

Digital Cinema: No Country for Old Entrepreneurs?

Nigel Culkin

Abstract

This paper reflects on current developments in the exhibition sector of the movie industry. It will examine why the adoption of an innovation (digital cinema), capable of revolutionising the movie industry, has stumbled in its attempts to cross Geoffrey Moore's "chasm" (Moore, 1991) and will argue that despite numerous setbacks, d-cinema can now rightly be considered within Christensen's framework of disruptive technologies. The author will examine the strategies of exhibitors at the forefront of the adoption process; describe some of the emerging business models being developed to facilitate change; and analyse how two different territories (the international markets of the USA and India) are realising the opportunities afforded by this technology. Finally he will project the overall implications of the advent of d-cinema for the future of the global movie industry and how (private and public) entrepreneurs are already changing the basis of competition in certain sectors to create new markets.

Keywords: Retail entrepreneurship, standards, innovation, adoption policy

Nigel Culkin is the head of Enterprise & Entrepreneurial Development, Business School, University of Hertfordshire, Hatfield, Hertfordshire, AL10 9AB. UK. Tel: +44 (0)1707 285492. Email: n.Culkin@herts.ac.uk

Correspondence address: Nigel Culkin Head of Enterprise & Entrepreneurial Development, University of Hertfordshire, Business School, Hatfield, Hertfordshire AL10 9AB. United Kingdom. Email: n.Culkin@herts.ac.uk Tel: +44 (0)1707 285492

Journal of Retail Marketing Management Research, Vol.1 No. 2, April 2008, pp. 44-58
ISSN 1752-6183 print / 1752-6191

Introduction

In 1869 Charles Darwin wrote, "Natural selection acts only by taking advantage of slight successive variations; she can never take a great and sudden leap, but must advance by short and sure, though slow steps." In that same year celluloid was developed by John Wesley Hyatt; later to become the universal platform for delivering feature film across the world. By 1900 Hollywood had emerged as the home of the US film industry and soon after cemented the dominant position worldwide. Since then the major players have arguably followed Darwin's dictum to maintain a position of control both in terms of the content and revenues.

However, the operating business practices which have successfully underpinned the movie industry since the early part of the 20th Century are coming under increasing attack. Digital cinema - aiming to replace celluloid - makes use of digital technology to produce, distribute and project motion pictures. For digital prints to be created, a digital master is needed. This is already available for movies that have been edited digitally (*figure 1*). Movies which do not go through a digital editing process need to be scanned

to create a digital master so that the digital prints can be made. The digital process converts each frame of the film into a digital image, composed of an array of millions of elements known as ‘pixels’ (figure 1a). Even today almost all movies create a digital master as this is required for TV and DVD masters and this master can be utilised to create digital prints. The final product can be distributed via hard drives, DVDs or satellite and projected using a digital projector instead of a conventional film projector.

