who intend to adopt OSS in this year and (b) those who do not, in terms of statistically significant factors.

Table 0.35: Analysis of Factors Associated with General OSS Adoption in the Initiation Stage (and Beyond)

	Sample (N)	Prior to Initiation			Initiation (and Beyond)			Fisher Exact Test One sided p-value	Hypergeometric Probability (p)
		Frequency	Agreed	%	Frequency	Agreed	%		
Attitude (A)									
*(Q17) Productivity (+ve)	45	12	2	17%	33	17	52%	*p(a>=17)=0.03702	0.03158
(Q18) Category Killer	45	12	3	25%	33	13	39%		0.19501
**(Q20a) Security (+ve)	45	12	4	33%	33	26	79%	**p(a>=26)=0.006885	0.00613
(Q20b) Cost	45	12	8	67%	33	29	88%		0.09397
(Q20c) Quality	45	12	4	33%	33	18	55%		0.12471
(20d) Flexibility	45	12	6	50%	33	23	70%		0.13227
(Q20e) Technologically Disruptive	45	12	7	58%	33	24	73%		0.18305
(Q20f) Relative Advantage	45	12	6	50%	33	20	61%		0.21720
(Q20g) Job Performance	45	12	7	58%	33	20	61%		0.26456
(Q20h) Transparency	45	12	6	50%	33	21	64%		0.19107
(Q20i) Perpetuity	45	12	6	50%	33	20	61%		0.21720
(Q20j) Freedom to modify	45	12	8	67%	33	30	91%		0.05951
(Q20k) Speed	45	12	6	50%	33	19	58%		0.23868
(Q20l) Knowledge Creation	45	12	9	75%	33	21	64%		0.22635
(Q20m) Creativity & Innovation	45	12	8	67%	33	24	73%		0.26149
(Q20n) Vendor Lock-in	45	12	9	75%	33	31	94%		0.09508
(Q20o)Observable Results	45	12	6	50%	33	17	52%		0.26189
(Q20p) Ideological Compatibility	45	12	7	58%	33	24	73%		0.18305
(Q21a) Unsustainable Business Model	45	12	9	75%	33	16	48%		0.08098
**(Q21b) Second Best Perception (-ve)	45	12	10	83%	33	16	48%	*p(a<=16)=0.03702	0.03158
(Q21c) Reliability (no better than propietary alternatives)	45	12	9	75%	33	15	45%		0.06047
(Q21d) Preference for building proprietary software skills	45	12	8	67%	33	13	39%		0.07518
(Q21e) Most OSS project fail to attract participants	45	12	8	67%	33	14	42%		0.09845
*(Q21f) Hidden costs and questionable returns (-ve)	45	12	11	92%	33	18	55%	*p(a<=18)=0.02105	0.01925
(Q21g) OSS commercial contracts not free (of charge)	45	12	7	58%	33	20	61%		0.26456
Subjective Norm (SN)									
(Q23a) Reported that others have adopted OSS	39	10	8	80%	29	27	93%		0.22212
(Q23b) Reported others success stories	39	10	7	70%	29	26	90%		0.13439
(Q23c) OSS Contributors (reported)	34	9	3	33%	25	15	60%		0.12458
(Q24a) Personal Identification with OSS Community	45	12	3	25%	33	10	30%		0.27893
(Q24b) Network Effects	45	12	5	42%	33	18	55%		0.19954
(Q24c) Internal Politics	45	12	0	0%	33	8	24%		0.06441
(Q24d) External Politics	45	12	1	8%	33	7	21%		0.23783
*(Q24e) Organisational Culture (+ve)	45	12	0	0%	33	11	33%	*p(a>=11)=0.01907	0.01907
