Silver Surfers Adopting and Using Facebook?
A Quantitative Study of Hertfordshire, UK applied to organisational and social change

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Abstract

With an ageing population that is on the increase, there are many older adults still in employment well past their retirement age. Currently, technological developments in the form of Online Social Networks (OSN[1]) are also impacting society and organisations alike, with organisations searching for ways to cope with these changes. The aim of this research study is to investigate the factors affecting the likelihood of adoption and use of OSN within an older population. Using an online questionnaire, empirical data was drawn from Hertfordshire, a vicinity in the United Kingdom, and analysed using the Partial Least Squares method. The findings revealed that - in a household situation - older individuals adopt internet technologies if they have 'anytime access' to internet capable devices, a fast reliable Internet connection, the support of their family and friends, as well as an apparent provision of privacy. For organisations, these findings indicate that the provision of a technical/trusted support department is essential, as is the provision for broadband and reliable internet connections. For academia, this research identifies factors that have been developed using theoretical concepts that will impact older adults' adoption and use of new technologies, but requires further research into whether these factors will impact a cross generation of workers in the organisation.

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[1] Throughout this paper 'OSN' is used to refer to Online Social Networks – in plural

Research Highlights

Older adults are likely to adopt Online Social Networks if the following are available:

- 'anytime access' to internet capable devices

- a fast reliable internet connection

- support from trusted individuals

- an apparent provision of privacy.

1 Introduction

Rapid advances in Information Technology (IT), which includes internet-capable technologies, combined with widespread household access to super-fast and reliable broadband, have paved the way for Online Social Networks (OSN) to become an increasingly important and popular venue for technology adoption (Peng and Mu, 2011; Niehaves and Palttfaut, 2013). OSN such as Facebook, LinkedIn and Twitter have penetrated society and organisations and become important for individuals' daily lives (Greengard, 2011). OSN are seen as pertinent for society since they are a form of digital technology facilitating daily tasks; thereby enabling demographic groups of users, such as older adults, to remain independent for longer (Schaefer, 2008). By doing so, updates and innovations on OSN, e.g. medical advances and information, can be obtained, implemented and increasing a person's quality of life (Shneiderman et al., 2011). As a result of OSN's revolutionary business innovations and business models (Tapscott and Williams, 2010; Shneiderman et al., 2011) OSN have become increasingly important as they enhanced citizens' participation on the internet and economic revitalization in austerity times.

When considering the adoption and use of OSN, socio-demographics of users statistics reveal that younger adults (50 years and below) are the majority of users while older adults (50+ years) remain the minority adopters of leading OSN such as Facebook and Twitter (Lyons, 2010). Large numbers of studies have been undertaken on older and younger adults, where the emphasis has been on the social capital divide that exists between the older and younger population's internet and computer use, and electronic commerce (Pfeil et al., 2009; Wagner et al., 2010). For example, a comparison between different age and gender groups (Passyn et al., 2011) found that different age groups (under 35 vs. 35–50 vs. over 50) have diverse perceptions towards online shopping. Fewer studies have been undertaken specifically on older adults above 50 years old (Lian and Yen, 2014) - making a case for a study on older adults to be conducted.

Due to advances in medicine and quality of life, countries around the globe are facing the prospect of ageing populations (UN DESA, 2011; Jeavans, 2004). Changes in legislation, care and quality of life for older adults have led to changes in the work place and society, where bridge employment and older entrepreneurs are on the increase. Bridge employment occurs after an individual's retirement from a full time position, but before the individual's permanent withdrawal from working life (Kim and Feldman, 2000). This has led to older adults being considered to be a wealth creating and affluent group of society which impacts the consumer market. This affluencein turn affects the performance and profitability of organisations (Moschis et al., 2004; Censky, 2011). For example, firms operating in the health services industry could benefit by having older consumers online, as online seniors tend to search for information related to medical products and services (Fox, 2004).

Since older adults are consumers and also users of technology, there has been an emergence of novel terms such as 'silver surfers'. In ICT research silver surfers are the 50 years plus age group (NetLingo, 2012). The 50 years cut off point important in geriatric research because 'a person is not old until 50 years as …relatively little decline in performance occurs until people are about 50 years old' (Albert and Heaton, 1988).

For organisations, OSN are viewed as an easy and efficient way to build and maintain offline social networks in an online manner (O'Murchu et al., 2004). Although OSN benefits are clearly evident within society and the public sector, private sector organisations are slower at adopting them (Efi mova and Grudin, 2008). This in turn has led to fewer research studies investigating their acceptance and use in organisations (Archambault and Grudin, 2012). Previous research findings on organisations and novel technologies suggest that when new technologies such as email, instant messaging, and employee blogging were first introduced and used, they were mainly employed by students and consumers to support informal interaction (Archambault and Grudin, 2012). Managers, who focused more on formal communication channels, often viewed them as potential distractions (Efi mova and Grudin,

2008). A similar situation emerged with OSN where initially some organisations viewed OSN as distractions and banned the use of public sites such as Facebook within the organisation (Sophos, 2007; Wired, 2009). However, this view is slowly changing and organisations such as Microsoft and IBM are realising the importance of OSN and making use of OSN within the work place (Archambault and Grudin, 2012; Santelli et al., 2010; Steinfield et al., 2011;Robert Half Technology, 2011).