Figure 1: The 35mm Process

Figure 1a: The Digital Process

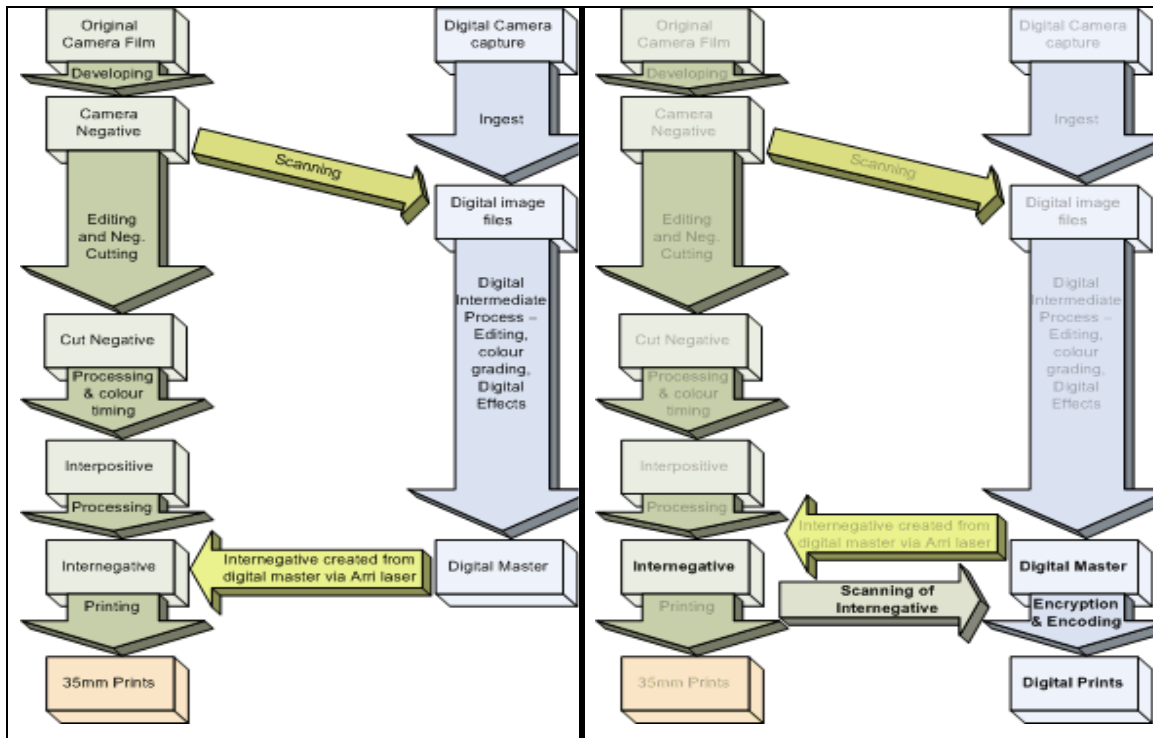


Figure 1a: The Digital Process

Faced with this innovation and fully aware of how digital distribution impacted negatively on the major record labels, the US studios find themselves challenged by a new generation of entrepreneurs; armed with a combination of ever more affordable filmmaking tools, widening access to broadband networks and mobile communication devices operating on digital platforms. Such profound change in the way entertainment is being consumed across the globe has created a potential ‘tipping point’ in the movie business.

Independence Day

In this first part the author considers that the basic assumptions around the way in which audiences engage with movies need to be re-examined in light of three contributory factors. First, both cinema audiences and DVD sales have been in relative decline in a number of key markets over the past four years (Waterman, 2005). Although the UK reported box office receipts of £904M in 2007 (8% increase on 2006) this was

driven by the release of three Hollywood sequels – Harry Potter And The Order Of The Phoenix, Pirates Of The Caribbean: At World's End and Shrek The Third. These three 'tent pole' movies¹ generated between them over £252M or just under 30% of total revenue. However, total box-office admissions in European Union countries, fell 2.2% in 2007 compared to 2006, (European Audiovisual Observatory, 2008). Second, the creative and commercial barriers which have kept cinema tied to the major US studios are under threat through technological developments in the way movies are created, stored, distributed and exhibited. Replacing celluloid film with d-cinema technology will arguably provide enormous opportunities for the exhibitor market (Elberse & Eliashberg, 2003).

Finally, a recent phenomenon forces us to consider the possible collapse of the cinema industry through the demise of the 'release window' agreement between the studios and the cinema operators. Here, first run movies are shown in the cinema for up to six months before release in other formats. Hollywood itself broke away from its traditional release strategies several years ago with the introduction of global, single day release date for 'tent pole' movies, including Lord of the Rings, The Matrix and Pirates of the Caribbean, instead of sequential releases by country. In addition to reducing piracy, it is argued that a single, global release date also maximises the marketing impact of advertising spending for a film. This strategy not only helps to increase the opening weekend box office but also prevents negative word of mouth affecting audiences. The year 2006 set new standards for global single day release strategies with phenomenal starting box offices for X-Men and DaVinci Code, which were both savaged by critics afterwards (Culkin and Morawetz, 2007); in this scenario a lack of consumer insight had little negative impact on the all important opening weekend at the box office. If Hollywood studios take advantage of the interest derived from a successful marketing campaign by releasing a film simultaneously across several territories, why not release a film simultaneously across several platforms in one country to maximise marketing spending for a smaller film?