(Q24f) Champion or Sponsor	45	12	7	58%	33	19	58%		0.26596
(Q24g) Commitment to local consultants/suppliers	45	12	2	17%	33	7	21%		0.31818
(Q24h) Lack of legally responsible third party	45	12	1	8%	33	3	9%		0.43942
(Q25a) Friends and Acquaintances	45	12	5	42%	33	14	42%		0.26596
*(Q25b) OSS Contributors (influence) (+ve)	45	12	4	33%	33	23	70%	*p(a>=23)=0.03221	0.02670
(Q25c) Colleagues (in line of business)	45	12	4	33%	33	13	39%		0.25721
*(Q25d) Colleagues (in IT Dept) (+ve)	45	12	3	25%	33	20	61%	*p(a>=20)=0.03691	0.03063
(Q25e) Colleagues (in Line of Business)	45	12	2	17%	33	7	21%		0.31818
(Q25f) Competitors	45	12	1	8%	33	1	3%		0.40000
(Q25g) Third Party Partners	45	12	0	0%	33	5	15%		0.19426
(Q25h) Suppliers	45	12	0	0%	33	2	6%		0.53333
(Q25i) Customers	45	12	1	8%	33	4	12%		0.40191
(Q25j) Government	45	12	5	42%	33	12	36%		0.25476
(Q25k) The Media	45	12	0	0%	33	7	21%		0.09414
(Q25l) The General Public	45	12	0	0%	33	7	21%		0.09414
Perceived Behavioural Control (PBC)									
(Q27) Easy to implement	45	12	2	17%	33	7	21%		0.31818
(Q28) Respondent's decision to adopt	45	12	4	33%	33	5	15%		0.13257
(Q29a) Set of Standards (Specifying Proprietary Software)	45	12	6	50%	33	18	55%		0.25395
(Q29b) Professionalism of IT Dept	45	12	5	42%	33	20	61%		0.14321
(Q29c) Availability of Resources, Expertise and Familiarity	45	12	6	50%	33	18	55%		0.25395
(Q29d) Availability of Training	45	12	6	50%	33	13	39%		0.21720
(Q29e) Availability of Time	45	12	6	50%	33	14	42%		0.23868
(Q29f) Internal OSS Installed Base	45	12	4	33%	33	17	52%		0.15305
(Q29g) Inertia (i.e. level of acceptance)	45	12	1	8%	33	5	15%		0.34966
(Q29h) Conservative Management	45	12	1	8%	33	3	9%		0.43942
(Q29i) Availability of Commercial Support	45	12	3	25%	33	11	33%		0.25516
(Q29j) Trial-ability (i.e. ability to demo capability)	45	12	5	42%	33	18	55%		0.19954
(Q30a) Unacceptable License Terms	45	12	5	42%	33	15	45%		0.25914
(Q30b) Overwhelming number of patches and upgrades	45	12	8	67%	33	21	64%		0.27162
(Q30c) Lack of Technical Support	45	12	11	92%	33	29	88%		0.40191
(Q30d) Complexity	45	12	11	92%	33	22	67%		0.08075
(Q30e) Proprietary Volume Purchase Agreement	45	12	9	75%	33	20	61%		0.19501
(30f) Lack of Resource	45	12	11	92%	33	25	76%		0.18801
(Q30g) Switching Costs	45	12	10	83%	33	23	70%		0.21241
(Q30h) Set of Standards	45	12	9	75%	33	23	70%		0.27893
(Q30i) Lack of Relevance	45	12	9	75%	33	18	55%		0.13298
(Q32) Past Implementation	45	12	1	8%	33	10	30%		0.10943
***(Q33) Organisation is Active OSS User (+ve)	45	12	0	0%	33	15	45%	***p(a>=15)=0.0030074	0.00301
*p value<0.05									
**p value<0.01									
***p value<0.005									