As both OSN and ageing populations are increasing on a daily basis, and both these changes are impacting large and small organisations this research study investigates whether and to what extent the technological development of OSN, particularly Facebook, is being adopted and used by an older adult population in households of a UK county.

Due to the advanced telecommunications infrastructure and understanding of the potential of internet enabled technologies an organisation can also be considered to be a microenterprise (Venkatesh and Davis, 2000). Few studies have investigated the reasons and motivations underlying older adults' adoption or non-adoption of ICTs such as OSN in a household. Acknowledging that both OSN and older adults constitute important changes for society and organisations alike, and that OSN potential cannot be obtained without their wider proliferation, this study addresses these gaps with the aim: *To investigate the factors affecting the likelihood of adoption and use of OSN within an older population.*

2. Theory Building and Hypotheses Development

Research on the adoption of IT within the older adult population, employs two main theories: The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) and the Model of Adoption of Technology in Households (MATH) by Niehaves and Plattfaut (2013).

The concept of technology acceptance and particularly <u>individual</u> technology acceptance was introduced by Davis (1986; 1989) in the form of the Technology Acceptance Model (TAM). TAM has since been subject to subsequent theory development by Information Systems (IS) researchers such as Venkatesh and Davis (2000). In UTAUT Venkatesh et al. (2003) presented constructs from eight competing theoretical models, including TAM. The authors provided evidence that in the case of IT adoption, their model has the greatest explanatory power compared with other models, including the theory of reasoned action (RA) (Fishbein, 1967; Fishbein and Ajzen, 1975); the TAM (Davis, 1989) and the theory of planned behaviour (TPB) (Ajzen, 1991; Taylor and Todd, 1995).

While UTAUT focuses on technology adoption in both the workplace and private environments, the MATH was created by Venkatesh and Brown (2001) to explain the adoption of technology - in their case, personal computers (PC) within the household and private environment. Both UTAUT and MATH are used to explain IT adoption in private, non-mandatory settings. The difference lies in the focus of the two theories. UTAUT explains IT adoption only in organisational settings, whilst MATH investigates the adoption of IT in private and voluntary settings.

As the older adult population is largely found in private, voluntary settings that may operate like organisations, MATH is used much more to understand and describe technology use among the elderly. It is also used in this study. However, we view this research as also applicable for understanding the adoption of IT in organisations, since due to the advances in medicine and the quality of life, microenterprises are being operated in households that consist of older adult entrepreneurs. Currently households are being proliferated by internet enabled technologies such as broadband, which allows households to proffer e-business capabilities. Due to such offerings, households are also viewed as organisations (Ayyagari et al., 2007). Previous research revealed that: "*The contemporary postmodern workplace blurs boundaries between home and work and thereby challenges the locus of self-identity.*

Professional employees are now expected to conduct business away from an established place of business with the aid of cell phones, laptops, and Internet technology." (Tian and Belk, 2005: 297).

2.1 The Conceptual Framework MOSN

Our conceptual framework for this research is referred to as the Model of Online Social Networks (MOSN) and consists of twelve constructs that have been drawn from the MATH (Venkatesh and Brown, 2001), the Decomposed Theory of Planned Behaviour (DTPB) (Taylor and Todd, 1995), and the e-services adoption model (Featherman and Pavlou, 2003). In IS, the constructs used in forming the foundations of the MATH model and DTPB have also been applied in organisational contexts; for example, to investigate the adoption of novel technologies such as Open Source Software (OSS) in Small to Medium Sized Enterprises (SMEs) (Macredie and Mijinyawa, 2011). Previous studies have also used these theories and factors to investigate user behaviour and have managed to successfully capture the personal, social and situational factors impacting individuals' decision-making process (Ajzen, 1991). E-services have been described as interactive software based IS received via the Internet (Featherman and Pavlou, 2003). E-services have been referred to as 'assets'-information, business processes, computing resources, applications - made available via the Internet as a means of driving new revenue streams and creating efficiencies.[2] E-services are important in business to consumer (B2C) e-commerce because they represent ways of providing on-demand solutions to customers strengthening customer-service provider relations, creating transactional efficiencies and improving customer satisfaction (Ruyter et al., 2001). Classic prominent examples of e-services include integrated trip planning, on-line banking and financial portfolio management. Comparatively, current examples of e-services are OSN.

[2]http://www.hp.com/solutions1/e-services/ (Accessed 3/9/02)

The e-service adoption model that has an organisational as well as individual adoption perspective has been applied to TAM. Since TAM is being applied to this research in the form of MATH, the model was considered suitable for this research.

Consistent with the DTPB (Taylor and Todd, 1995) and MATH (Venkatesh and Brown, 2001), the constructs selected for this research were categorized into three groups, which are: attitudinal beliefs, normative beliefs and control beliefs.

2.1.1 Attitudinal Beliefs

Attitudinal beliefs refer to an individual's positive or negative feelings when performing a behaviour (Eagly and Chaiken, 1993). Consistent with the rationale and application in MATH (Venkatesh and Brown, 2001) and in the Macredie and Mijinyawa (2011) study, hedonic outcomes, utilitarian outcomes and social outcomes were categorized as attitudinal belief structures. The innovation attribute of Relative Advantage (RA), drawn from the Diffusion of Innovations (DoI) theory, was also included in this category on the basis that OSN are superseding innovations such as mobile telecoms, e-mail & SMS, such that positive attitudes emerge towards OSN adoption and use. RA has also been applied to investigate novel technologies' adoption and use in organisations where perceptions are related to economic benefits (e.g., cost saving (Fitzgerald, 2004); (Giera, 2004), convenience benefits, e.g., trialability (Rogers, 1983); Dedrick and West, 2003), satisfaction benefits e.g., quality characteristics (Overby et al., 2006), and image enhancements and performance (Taylor and Todd, 1995; Venkatesh et al., 2003). RA is viewed as being critical to the attitude an individual forms about a new technology (Rogers, 1983). RA also conceptually embraces a major construct of TAM, perceived usefulness (Porter and Donthu, 2006).