A recent study by Gerbrandt (2006) found that thirty-six percent of cinema audiences said they would skip theatrical releases altogether and rent the movie on DVD instead if a movie were released on both platforms simultaneously. The study also found that because of their lack of commitment to the cinema movie experience, younger movie consumers posed the biggest threat to the exhibition community and the greatest opportunities for those engaged in alternative platforms. The problem for the studios, as they seek to retain control of product distribution - and effectively profit - is that they face the same disruption as that of the music industry conglomerates when confronted by the social entrepreneur, Shawn Fanning who founded Napster - a decentralised, easily-distributed programme which allowed users to share music and other files directly from peer-to-peer over the internet. So, the studios recognise the enormous cost savings afforded by the adoption of d-cinema but cannot ignore the damage caused in the early part of the twenty-first century to the intellectual copyright holders in another part of the entertainment industry. We now move on to consider how that disruption is being played

¹ A tent pole movie is considered the studio's major release in any given season – usually summer – which is accompanied by an enormously wide release. The theory is that the studio's other pictures will be "held up" by this tent pole and provide a profitable summer season. It is increasingly the start of, or an installment in, a franchise.

out in the movie market before reviewing the research methodology employed in this study.

Paths of Glory

This section places digital cinema in the context of localised technological change which draws together innovation, adoption and diffusion focusing the analysis on the determinants of the adoption process (Rogers, 2003). Here adoption is viewed as a complementary component of a broader process of adjusting the technology when unexpected events in the product and factor markets push firms towards a creative reaction. An early observation of this phenomenon came from Zvi Griliches (1957) whose research into hybrid corn found that the adoption of a new technology was not a single event. Instead it was influenced by a series of developments that occurred at different rates across geographical space. His work demonstrated the numerous individual decisions and economic calculations that drove new hybrid corn technology forward. Antonelli (2006a) has argued that this is important for European Economists who, consider growth and change rather than equilibrium as the relevant object of analysis and, hence, values historic time and philological investigation as basic tools to study the dynamics of social events (p51). This is in sharp contrast to Friedman *et al* from the Chicago School of Economics who would contest that the purposeful, rational behavior of forward-looking, profit-seeking economic agents will inevitably override the effects of events in the past and avoid 'lack of foresight' situations which lead to outcomes that offer lower payoffs than some hypothetical - but unattainable - alternative (Liebowitz and Margolis, 1995).

Anotelli's argument draws heavily on the notion of path dependence elaborated by the work of David (1985) and Arthur (1989). The general theory of which assumes, that, buyers rarely have access to perfect information with which to make rational decisions. It further purports that, current choices are influenced by earlier decisions which in turn limit later choices, channeling the sequence of economic outcomes along one possible path rather than another (Anotelli, 2006a). In part, the difference between path-dependent and "path-independent" processes can be explained by the fact that foresight doesn't matter for path-independent processes (Purfett, 2008). Regardless of the journey, path-independent processes will invariably lead to a set of predictable outcomes - those that lead to the most efficient and produce maximum payoffs. However, path-dependent processes have multiple potential outcomes, and the outcome selected is not necessarily the one producing maximum payoffs. This contrast, to the results of standard economic analysis is part of what makes path dependence interesting in this present study as is discussed shortly.