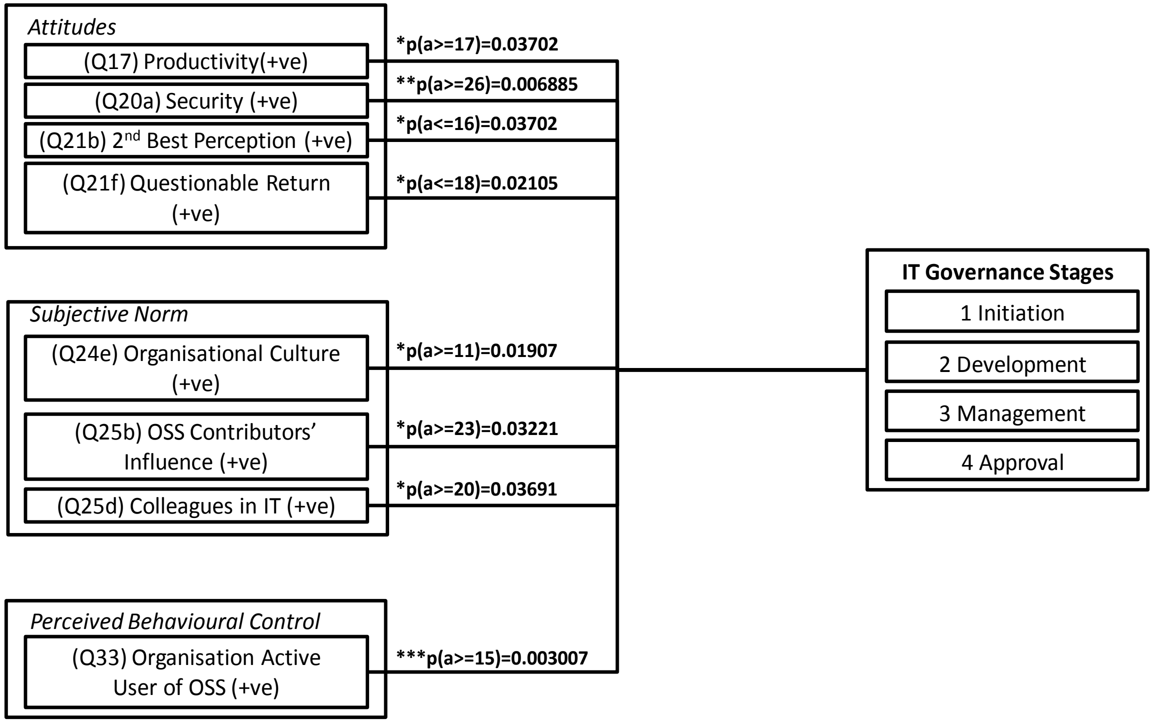
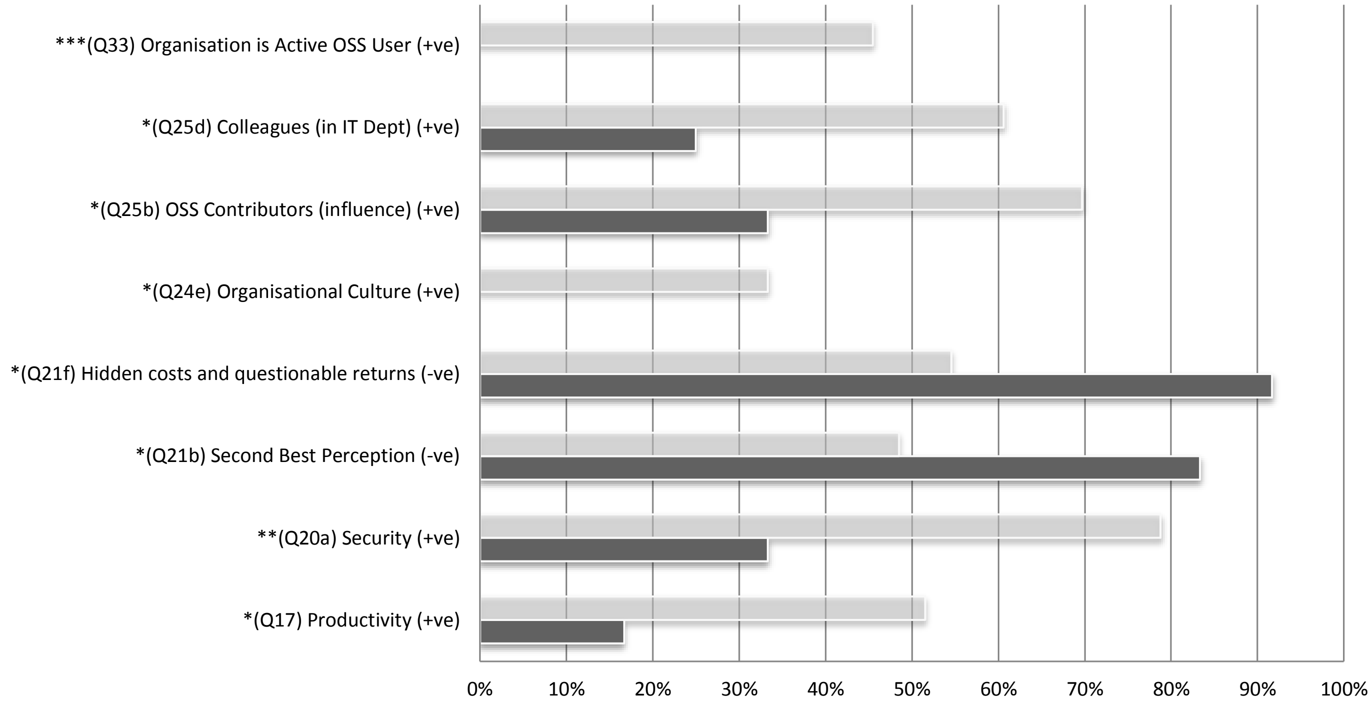