A new factor of consideration for this category is privacy. Privacy concerns are significant for security, trust and attitudes towards OSN adoption and use (Shin, 2010). Privacy and an individual's intention to adopt e-services such as OSN were considered and developed in the e-services adoption model, and assisted us in addressing this issue (Featherman and Pavlou,

2003). Using these two research studies as precedence, privacy risk was identified as a necessary construct that was integrated as an attitudinal belief construct in the MOSN.

2.1.2 Normative Beliefs

Normative beliefs refer to subjective issues such as peer influences and superior influences (Venkatesh and Brown, 2001). Such constructs can be used to identify and explain the influence of different reference groups' perceptions, views and attitudes when considering whether to use or not use a particular technology (Ajzen, 1991). As this research is focused on organisations as well, it was found that normative beliefs have been used in previous studies of organisations. In those studies the normative beliefs structures (or subjective norms) of peer influences and superior influences are used to identify and explain the influence of different referent groups on perceptions of whether the use of the IT is beneficial or deterimental for the SME (Macredie and Mijinyawa, 2011; Fishbein and Ajzen, 1975). In terms of societal aspects, MATH suggests that normative beliefs include three sub groups of normative influence: (1) friends and family; (2) secondary sources such as TV or newspapers (media); and (3) workplace influences. Since OSN are still taking off within organisations and are still novel to society, we felt that OSN acceptance and use of OSN still had to be explored, in society and organisations alike. However, since access to older adults in households was easier to achieve than within organisations, we focused this research towards a household's OSN use *and not* OSN use in the workplace. The normative belief categories applied are primary normative influence (primary influence) and secondary source normative influence (secondary influence).

2.1.3 Control Beliefs

Control beliefs relate to an individual's perception regarding difficulties when performing a behaviour (Eagly and Chaiken, 1993). According to DTPB, Facilitating Conditions (FC) are

defined as "money, time and technology that are needed to make use of an innovation" (Taylor and Todd, 1995a: 144). They are important for considering the adoption of OSN, which require internet access and an internet-enabled device. Consistent with the decomposition of FC within organisations, FCs were further deconstructed when considering the societal aspect, into two constructs: 'Technology Facilitating Conditions' and 'Resource Facilitating Conditions' (Macredie and Mijinyawa, 2011). First, Technology FC refers to technologies required to operate OSNs such as, internet access (broadband) and access to or ownership of internet capable devices such as laptops, computers, smart phones and PDAs. Second, Resource FC pertain to the time available for individuals when using OSNs and monetary expenses required for households purchasing an internet service and internet providing devices. In the context of organisations, this construct was associated with factors such as IT capital investment, which has been reported as an essential resource for the development of an SMEs' IT capacity and capability (Kwan and West, 2005; Mannaert and Ven, 2005).

Prior technology adoption research in society has identified that not possessing the requisite knowledge to use a computer will significantly inhibit adoption (Venkatesh and Brown, 2001); therefore, 'Requisite Knowledge' was applied as the final construct to the control belief category. After the aforementioned constructs were understood, they were combined to provide determinants of the dependent variable 'Actual Use'. This was pursued in order to determine significance and positive or negative influences on actual adoption and use of OSN.

2.2 MOSN Hypotheses Development

All the twelve explanatory and dependent theoretical constructs guiding this research are interlinked using linear one-way causal paths. These paths represent the twelve research hypotheses employed in the study, which are identified and explained as follows.

2.2.1 Hedonic Outcomes

Hedonic Outcomes (HO) in the context of this research relates to the perception of pleasure and fun that OSNs provide when adopted and used. Extant literature has found enjoyment and playfulness to have a mediating or direct effect on intention to use a technology (Sledgianowski and Kulviwat, 2009). In the context of OSN use intention, HO was found to have a significant direct effect (Sledgianowski and Kulviwat, 2009). Therefore, a HO is considered to be a motivational construct to OSN use that renders a positive effect on the decision to adopt OSN:

H1: Hedonic Outcomes (HO) will have a significant positive influence on an older adult's behavioural intention to adopt and use OSN.

2.2.2 Utilitarian Outcomes

Utilitarian Outcomes (UO) pertains to "the degree to which using a PC enhances the effectiveness of household activities" (Venkatesh and Brown, 2001: Mannaert and Ven, 2005). As OSN can help with household and non-recreational activities such as being an intermediary for government subsidiary communication or as a communication method for those who conduct paid or unpaid work from the household, UO are hypothesized to have a significant effect on one's behavioural intention to use OSN. When investigating PC use in the household, it was found that fulfilling work-related activities and task is a significant predictor of household PC adoption (Brown et al., 2006). Therefore, application of this construct will assist in understanding whether older adults view or use OSNs in order to enhance or improve household activities by testing the following hypothesis:

H2: Utilitarian Outcomes (UO) will have a significant positive influence on an older adult's behavioural intention to adopt and use OSNs.