In Arthur's (1989) basic analytical framework, "small events," which he treated as random, lead to early fluctuations in the market shares of competing techniques. As Purfett (2008) goes on to argue, *these fluctuations are magnified by positive feedbacks, because techniques with larger market shares tend to be more valuable to new adopters. As a result, one technique grows in market share until it is "locked in" as a de facto standard.* Within this context the role of private and public sector agents is interesting in that they are both seeking to influence the adoption of competing technologies as a way of developing local markets. And, in this respect they exhibit Schumpeterian tendencies in that, *'every social environment has its own ways of filling the entrepreneurial function'*

(1949:70). Thereby supporting the notion that one outcome of a market disruption is that it brings with it multiple and mutually exclusive solutions. This in turn leads to the development of many different standards if no supplier can achieve early market leadership which can lead to 'lock in'. Multi-standards in digital cinema is not a desired outcome for the studios that have made a significant investment over 75 years to ensure a single standard (35mm film) operating globally (David, 1987). Whilst path dependence provides a framework upon which to base this study it requires a dataset on which to test the hypothesis. D-cinema technology is a new and unproven product in a relatively stable market and has yet to cross Geoffrey Moore's 'chasm' (1990) as is shown in figure 2.

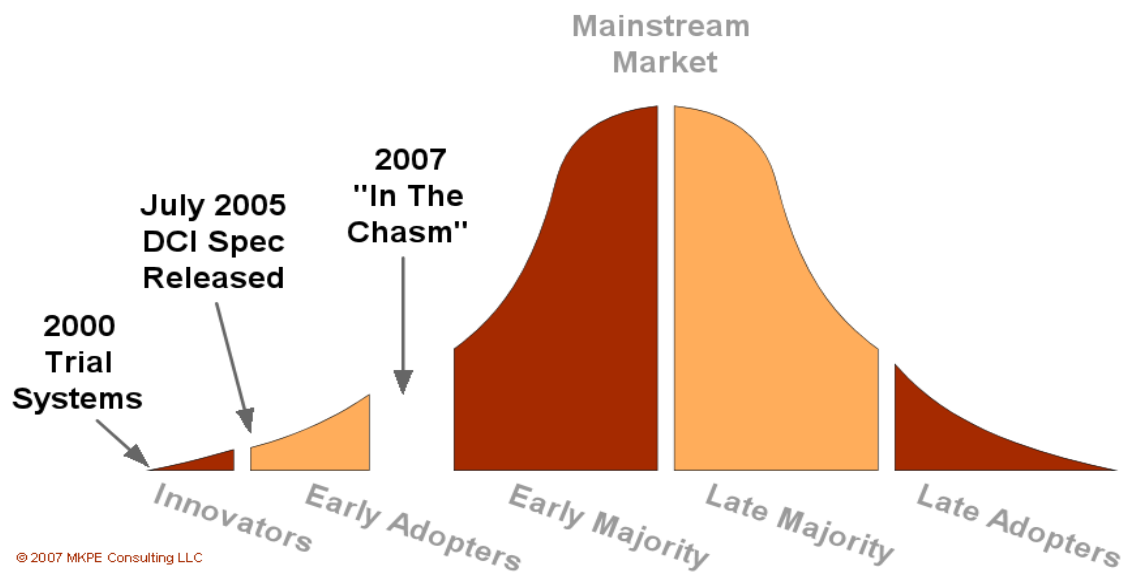


Figure 2: The Path to Mainstream Digital Cinema 2007

Consequently, the author has turns to the work of Clayton Christensen (1997, 2003) who has written on the impact of disruptive technologies in seemingly stable markets; he states disruptive technology is in essence, simpler, cheaper, and more reliable and convenient than established technologies (Christensen, 2003:192). In this context, low-end disruptions are similar to what Schumpeter referred to as '*creative destruction*' (1942:82-83) in so much that low-end disruptions create a step-change cost reduction within an industry. However, this is achieved by entrant firms destroying the incumbents. New-market disruption, in contrast, entails a period of substantial creative creation - new consumption - before the destruction of the old occurs (Christensen, 2003:70). Based on their ability to see opportunity from a fresh perspective, new entrants are able to develop disruptive innovations that appeal to emerging market segments and to eventually supersede prior industry leaders (Slater & Mohr, 2006; Culkin & Smith, 2000). In line with previous studies (Stoneman, 2002; David, 1985) the existence of two key drivers in technological change - bias and rivalry between competing technologies – are evident in the digital cinema adoption process. Bias in terms that adoption favours the large

American studios by reducing costs significantly. Rivalry, not only as it exists between old and new technologies (celluloid vs. digital) but also in the attempted imposition of a minimum operating standard for the new technology itself (1.3k [low end digital projection] vs. 2 or 4k (high end digital projection)).