Figure 0.83: Factors Associated with OSS Adoption in the Initiation Stage (and Beyond)



	*(Q17) Productivity (+ve)	**(Q20a) Security (+ve)	*(Q21b) Second Best Perception (-ve)	*(Q21f) Hidden costs and questionable returns (-ve)	*(Q24e) Organisational Culture (+ve)	*(Q25b) OSS Contributors (influence) (+ve)	*(Q25d) Colleagues (in IT Dept) (+ve)	***(Q33) Organisation is Active OSS User (+ve)
Initiation (and Beyond)	52%	79%	48%	55%	33%	70%	61%	45%
Prior to Initiation	17%	33%	83%	92%	0%	33%	25%	0%

Figure 0.84: Bar Chart Illustrating Factors Associated with General OSS Adoption in the Initiation Stage (and Beyond)

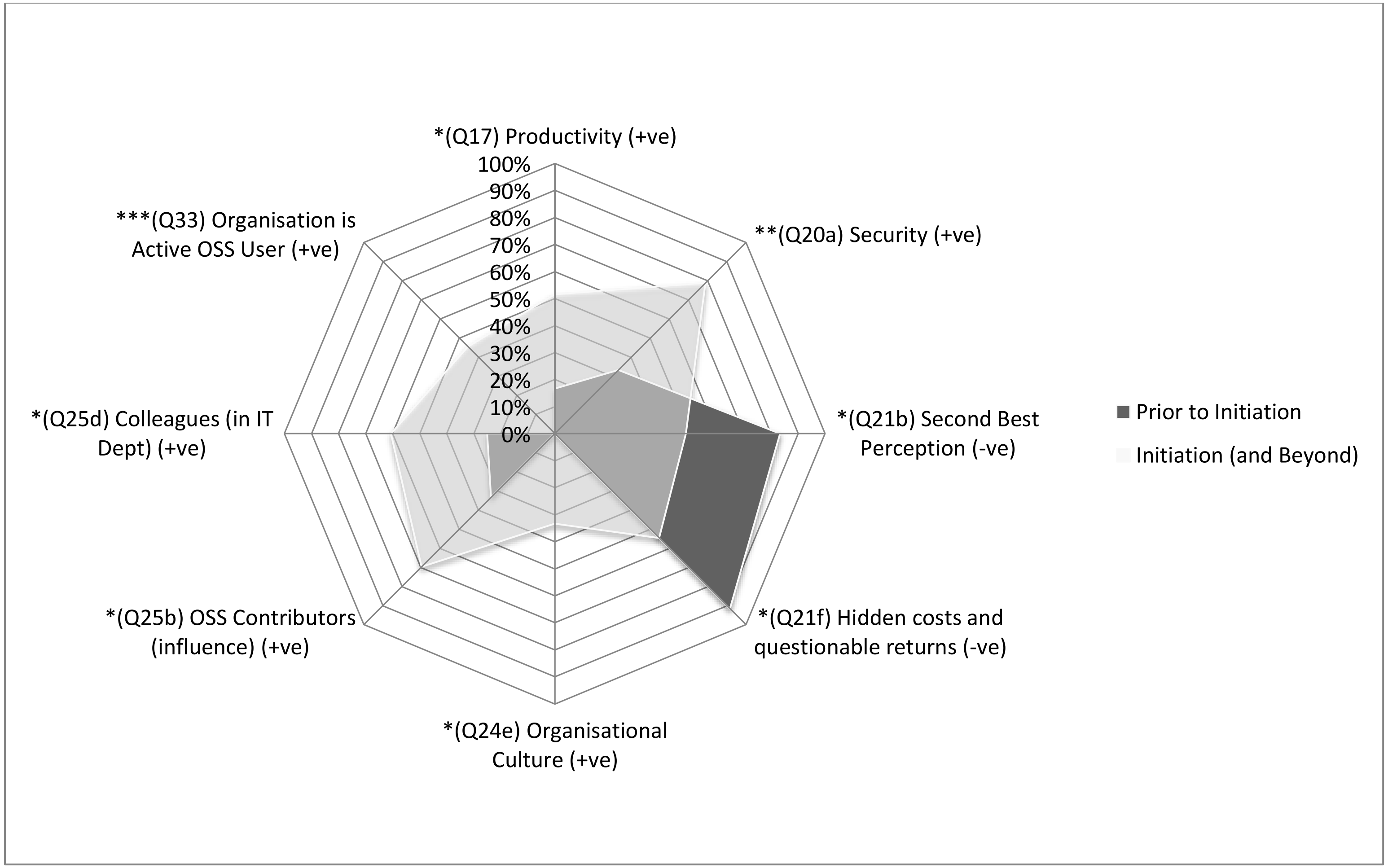


Figure 0.85: Radar Graph Illustrating Differences in Responses for Factors Associated with OSS Adoption in the Initiation Stage (and Beyond)

Appendix S: Mixed Methods Analysis

Mixed Methods Analysis for N=26 (i.e. Qualitative Responses Only)

Cross-industry Intention to Adopt OSS in 2013

Cost (Negative) Factor

			OSS Cross-industry Intention 2013		Total
			No	Yes	
Cost (Negative)	Not Coded	Count	7	16	23
		% within Cost Negative	30.4%	69.6%	100.0%
		% within OSS Cross-industry Intention 2013	70.0%	100.0%	88.5%
	Coded	Count	3	0	3
		% within Cost Negative	100.0%	0.0%	100.0%
		% within OSS Cross-industry Intention 2013	30.0%	0.0%	11.5%
Total		Count	10	16	26
		% within Cost Negative	38.5%	61.5%	100.0%
		% within OSS Cross-industry Intention 2013	100.0%	100.0%	100.0%

Colleagues in IT Dept (Negative)

			OSS Cross-industry Intention 2013		Total
			No	Yes	
Colleagues in IT Dept (Negative)	Not Coded	Count	6	16	22
		% within Colleagues in IT Negative	27.3%	72.7%	100.0%
		% within OSS Cross-industry Intention 2013	60.0%	100.0%	84.6%
	Coded	Count	4	0	4
		% within Colleagues in IT Negative	100.0%	0.0%	100.0%
		% within OSS Cross-industry Intention 2013	40.0%	0.0%	15.4%
Total		Count	10	16	26
		% within Colleagues in IT Negative	38.5%	61.5%	100.0%
		% within OSS Cross-industry Intention 2013	100.0%	100.0%	100.0%

Ease of Implementation (Negative)

			OSS Cross-industry Intention 2013		Total
			No	Yes	
Ease of Implementation Negative	Not Coded	Count	4	14	18
		% within EoI Negative	22.2%	77.8%	100.0%
		% within OSS Cross-industry Intention 2013	40.0%	87.5%	69.2%
	Coded	Count	6	2	8
		% within EoI Negative	75.0%	25.0%	100.0%
		% within OSS Cross-industry Intention 2013	60.0%	12.5%	30.8%
Total		Count	10	16	26
		% within EoI Negative	38.5%	61.5%	100.0%
		% within OSS Cross-industry Intention 2013	100.0%	100.0%	100.0%

OSS Adoption in 2010

Supplier (Negative)