2.2.3 Relative Advantage

The perceived attributes of an innovation are viewed to be RA, compatibility, complexity, trialability and observability (Rogers, 1983). For this study, we applied RA as it focuses on the perceived advantage that OSN may hold for older adults, while emphasising the advantages OSN offer relatively to other technologies and which older adults may be currently experiencing or have experienced in the past. It has been shown that older adults do benefit from OSN use through access to health information. This was attributed to the benefits likely to emerge from increases in perceived RA (Thackeray et al., 2013). Moreover, RA has been associated with the adoption of electronic banking technologies, which older adults are more likely to presently use (Kolodinsky et al., 2004). Thus, RA can provide an understanding of whether OSN adoption is motivated by advantages that OSN achieve with respect to technologies being currently utilized by older adults such as, landline telecoms, mobile telecoms, e-mail and SMS. As a result, RA was integrated within the proposed conceptual framework using the following hypothesis:

H3: Relative Advantage (RA) will have a significant positive influence on an older adult's behavioural intention to adopt and use OSN.

2.2.4 Social Outcomes

Previous efforts to understand Social Influence (SI) within the context of OSN adoption led to the formation of a theoretically grounded model examining the former as an explanatory construct of the latter (Vannoy and Palvia, 2010). An investigation into Instant Messaging (IM) within the context of the workplace found that SI positively influenced IM adoption (Glass and Li, 2010). IM integration within TAM suggested that Social Outcomes (SO) has a significant positive effect on the behavioural intention to use computers (Sajjad et al., 2009). In terms of older adults' computer adoption, SO were found to be a strong significant

predictor (Nagle and Schmidt, 2012). Noting the theoretical value of SO and based on previous research that acknowledges its significance towards one's intention to adopt digital technologies, the following hypothesis is formed:

H4: Social Outcomes (SO) will have a significant positive influence on an older adult's behavioural intention to adopt and use OSN.

2.2.5 Privacy Risk

Uploading personal information (e.g., name, e-mail address, residential location, age, photos) is typically required when using OSNs. Therefore, such requirements may cause anxiety or uncertainty regarding the consequences of having this personal information available on the internet. Extant literature on personal privacy within the technology adoption research stream confirmed that privacy concerns are potentially relevant and important before signing-up for an OSN profile (Fogel and Nehmad, 2009). Similarly, Perceived Risk (PR) and/or privacy in other contexts are influential factors of consideration for technology adoption (Shin, 2010; Belanger and Carter, 2008). Within the context of the household and older adults' research, privacy concerns are considered to be a barrier towards technology adoption (Courtney, 2008). Consequently, we hypothesized that PR is an impediment to OSN adoption and use:

H5: Privacy Risk (PR) will have a significant negative influence on an older adult's behavioural intention to adopt and use OSN.

2.2.6 Primary Influence

Peer influence is concerned with the perception that peers, such as friends, families, and colleagues or other external actors, influence the normative beliefs of decision-makers (Ajzen, 1991; Efi mova and Grudin, 2008). In the organisational context, an example is the influence exerted by family members in the case of a family-owned SME (Houghton and Creeda, 1999). Ultimately, the purpose of social networks is to provide a medium for socially

orientated media and communication exchange between its users. Inherently social exchange occurs between and across friends and family. Thus, it is likely that if an internet consumer's friends or family use or encourage the use of online social networking, the adoption of OSN is more likely to take place. After all, SI has been shown to significantly influence technology adoption (Venkatesh and Davis, 2000); hence, we posit that:

H6: Primary Influence (PI) will have a significant positive influence on an older adult's behavioural intention to adopt and use OSN.

2.2.7 Secondary Influence

Secondary Influence (SI) is explained to be 'the extent to which information from TV, newspaper, and other secondary sources influences behaviour' (Venkatesh and Brown, 2001). Researchers suggest that such information can influence the normative beliefs of decision-makers (Fishbein and Ajzen, 1975; Taylor and Todd, 1995a). In recent years, OSN, such as Facebook and Twitter, have been at the forefront of media coverage. Much of this coverage reports the negative impact that social networking has on society, e.g., Internet grooming and identity fraud. In the light of these, and seeking to examine whether negative media coverage impedes the adoption of online social networks by 50+ Internet consumers, we hypothesize that:

H7: Secondary Influence (SI) will have a significant negative effect on an older adult's behavioural intention to adopt and use OSN.

2.2.8 Requisite Knowledge

Requisite Knowledge (RK) is defined as the individual belief that [one] has the knowledge necessary to use a technology (Venkatesh and Brown, 2001). In order to use or adopt an OSN some computer literacy is required. A person first needs to sign up and then actually use the

application and interact with other members of the network. It is possible that if this RK is not available, then the 50+ Internet users may be discouraged from exploring the use of social networks:

H8: Requisite Knowledge (RK) will have a significant negative influence on an older adult's behavioural intention to adopt and use OSNs.

2.2.9 Technology FC

Within the household and in an organisation, two technological resources must be available to facilitate the adoption of OSNs. First is internet access, which is dependent on the availability of internet services at the individual's household in either wireless (Wi-Fi or 3G) or physical access via broadband internet (fibre optic & ISDN). Second, essential is at least one internet-enabled device such as a smartphone, a PDA, a laptop or a desktop PC, all of which are capable to provide access to an OSN provider. Therefore, if either or both of the technology facilitating conditions are not available, an older adult's intention to use OSNs can never progress to actual use:

H9: Technology FC will have a significant positive influence on an older adult's behavioural intention to adopt and use OSNs.