In order to provide some background on the technical issues involved in Digital cinema there is basically one projection technology, several server solutions, but no one global standard. All digital cinema projectors currently deployed are built using Texas Instruments' DLP Cinema² which can display 2,000 horizontal lines of resolution (in a 2,048 x 1,080 chip), compared to its m10 and m15 chips that had 1,280 x 1,024 resolution (roughly 1.3K). In July 2005 the DCI³ published its final overall system requirements and specifications for digital cinema, opting for a scalable solution from 2K to 4K (4,000 x 2,000); thereby leaving the decision to which projector technology will be used in theatres to the market. Whether or not Digital Cinema will provide new entrants with the opportunity to create a 'new value network' in the movie industry will depend ultimately on their ability to augment their skill set with the capabilities to serve mainstream customers as well. This paper is part of a global study of digital cinema and in this next section the author briefly describes the research methodology employed in this study.

The Third Manin the research methodology debate

This study embraces a mixed methods approach which provides the potential to reduce some of the problems associated with singular methods especially in analyzing the early (and current) stages of the technology adoption cycle. This pragmatic approach does not sit well with purists who would argue that "accommodation between paradigms is impossible . . ." (Guba, 1990:p81). However, embracing the strengths and weaknesses of quantitative and qualitative research puts a researcher in a position to mix or combine strategies and to use what Johnson and Turner (2003) call the *fundamental principle of mixed research*. According to this principle, researchers should collect multiple data using different strategies, approaches, and methods in such a way that the resulting mixture or combination is likely to result in complementary strengths and nonoverlapping weaknesses. In complex or emerging (international) markets mixed methods research frequently results in superior research compared to a single method approach (Johnson and Onwuegbuzie, 2004). A mixed method approach provides opportunities to react to, reflect upon and incorporate emerging themes in a dynamic system which requires the researcher to embrace expansive and creative lines of inquiry. Research into the movie industry is fraught with difficulties. First, there is the secretive nature of deal making at all stages of the value network from script development, through green-lighting a project to sales and distribution across many territories (Daniels *et al*, 1998). and finally audience measurement; as a consequence there is little published data available to analyse. The fact that this is part of a four country study poses a challenge in terms of interviewing key players. This is further exasperated when there are both private and public players engaged in the process.

² TI's projection technology gained widespread approval when it unveiled its so-called 2K chip (called the m25 by TI).

³ The DCI (Digital Cinema Incentive) was formed in 2002, a joint venture of the seven major Hollywood studios (Disney, Fox, MGM, Paramount, Sony Pictures Entertainment, Universal and Warner Bros) it effectively dwarfed the importance of the other institutions to establish guidelines for digital cinema into.

One of the ways that the author and other colleagues working in this field (Hardy *et al*, 2007) has found to overcome part of this problem is to take advantage of what Maskell *et al* have referred to as *temporary clustering* (2006:997). This approach recognises that movie business people and cinema professionals regularly meet at conventions, festivals and conferences. Here, their latest and most advanced findings, inventions and products are demonstrated and evaluated through a mix of exhibitions and seminars. The benefits are clear if one makes the most use of the networking opportunities - the existence of local buzz of high quality and relevance leads to a more dynamic cluster (Bathelt, 2004:45) which for the researcher provides follow up interviewing opportunities. As such the existence of temporary clustering in the movie industry is particularly well-suited to research into d-cinema and the next section will provide a snap shot of the journey, examining the emerging strategies amongst actors in response to this disruption focusing on three territories, the UK, USA and India.

Around The World in 80 Days

The first commercial digital screening (Star Wars) took place in May 1999; since when there have been a number of false dawns for entrepreneurs. As with any technology adoption process conversion has created unforeseen problems and opportunities. The US movie studios have tried to control roll out through a ‘stick and stick’ approach - the imposition of minimum standards by which to exhibit their product linked to a threat of withholding digital product if the technology does not meet this standard. This attempt to control the route through the adoption and diffusion stage has elicited interesting responses (Culkin & Randle, 2003).