			OSS Adoption 2010		Total
			No	Yes	
Supplier Negative	Not Coded	Count	5	15	20
		% within Supplier Negative	25.0%	75.0%	100.0%
		% within OSS Adoption 2010	55.6%	93.8%	80.0%
	Coded	Count	4	1	5
		% within Supplier Negative	80.0%	20.0%	100.0%
		% within OSS Adoption 2010	44.4%	6.2%	20.0%
Total		Count	9	16	25
		% within Supplier Negative	36.0%	64.0%	100.0%
		% within OSS Adoption 2010	100.0%	100.0%	100.0%

OSS Approval Stage One (and Beyond)

Risk (Negative)

			Approval Stage (and Beyond)		Total
			No (Prior to Approval)	Yes	
Risk Negative	Not Coded	Count	20	4	24
		% within Risk Negative	83.3%	16.7%	100.0%
		% within Approval Stage (and Beyond)	100.0%	66.7%	92.3%
	Coded	Count	0	2	2
		% within Risk Negative	0.0%	100.0%	100.0%
		% within Approval Stage (and Beyond)	0.0%	33.3%	7.7%
Total		Count	20	6	26
		% within Risk Negative	76.9%	23.1%	100.0%
		% within Approval Stage (and Beyond)	100.0%	100.0%	100.0%

Mixed Methods Analysis for N=44 (i.e. Quantitative and Qualitative Responses)

Cross-industry Intention to Adopt OSS in 2013 (N=42)

Cost (Negative)

			OSS Cross-industry Intention 2013		Total
			OSS Non-adopters	OSS Adopters	
Cost Negative	Not Coded	Count	13	26	39
		% within Cost Negative	33.3%	66.7%	100.0%
		% within OSS Cross-industry Intention 2013	81.2%	100.0%	92.9%
	Coded	Count	3	0	3
		% within Cost Negative	100.0%	0.0%	100.0%
		% within OSS Cross-industry Intention 2013	18.8%	0.0%	7.1%
Total		Count	16	26	42
		% within Cost Negative	38.1%	61.9%	100.0%
		% within OSS Cross-industry Intention 2013	100.0%	100.0%	100.0%

Suitability (Negative)

			OSS Cross-industry Intention 2013		Total
			OSS Non-adopters	OSS Adopters	
Suitability Negative	Not Coded	Count	9	22	31
		% within Suitability Negative	29.0%	71.0%	100.0%
		% within OSS Cross-industry Intention 2013	56.2%	84.6%	73.8%
	Coded	Count	7	4	11
		% within Suitability Negative	63.6%	36.4%	100.0%
		% within OSS Cross-industry Intention 2013	43.8%	15.4%	26.2%
Total		Count	16	26	42
		% within Suitability Negative	38.1%	61.9%	100.0%
		% within OSS Cross-industry Intention 2013	100.0%	100.0%	100.0%

Ease of Implementation (Negative)

			OSS Cross-industry Intention 2013		Total
			No	Yes	
EoI Negative	Not Coded	Count	10	24	34
		% within EoI Negative	29.4%	70.6%	100.0%
		% within OSS Cross-industry Intention 2013	62.5%	92.3%	81.0%
	Coded	Count	6	2	8
		% within EoI Negative	75.0%	25.0%	100.0%
		% within OSS Cross-industry Intention 2013	37.5%	7.7%	19.0%
Total		Count	16	26	42
		% within EoI Negative	38.1%	61.9%	100.0%
		% within OSS Cross-industry Intention 2013	100.0%	100.0%	100.0%

Utilities Adoption in 2012 (N=44)

Development/Freedom to Modify (Negative)

			OSS Utilities Adoption 2012		Total
			No	Yes	
Development Negative	Not Coded	Count	8	34	42
		% within Development Negative	19.0%	81.0%	100.0%
		% within OSS Utilities Adoption 2012	80.0%	100.0%	95.5%
	Coded	Count	2	0	2
		% within Development Negative	100.0%	0.0%	100.0%
		% within OSS Utilities Adoption 2012	20.0%	0.0%	4.5%
Total		Count	10	34	44
		% within Development Negative	22.7%	77.3%	100.0%
		% within OSS Utilities Adoption 2012	100.0%	100.0%	100.0%

Appendix T: Mixed Methods Results

Cross-industry Intention to Adopt OSS in 2013

The figure below shows the relationship summarised in a diagram and categorised into three TPB constructs. The testing condition was set to a p-value of greater than 95% as before. The results show the nine factors, established via quantitative methods only, for intention to adopt OSS of this category of software in 2013. However, in this mixed-methods version, the diagram includes the two inhibiting factors (in the attitude construct) associated with OSS adoption behaviour (i.e. Cost and Suitability) established via the aforementioned meta-inference. Similarly, in the PBC construct, the Ease of Implementation inhibiting factors is also included. The same figure also show illustrative comments made by participants in the survey in relation to the factors established by meta-inference.