2.2.10 Resource FC

As previously discussed, certain resources, such as internet availability and internet-enabled devices, are necessary to facilitate OSN use; however, additional resources are required. As suggested by Taylor and Todd (1995a), time and money are central for one's behavioural intention. Internet access is generally available through a monthly subscription to an Internet Service Provider (ISP), which in the UK typically costs £10-40 per month. Devices that are internet-enabled and provide access to OSN through web browsers and/or mobile applications cost at least £300. Individuals may not want to accrue this additional expenditure or may not

have the money to do so. Therefore, money can be an indirect impediment towards OSN adoption and use. Further, currently OSNs are still in the early stages of being adopted within organisations. In the household, most of OSN use in the older adults' personal life could be viewed as a social and recreational past time that could be better applied for work or professional purposes. Therefore, older adults may view OSNs adoption as encroaching on the time that they have available for other activities in their daily lives and not adopt OSN. This suggests that both time and money must be available to OSN users as their shortage may impede OSN adoption and use. Furthermore, FC have been shown to be significant predictors of computer use and intention within the older population (Nagle and Schmidt, 2012).

H10: Resource FC (Resource FC) will have a significant positive influence on an older adult's behavioural intention to adopt and use OSN.

2.2.11 Behavioural Intention

Behavioural Intention (BI) is the key dependent construct and the theoretical explanatory construct of Actual Use (AU) for our study. With regards to technology adoption, several studies illustrate a significant relationship between BI and AU (e.g., Kijsanayotin et al., 2009). Nevertheless, Tao (2009) has suggested that there may be no significant relationship between the two constructs. In any case, and despite there not being a perfect relationship between the two, BI can be used as a proximal measure of behaviour (Francis et al., 2004). Using this assumption we hypothesised that:

H11: Behavioural Intention (BI) will have a significant positive effect on Actual Use (AU).

2.2.12 Continuance Intention

In the context of Twitter's OSN, it was found that 45.5% variation of an individual's Continuance Intention (CI) to use OSN could be significantly explained by habit, perceived

usefulness and satisfaction (Haider, 2009). It was also found that minimal studies of the relationship between AU and CIexisted. This research therefore intends to contribute towards an understanding of a configuration of these theoretical constructs. Since OSN typically require access with some regularity to fully obtain the anticipated benefits, it is expected that the majority of those participants currently using OSN at the time of being surveyed will have the intention to continue using OSN; therefore the following hypotheses has been formulated.

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H12: Actual behaviour will have a significant positive effect on continuance intention (CI)

3. Research Method

3.1. Research Site, Data Collection

To obtain a UK perspective household residents from the Hertfordshire area, in the Southeast of England were surveyed. Hertfordshire was specifically selected due to its current contribution to economic growth in the UK, its gross household income per head -the fourth highest in England- (ONS, 2012a; ONS, 2012b;)and the increasing number of older adults (HomeInstead, 2014). Households have also been selected due to previous research on SMEs showing that households now offer a telecommunications infrastructure that makes it possible to operate a business that functions as an organisation (Ayyagari et al., 2007; Houghton and Creeda, 1999). We focused on the general propensity to use ONS, which is measured at the individual level. We also assumed that an individual's personal online attitudes and behaviour could be extended into the workplace, and expected that an organisational perspective is also plausible from research studies focused on households.

For the sampling, a two-phase multi-stage random sampling method was employed. This allowed for an elimination of coverage error. The sampling method allowed for an equal-chance selection of all towns/areas and households within those townsthat comprise the

geographic area of Hertfordshire. Phase 1 initially included geographically stratifying the Hertfordshire area into its 267 towns and areas. This led to the identification of 67 towns/areas. Phase 2 pertained to the household selection. For participation, the invitation letters in the survey flyer invited only older adults that we defined in the survey flyer. Households were identified based on their addresses. It is also noted that a degree of sampling error may have been present as the entire population of Hertfordshire was not surveyed. Google Maps was used to identify the geographic starting point for flyer distribution.

175 flyers that contained an introductory letter stating the purpose of the research, and a link to the online questionnaire on Survey Monkey were distributed to each household in the selected area. In order to resolve and address the BI aspect, the questionnaire had sections and associated questions for those who are OSN users, not intending to be OSN users or those who intended to adopt OSN. As Sun and Jeyeraj (2013) found adoption normally refers to an individual's decision to use an innovation for the first time. Therefore, one section of the questionnaire was addressed to those older adults who are using OSN for the first time. Then, there are some individuals persisting with the OSN beyond the first time, which refers to the continuance factor.

The questionnaire items were all drawn from the classic theories that were explained earlier and adapted for the purposes of our study. Overall there were 63 questionnaire items that were measured on a 7-point Likert scale, ranging from Strongly Agree (1) to Strongly Disagree (7). The items were grouped in three sections:demographics, internet usage, and OSN usage.

Not all the sampling population selected towns consisted of 175 households. This led to 7480 households being selected for participation in this study. Survey flyers were disseminated for one month and the survey link was available for two months. This led to 1119 responses in total. Following data cleansing, there were 1080 complete questionnaires and an overall 14.4% response rate. Non-response bias occurred partly due to the respondents replying to a

survey being different to the sampled individuals who did not respond. These participants are in a context that is relevant to the study.