Table 1: D-Cinema Screens by Region

Table 1: D-Cinema Screens by Region									
	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Europe	0	11	8	22	30	52	229	532	747
North America	0	15	23	80	82	90	332	2014	3536
Central and S America	0	1	2	7	10	12	13	16	20
Africa Middle East	0	0	0	0	0	1	2	4	5
Asia- Pacific	0	4	8	50	66	180	272	430	561
World	0	31	41	159	188	335	848	2996	4869
* Jan – June 2007									
Source: ScreenDigest, 2007									

In some international markets the response has been to ignore the standards issue altogether, which is understandable if you are not dependent on Hollywood product (China and India). In other markets entrepreneurs have sidestepped the issue altogether and found early success in developing a product not considered important and therefore not covered by the standards, 3D or stereophonic cinema (USA and UK), whose original

golden era ran from 1950 to 1953⁴. Whilst it still only accounts for less than 5% of screens worldwide, the number of digital screens is rising and stood at 5,500 as at December 2007 (*table 1*) with North America accounting for more than half of the total (Hancock, 2007). In terms of screens, the dominance of North America is even more marked because of a different pattern of adoption. A number of exhibitors in the United States have opted to substantially or completely convert their cinemas to digital projection, whereas in the rest of the world most installations in the pilot phase covering one or perhaps two screens per complex.

As the major studios have been unable to enforce a global standard we should not be surprised to see that differences between adoption patterns across territories are taking place, not only in line with the finding of Griliches (1957), but also with the primary objectives of the adoption itself. In Japan we find that exhibitors seeking to differentiate themselves from the competition are the main drivers of the adoption process; this is in parallel with the country's manufacturers desire to lead in the technology race⁵ (e.g. Sony and their development of 4k projectors). A similar situation to this exists in South Korea. However, as Hancock (2007) claims, adoption in China is being driven by the Chinese Government's desire to bring cinema to a wider population than that of the big cities where multiplexes are concentrated. Although some 2K installations exist, digital cinema using lower resolution projectors (1.3k) is more widespread, providing the opportunity to leapfrog the need to modernise 35mm cinemas at a relatively low cost. This follows Christiansen's work on *disruptive technology* where simpler, cheaper, new technologies and more reliable and convenient than established technologies. As the Chinese state is mostly concerned with reducing piracy and to limit the availability of Hollywood movies DCI compliance is less of an issue than in other territories.

Case Study 1: USA

As one might expect, the USA has taken the global lead in adopting digital cinema with over 4,000 screens converted by the end of 2007. Although a large territory North America is a very homogenous one, meaning that once an innovation is adopted and business models emerge the move to diffusion where one technique grows in market share until it is "locked in" as a de facto standard is arguably less difficult than in a heterogeneous market (Scott, 2005). Historically, there has been little public agency intervention in distribution and exhibition sectors and as the home of Hollywood exhibition has been forced to follow the product.

The larger exhibition chains (or circuits) are financing the change through a mix of subsidy and the identification of new revenue streams. The subsidy, which is known as the Virtual Print Fee (VPF) model is a means of financing the conversion of the industry to digital cinema. A new player in the movie value chain, a third party⁶ purchases the

⁴ Amongst other things, the decline in popularity for 3-D stemmed from the fact that two prints had to be projected simultaneously and they had to remain exactly alike after repair or synchronization would be lost. This is not an issue with d-cinema.

⁵ The growth of 3D-related technologies provides Japan's manufacturers with an opportunity for future innovations. Sony's new 4K 3D projectors, which compete with what DLP offers, are currently being tested. Their focus is on the development of competitive systems that only require a single projector.