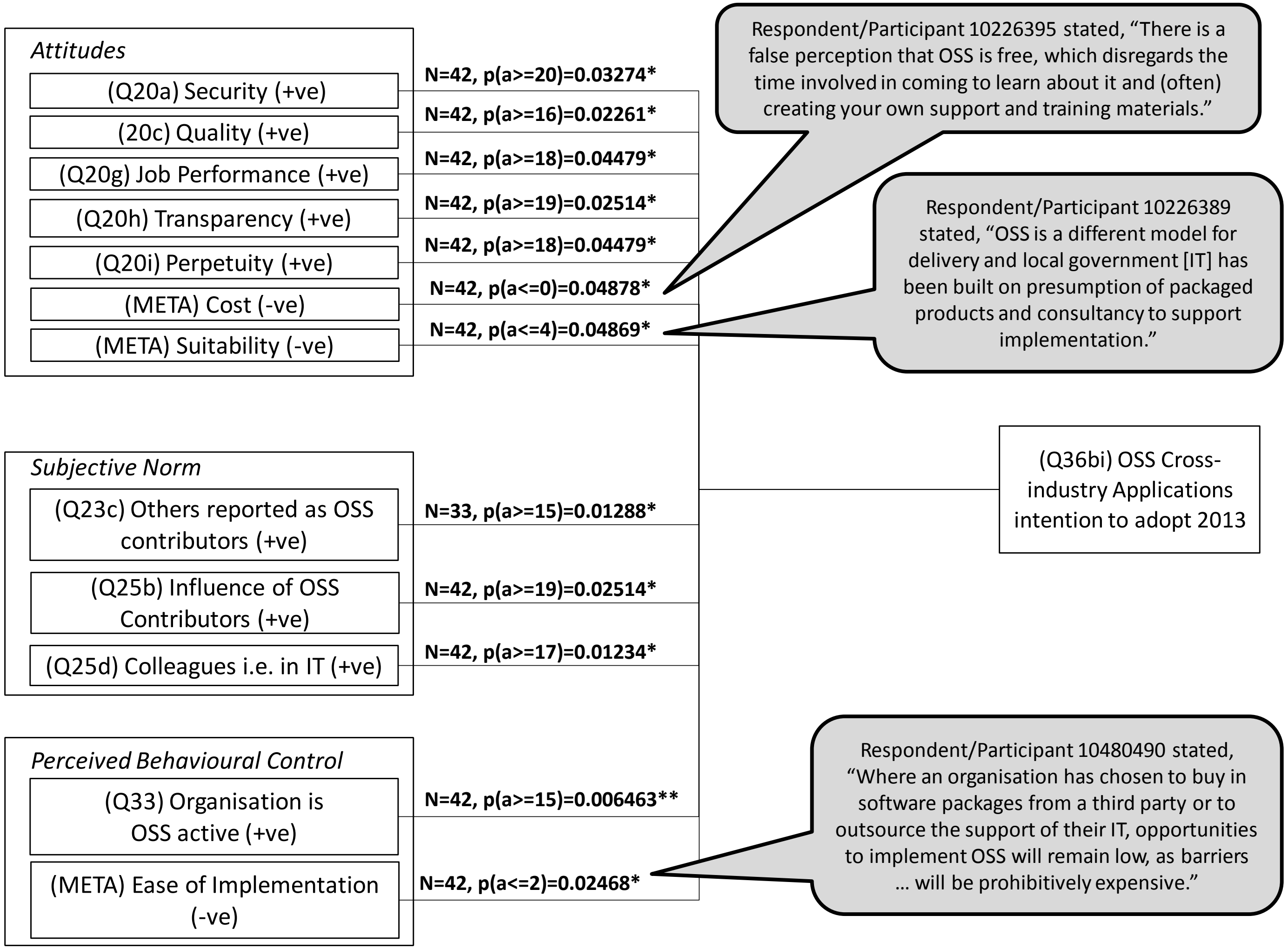


Figure 0.86: Driving/Inhibiting Factors Associated with OSS Cross-industry Application Intention to Adopt in 2013 Established via Mixed-methods

Utilities Adoption 2012

Similarly, the diagram below shows the significant factors and is categorised into three TPB constructs. The testing condition was set to a p-value of greater than 95% as before. The results show the single factor, established via quantitative methods only, for OSS adoption in this category of software. That is, the Most OSS Projects Fail factor. However, in this mixed-methods version, the diagram includes another inhibiting factors (in the PBC construct) associated with OSS adoption behaviour (i.e. the Development/Freedom to Modify Capability factor) established via the aforementioned meta-inference. The same figure also show illustrative comments made by participants in the survey in relation to the factor established by meta-inference