As revealed earlier, following data cleansing, it was found that only 14.4% of the selected households participated in this research. This can be partly accounted for by those households that contained non-internet users or were not of the age of 50 years old or above. The households in the 16 towns that did not respond did contribute to non-response error suggesting that this created an imbalance towards the geographical representation of the obtained sample. The representativeness of the sample was purely geographic. The response distribution amongst all randomly selected towns was relative and no area was overly represented. With these individual response rates it is observed that the results of this geographic context are representative of Hertfordshire's older population.

It is also recognized that the 14.4% is a low response rate; however, researchers have found that surveys inviting participants without any incentives are likely to yield low response rates (Pew Research Center for the People & Press, 2012), which our research indicated. Sampling was undertaken from June 29th – September 29th 2012.

4. Data Analysis

To statistically analyse the quantitative data Partial Least Squares (PLS) path analysis and SmartPLS M3 software were used. PLS is effective for explaining both response and predictor variation (Chin, 1998). PLS also analyses more complex models by imposing less stringent demands on residual distributions and sample size. Additionally, PLS avoids two serious problems: inadmissible solutions and factor indeterminacy (Fornell and Bookstein, 1982). For the analysis, a two-step approach was pursued that first assessed the measurement model and then examined the structural model.

4.1 Measurement Model Assessment

For the measurement model validation tests of the constructs was conducted using construct validation and factor analysis. To test for construct validity evidence of convergent and discriminant validity was demonstrated, which is a requirement when construct validity is conducted (Trochim and Donnelly, 2008). Convergent validity was demonstrated by all the constructs except for SI and Resource FC as RFC1 did not converge with the related RFC measures (RFC2 & RFC3). Table 2 illustrates that all the constructs except for Resource FC demonstrate discriminant validity. This was determined as all the three factors loadings for the same construct load far greater than those factors loadings of any other construct within the factor analysis. Therefore, from the factor analysis that demonstrated construct validity it was learnt that all measures were appropriate, except for SI and Resource FC, as convergent and discriminant validity could not be observed in these cases. Following the construct validity, reliability needed to be determined. Reliability refers to reproducibility or stability of data and observations (Trochim and Donnelly, 2008). Focusing first on our measurement model, reliability measurements show that most of our constructs scored well above the threshold values across all indices. Specifically, Table 1 shows that all constructs performed well except for Resource FCs. Furthermore, Average Variance Extracted (AVE) indicates the variance a construct captures from its indicators, relative to the variance contained in measurement error, and, as an indicator, is generally interpreted as a measure of reliability for a construct (Trochim and Donnelly, 2008). In our study, all the AVEs for the constructs, except SI, are above the 0.7 cut-off value. If all the composite reliability values are higher than 0.7, it can be concluded that the measurement has both internal consistency and convergent validity (Werts et al., 1967), which our results demonstrated. Finally, Table 2 illustrates that the loadings for most measurement items except for Resource FCs and SI are above 0.7, showing that the measurement model of this study has strong discriminant validity.

[Insert Table 1 here]

[Insert Table 2 here]

4.2 Structural Model Assessment

Following the measurement model assessment, the conceptual framework (MOSN) had to be empirically operated. This led to 33 construct measurements (survey items) that were completed by 1080 participating older adults, resulting in 35,640 valid responses. For this part of the research, descriptive statistics were used (Appendix 1). This method is one where statistics summarize patterns in a sample of participant's responses (DeVaus, 1996). This method is preferred as it provides quantitative descriptions of data in manageable forms through the provision of results that provide an overview of single variables. In this case, the numerical scale responses collected for all construct measurements (Babbie, 2010). Hence, the data is not in a large format such that some meaning or comprehension cannot be made. Instead, it consists of measures such as the mean value.

The mean value in this case was calculated to demonstrate the overall average value, which was selected for each construct item. By doing so, there are insights into the perspectives that are held for the collected sample with regards to each theoretical construct. Another associated measure is the Standard Deviation (SD). The SD is the most common measure of statistical dispersion that measures how widely spread values in the data are (MR, 2007), particularly the dispersion of the data from the mean. Therefore, the greater the SD the less consistent the answers were for the analysed sample. From the descriptive analysis of the entire sample it was revealed that the factor SI produced mean values of between 1.53-1.81 (1= strongly disagree); thereby revealing consistency within the entire sample.

SEM was then conducted where statistical significances of path coefficients (p-value) were observed (t-stats were calculated into p-values). As a result, an R^2 value equal to 0.92 emerged. This is an estimate of the variance in one's BI to adopt OSN and is the variance

that our study succeeded in accounting for. It is also what our theoretical model manages to explain. This result is quite significant and supports the applicability and usefulness of the MOSN framework and its constructs when examining and investigating the OSN phenomenon. Therefore, it may be said that it supports the value of the developed framework for future studies. However, the 0.92 result emerged with the addition of the intensity of internet usage. Actual behaviour observed that 51.6% of the variation within a participant's actual decision to go ahead and use or reject OSN was accounted for by the measures of actual use and Internet usage.

CI explained 64.4% of the variance in continued and intended long-term use of OSN. Overall from the entire sample analysis the achieved R^2 values demonstrated a strong explanatory power for applying the MOSN within an older adult population. From this analysis, an overall eleven significant relationships were observed within the final MOSN model. Further, from the path coefficients it was found that six theoretical constructs had significant influence on the key dependent variable of BI (Figure 1). The constructs are HO, RA, SO, PI, Technology FC and PR. In terms of significance, HO had the weakest positive effect (p-value <.05), and PR was the only construct to have a negative effect on BI. Therefore, although, HOhas a weak impact, participants' perceptions of fun and entertainment are indeed motivational considerations towards OSN adoption and use.

The five other remaining significant constructs held extremely strong significant paths (p-values <.001). Furthermore, PR has a significant negative influence on BI, suggesting that the perceived loss of control over personal information, i.e., personal information being used without consent and criminal activity associated with internet services, impede the adoption and use of OSN within older adults. SO shows a significant positive influence on BI; thereby confirming that older individuals perceive OSN use to achieve greater social status in terms of number of friends or respect among peers. Therefore, participants perceiving OSN as an

improvement to their communication with others or as benefiting their internet experience are more likely to adopt and use OSN.

As expected, PI in the form of a participant's friends, family and co-workers recommending OSN use was found to be a strongly significant positive explanatory construct of BI. Also Technology FC positively influences an older individual's BI. More information regarding the correlations and outer SEM weightings of the MOSN constructs are provided in Appendix 2.

[Insert Figure 1 here]

5. Discussion, Implications, Limitations and Future Directions

Building upon previous theories that have been used to examine adoption generally as well as an online questionnaire, a social change in the form of an OSN within the older adult population was investigated.

Our findings illustrate that an older population adopts internet technologies when Technology FCs, such as 'anytime access' to internet enabled devices and fast and reliable internet connection, are available. Moreover, a supportive environment, e.g., encouraging opinions from one's social circle, together with privacy concerns also influences OSN adoption. This does align with the view expressed by Dickinson and Gregor (2006) who found that older adults do rely upon others for relatively basic computer tasks.

For organisations and management that have bridge employed individuals, these results suggest that older adults will adopt anytime access enabled devices, particularly if the individual is provided with a supportive environment. Further understanding of this finding suggests that the socio-emotional theory, supporting the view that an older worker promotes collaboration rather than competition, is evident in this research (Carstensen, 1998). This is where social interaction changes over the life span as a function of a shift in the individual's

time orientation emphasizing 'life lived from birth' to 'life left until death' (Neugarten, 1968). This also means that due to the maturity, knowledge and experience, an individual's preferences and motivations are skewed more towards working with others rather than competing with peers. Therefore, organisations and management alike should prepare for an ageing workplace by considering as essential the provision of an IT support department.

In terms of older adults' gender differences; it was found that only men are significantly motivated to adopt OSN due to perceptions of fun, enjoyment, and entertainment. Men also considered technology FC within their households being pertinent for OSN use. In contrast, women are influenced by factors pertaining to non-recreational or utilitarian benefits, such as personal use, paid work and assisting with household tasks, and they need to have the necessary Resource FCs, e.g., enough time to use OSN. Positive SO thanks to the adoption of OSN, e.g., increased respect within one's social circle, increased number of friends and social status, were found to be important solely for women. However, there were also similarities between the two genders. In both samples, PR regarding personal information and security proved to be a significant impediment toward the adoption of OSN. Both males and females experienced a significant positive influence from friends, family and co-workers toward adopting and using OSN.

Therefore, it may be argued that there is a gender divide, but this requires further analysis since evidently there is more to the adoption and use issue of OSN.

OSN require the insertion of personal details when initially registering, therefore the factor of privacy risk was applied to this research. It was found that privacy is a matter of consideration to older adults and can deter the older adult population. This is something that several previous studies; for instance, Chakraborty et al., (2013); Ku et al., (2013) also found and our research findings also confirmed. However, our research differs from these studies by not identifying types of privacy (Chakraborty et al., 2013).

OSN are provided using the internet, and cost has previously been found to be an impediment of internet use (Porter, 1980; Carpenter and Buday, 2007). This research also considered cost through the construct Resource FCs. Our results showed that cost had no significant effect on OSN intention, which aligns with Porter (1980). Shin (2010) found privacy concerns to have significant effects on attitudes towards OSN adoption. This was supported in this study since perceived privacy risks associated with OSN use observed a highly significant negative effect on intention. Consistent with Peng and Mu (2011), MOSN revealed a primary influence to positively and significantly affect OSN intention. This finding shows that older individuals are considerate and act upon views of members in one's social circle.

Both the adopters and non-adopters considered PR to be a negative outcome of OSN adoption. Meanwhile, the influence of friends, family and co-workers had a positive effect on BI for both the adopters and non-adopters. Observed only within the adopter sample were the following: RK - basic knowledge of internet and computer use; availability of a fast and reliable internet connection and an internet capable device in the household .

Within the adopters' sample, BI was not a significant predictor of actual behaviour and this was also the case for the remaining key dependent variables, i.e. Actual Behaviour, CI and Intention to Use. This was contradictory to the non-adopter samples, where Internet usage was a weak significant predictor of actual behaviour (choosing not to use OSN) (Results shown in Table 3).