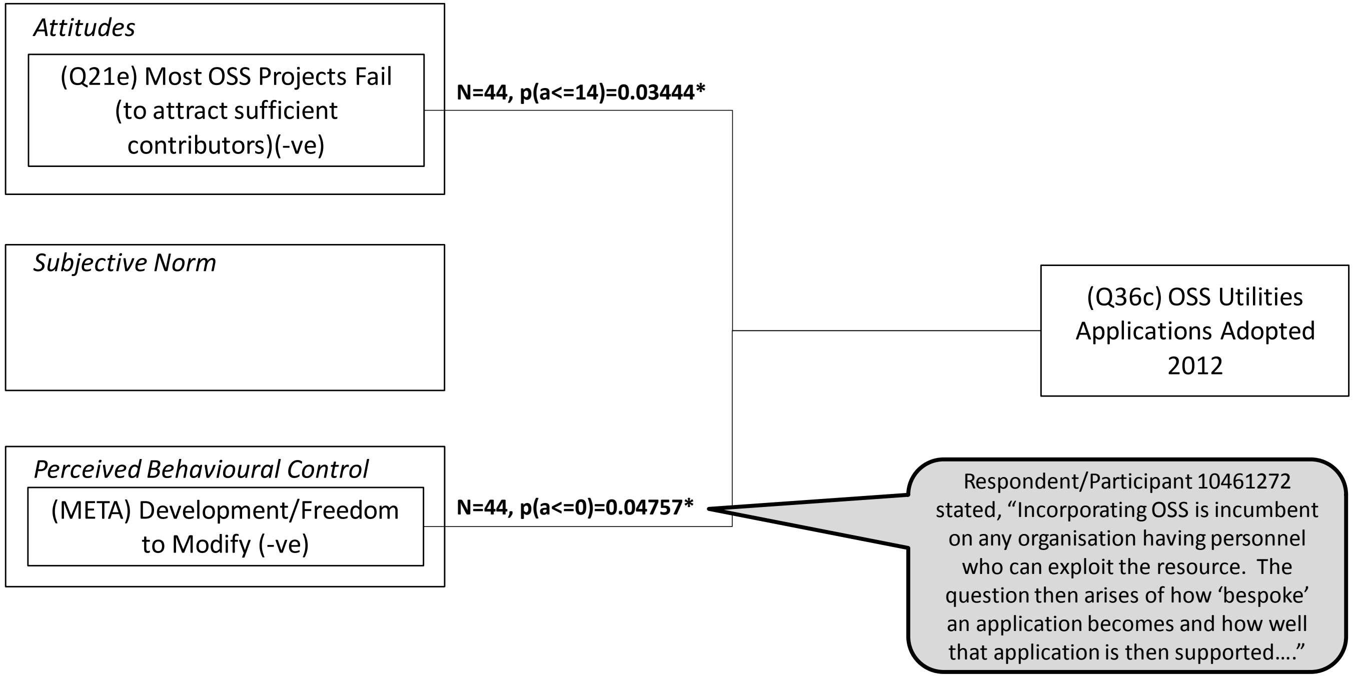


Figure 0.87: Driving/Inhibiting Factors Associated with Utilities Applications Adopted in 2012 Established via Mixed-methods

Appendix U: Demand-side and Supply-side Key Informant Interview Data

Supply-side Key Informant Semi-structured Interview

I introduced my research. I was already known to the participant who had taken a friendly interest in the research topic. At the time, the participant was employed as a pre-sales engineer or architect for a large US software company, selling to the financial services industry. The context of the interview was that the participants would be a key informant (on the supply-side) as someone who has regular contact with customers (mostly IT infrastructure managers and architects).

The concept of TPB was broadly discussed in terms of attitudes, subjective norm and perceived behavioural control and was suggested as a broad structure for the subsequent discussion.

The participant commented that although Figure One [in the respondents report] showed a dip in the FTSE100 shared index (at the time of the global financial crisis) a trend-line would probably show similar growth to the revenue of the global software industry.

Attitudes

The participant commented that he had noted a strong driver in cost savings in customer behaviour, largely as a result of the consequences of the 2008/9 global financial crisis. He regarded OSS as a part of a wider theme of customers seeking out alternatives to mature proprietary incumbents (or traditional client-server variants) for example cloud-computing. He also noted the emergence of "next generation" style of businesses such as Amazon, Google, Apple and Facebook as being less dependent on the incumbent models. He described a new wave of users as "generation Y" who view OSS as a means of reducing barriers to entry for environments and markets. He also detected that customers were supporting a drive to commodity computing infrastructure which OSS also helped facilitate. Time-to-market (or rapid deployment) was also viewed as a key enabler for OSS with "generation Y" users expecting access to OSS development tools. He cited that customers had built up experience in Linux and Android as standardised building blocks. This had led to an expectation of an "instant on community" with no twelve month wait for infrastructure to be designed, procured, engineered, maintained and etc.

Subjective Norm

The participant commented that he had detected a theme of a technologist's "bottom-up" rather than strategist's "top-down" approach to delivering IT and that OSS was an enabler in this respect.

He believed that customers regarded OSS adoption as something which competitors are using to develop advantage (even if certain others were not) and that as a result "more was being achieved with less".

Perceived Behavioural Control

The participant described the combination of organisations, vendors and analysts as a "battleground" between COTS (Custom-off-the-shelf) packages and more agile SaaS (Software as a Service) variants. Some have embraced others have technologically lagged (cited Roger's diffusion curve and the associated concept of 'laggards'). He also described a conflict between technologists and management with concerns about reliability occasionally being levelled at OSS.

Commented that Cloud-computing and BYO (bring your own) devices had accelerated the trend toward commodity and standardised building blocks for computing. The participant used a car metaphor to describe how users expect a standardised experience in some ways and enhanced experiences through innovation in others.

With respect to Table One [in the respondent's report] which shows the similarity in terms of market size between Applications software and Systems software market a participant commented that OSS developers tend to focus on Systems category which he regarded as "done and dusted", and "heading for apps space" citing examples of SaaS such as Google Apps.