*[*Insert Table 3 here]

5.1. Implications for Academia

Our research applied the MATH to identify the adoption and use of OSN in older adults. This led to several theoretical contributions. First, MATH has been extended by adding the e-services adoption model as a way of examining individual acceptance of OSN and explaining the older adult consumer's attitude toward risks in OSN. This suggests that this model can be used to understand the adoption and use of OSN within an older adult population. Second,

although highly unusual for social sciences, there was a very significant R^2 of 0.92 that implied the developed MOSN was conceptually strong and explained a large proportion of the variance in the large sample population. A study of models used to explain the older adults' adoption behaviour suggested that MATH has a slightly superior explanatory power (R^2) due to the inclusion of socio-demographic moderating variables (Niehaves and Plattfaut, 2013) which our study also revealed and confirmed.

5.2 Implications for Practice

An important question in the field of IS is how information or knowledge is developed and disseminated, which in this case is an online community within the OSN Facebook. For this study, older adults were considered, since they are a group of society that is viewed to be important and yet not paid enough attention within the research community. For organisations, research that investigates and identifies the social influence that organisations and individuals have within an online community is of immense importance. This allows them to leverage their position and, in the long run, improve their competitive advantage. Our model's strength lies in identifying factors that are of importance to an older adult population and can be utilized by organisations such as internet service providers or telecommunication device manufacturers to increase and sustain their competitive edge.

An important implication of this research study is that older adults can promote collaboration and innovation within the organisation. Thanks to their experience and knowledge older adults can assist an organisation in further understanding and developing innovation achieved by technological changes. This implies that when forming teams within organisations, or determining the performance and productivity of teams for novel technologies such as OSN, an organisation should ensure that a team also consists of older adults in order to promote collaboration and to bring their immense experience and knowledge to the group.

Our research study showed that although older adults require Technology FC, they do have knowledge regarding technology infrastructure. Like Porter and Donthu (2006) this study too

26

found that older adults require support. Hence, even though a different theoretical aspect in the form of MATH was applied to this study, the results are similar to those when TAM is applied on its own. As Porter and Donthu (2006) suggested, technology providing organisations should first focus on developing access tools based on familiar devices, e.g. web-enabled televisions, because continuous innovations face less resistance. Second, organisations should develop training programmes to help older adults overcome psychological barriers associated with internet use, e.g. 'learn at your own pace' programmes delivered by individuals that older people can identify with (Porter and Donthu, 2006). Finally, there should be a reduction in the price of internet access (Porter and Donthu, 2006) for older users.

OSN have changed the way that businesses operate. Previously IS and information technologies were very expensive. This meant that only large organisations had the resources, time and people to ensure that they were implemented and used strategically. Due to the ubiquity of OSN consumers, bargaining power has changed as there are forums provided by OSN for organizing and sharing information (Porter, 1980). The changes in the boundaries of communication due to the OSN platforms allow people outside the organisation to communicate amongst themselves, which cannot be controlled by the organisation (Kane and Fichman, 2009). Since this study has shown that older adults are adopting OSN, organisations should pay attention to the factors that will affect an increase in older adult consumers, and ensure that their reputation and brand within the consumer market are increased, not reduced.

An added implication of this study is that to examine OSN adoption, one of the main questions within the questionnaire sought the participants' access to the internet. Internet access is pertinent for other internet enabled technologies, such as smartphones, tablet devices. Therefore, the IT aspect of internet access and age, a socio-demographic aspect can assist in forming an understanding of the digital divide such as that suggested by van Dijk (2006) or Agerwal et al. (2009).Our study does not come without limitations. As this research

was quantitative, it was not possible to gain a richer and deeper understanding of the reasons for adopting and using OSN. While we succeeded in identifying several factors leading to the adoption and use of OSN, there is a need for future research to adopt a qualitative stance, and seek to explore the impacts of other factors, such as income or disability - thereby extending the research findings of this study.

We also acknowledge that only one county in the UK was used for this study. This implies that the findings cannot be generalized to the entire population of Great Britain or the UK. However, we hope that future research investigating and identifying factors important for the adoption and use of other novel technologies can utilize these factors to broaden their research agenda. Finally, as this research study was solely focused on older adults and on the use of Facebook, this could have accounted for the low response rates. An increased response rate and a diverse view may be obtained through a comparative and/or wider study focused on both younger and older adults which could lead to support for some of the findings of this study or to diverse results.

6. Conclusions

The aim of this research study was to investigate the factors affecting the likelihood of adoption and use of OSN, in particular Facebook, within the older adult population. For this purpose, a theoretical research model of the adoption of OSN within the older adult population was formed. The model was then validated using empirical, quantitative data. To ensure that the theoretical concepts can be operated in real life the constructs that were applied to this research were validated using factor analysis and construct validity. This demonstrated the presence of convergent and discriminant validity.

The empirical data highlighted that the cost for providing the infrastructure necessary for OSN was not an important factor of consideration. Instead, a supportive environment, as well

as the knowledge of and experience of technologies providing OSN are essential for the adoption of OSN in older adults. However, a deterrence to their adoption of OSN is PR, an issue that appeared to be important since there are concerns regarding security as well as trust issues regarding OSN adoption.

For organisations, the provision of a technical support department as well as awareness, training and knowledge regarding these issues should assist in reducing these concerns. These are important lessons for organisations and households alike. This suggests that support or a human aspect to ensuring the adoption and use of OSN is much more important than the technology itself.

What was also learnt from this study is that to date this topic has received little attention. Given that organisations and society are and will face an increasingly older adult population, and technological developments are expeditiously occurring both in the workplace and in households this study should be viewed as important for identifying and examining the adoption issues of OSN within an older adult population.

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[Insert Appendix 1 here]

[**Insert Appendix 2 here**]