Commenting on the illustration [in the respondent's report] which shows the emergence and decline in number of publications for OSS the participant regarded this as evidence of "acceptance" rather than 'fad-ism'. He commented that similar analysis on SaaS and Cloud computing would be of interest.

Commenting of Figure 14 [in the respondent's report] which shows the difference in belief systems between OSS adopters and non-adopters the participant was interested to know how the results would vary across industry segment, by size etc. e.g. is one industry more accepting than another? The participant made further references to Rogers' Diffusion Curve.

With respect to FFA as a form of implementation for this research the participant commented that this would be a "good starting point".

Demand-side Key Informant Semi-structured Interview

I introduced myself and my research. The participant introduced themselves and the department including some of the department's history. The department was described as a central government agency, regarded as exemplar in online (or digital) services whose role had expanded to provide advice, guidance, strategy and control for certain government IT projects.

The agency had recently set-up a new system of governance incorporating a review triggered by certain levels of expenditure. For example, an IT project with greater than GBP5million spend would receive a thorough review where management could expect project decisions to be challenged and reviewed for establishing value for money. The review was based on the departments experience with the UK's top 25 most popular public sector websites spanning 8 departments and 14 agencies.

The concept of TPB was broadly discussed in terms of attitudes, subjective norm and perceived behavioural control and was suggested as a broad structure for the subsequent discussion.

Attitude

One of the goals of the aforementioned review was to establish "a level playing field" for OSS with proprietary software in line with the UK government's coalition agreement.

An example was used to explain how certain government tenders had actually included software branded products. This was regarded as an inhibitor to competition in general and OSS in particular. Some agencies were observed circumventing a ban on this practice by listing functions and features, effectively specifying a specific product, in all but name.

An OSS toolkit had also been specified and published on the internet.

Some positive discrimination toward OSS was noted in the sense that when a business case for an IT project was presented for review, it would also have to include switching costs as part of the TCO (total cost of ownership).

CSG (a government security agency) had produced a "myth-busting guide" for government IT managers thinking of using OSS. The same agency had asserted that OSS is no more, or less, secure than proprietary software.

The participant’s department had produced a range of technology code of practice documents, a rule-set for review/analysis. This included a policy that all things being equal OSS should be the preferred decision.

It was also noted that public sector IT spend had been affected by an outsourcing tradition, driven by systems integrators. This was now being challenged through the spending control procedures. These reviews would also take place in a number of phases depending on the size and scope of the project. The output could include approval, rejection or approval (with conditions). These conditions could include developing skills in certain areas (including OSS alternatives) if it were deemed appropriate.

It was noted that the resulting adoption of OSS technology was predominantly in the Systems software layer, as opposed to the Application software layer. Some application layer penetration had been noted at the SaaS (Software as a Service) level.

It was pointed out that license agreement expiry or renewal was often being used as a trigger point for review and challenging procurement decisions.

Subjective norm

A participant referred to an "oligopoly" whereby a large government spend was being shared with a small number of suppliers. This was generally regarded as an undesirably situation which was "prime for disruption". It was noted that SaaS was moving toward OSS.

The participant had observed further difficulties with government agencies adopting OSS in terms of deciding where the intellectual property would reside. This could be with a vendor, who would not necessarily find it in their commercial interests to allow the IP to transfer to a subsequent vendor. This had complicated certain contracts in the past.

The participant reported that one IT manager had referred to OSS as a "fad" and "fashionable for government".

Participant regarded government in general as "late adopters" in terms of Roger's diffusion curve. Many government decision makers require extensive references and success stories to help support their decision making which had resulted as a culture of "doing what others do". This was described as not so much as a need for best practice but a herd mentality.

Perceived Behavioural Control

It was pointed out that IT resources were bifurcated into (1) large IT departments with extensive tenure who had a tendency to 'ossify' their IT decision making and (2) Smaller IT departments which were more receptive to change but with perhaps less skills and needing time to develop them.

Participants' department would seek to support other agencies by providing discrete project support, recruitment advice, supplier data and improved approval procedures. All of which would be expected to have OSS experience (as well as other relevant experience). The department employed around 30% software developers.

A persistent objection was noted as security concerns. The idea that OSS projects effectively created a "sandbox" for security attacks. An IT expert from the security agency previously mentioned was quoted as saying (in jest). "If anybody says that OSS is banned because of security concerns give me their name and I will have them killed".

The report

Sections of the report were highlighted relevant to the previous discussion. A participant noted the declined in the number of academic and trade publications and perceived this to be evidence of 'maturity' rather than 'fad-ism'.

Participant referred to an OSS lead who might be interested in participating in the research. He had previously noted that supply side or vendors did not regard government as serious about OSS.

Further inhibitors were noted as cost with OSS just as expensive. The dichotomy between systems and apps was also re-emphasized with apps not being as "feature-rich" as proprietary alternatives.

The force field analysis was described and was characterized by the participant as potentially useful.

The radar diagram [included in the respondent’s report] showing salient beliefs between adopters and non-adopters showed effectively the views of the OSS experience (the adopters) vs the inexperienced.

The question of IT manager's confidence as a function of experience was also raised by the participant.

The meeting had overrun and was ended when a colleague requested the room.