⁶ A ruling handed down by the Supreme Court on May 4, 1948 declared that the five major studios of the day were guilty of violating antitrust laws through their subsidiaries or affiliates, owning or controlling theatres. Therefore the studios would be in breach of the ruling if they were seen to be directly involved in the process (Christopherson & Storper, 1986).

equipment, and then recoups the cost of the equipment over time, through payments from distributors (who pay the majority of the cost) and exhibitors. An example of how the VPF model would work over the life of an agreement can be seen in *table 2*. However, such a scheme will only work for those exhibitors who are dependent on studio product. The smaller exhibitors recognising the risk of being isolated created the Cinema Buying Group (a semi-autonomous programme of the National Association of Theatre Owners [NATO]) which represents almost 9,000 smaller screens in the USA and Canada. The Group has yet to announce how its model may differ from the VPF scheme.

Table 2 Example of the Virtual Print Fee Model

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
System Cost*	80,000	0	0	0	0	0	0	0	0
Financing cost	5,836	5,556	5,006	4,416	3,739	3,011	2,229	1,389	485
Total Annual Cost	85,836	5,556	5,006	4,416	3,739	3,011	2,229	1,389	485
Average Turn rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Number of Pictures	16	16	16	16	16	16	16	16	16
Utilisation Rate (%)	80	90	90	95	95	95	95	95	95
VPF per booking (\$)	700	700	700	700	700	700	700	700	700
Total Distrib VPF revs	8,960	10,080	10,008	10,640	10,640	10,640	10,640	10,640	10,640
Exhib contribution	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
No of alt cont bookings	12	12	12	12	12	12	12	12	12
VPF for alt cont (\$)	100	100	100	100	100	100	100	100	100
Total VPF for alt cont	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Total Revenue	11,760	12,880	12,880	13,440	13,440	13,440	13,440	13,440	13,440
Amount unrecouped	74,076	66,752	58,878	49,854	40,153	29,724	18,514	6,462	-6,493

* Does not include maintenance and installation

Average Turn Rate = Average time a movie stays on screen

Number of pictures per year = Films played on a screen per year

Utilization rate = Depends on number of distributors signed up to VPF system

Source: Screen Digest

A further development, announced in the spring of 2007, which arguably sails close to the 'anti-trust law' wind, saw the formation of a venture called, the Digital Cinema Distribution Coalition delivery system. This purports to represent the first collaboration between studios and exhibitors to develop the most cost-effective form of digital content delivery through technologies such as satellite or digital terrestrial distribution. The coalition claims that it would be open and available to any content provider, vendor and exhibitor, including the owners, Warner Bros. Entertainment, Universal Pictures and DCIP, which is owned by Regal Entertainment, AMC Entertainment and Cinemark USA and represents 14,000 screens (Hancock, 2007). As the DCIP venture – which is close to announcing its deployment methodology shows - the US exhibitor market is fully recognising the potential benefits of digital, which is moving it closer to the mainstreaming phase through a mix of studio product, alternative content and digital 3D which saw close to 1,100 systems installed in the territory by end 2007.

While digital cinema offers a brilliant picture quality (equal to first run 35mm), excellent repeatability, higher security and lower distribution costs, these factors do not excite American audiences offering little visual differentiator from 35mm film. The panacea for declining cinema receipts and movie-piracy-hysteria could therefore be digital stereoscopic (originally known as 3D) cinema. Prominent supporters of 3D digital cinema are directors James Cameron, George Lucas and Robert Rodriguez. Cameron believes that, in the near future, studios will release 4-5 big tentpole pictures a year in 3D, making it the format for must-see films that can only be experienced in a cinema. The first films that will take full advantage of the new technology are 3D animated films, which can easily be adapted for 3D projection – although a documentary of the pop group, U2 during the South American leg of the band's “Vertigo” tour is currently on release and receiving excellent critical reviews. Paramount and has predicted that by 2009 there will be enough digital 3D content to keep at least one screen in a multiplex occupied full time (Toumarkine, 2007).

Table 3: Box Office per Screen results 3D vs 2D

Title	Digital 3D screens	2D (\$)	3D (\$)	X Revenue
Chicken Little	86	6,760	24,419	3.6
Monster House	178	4,798	13,483	2.8
Meet The Robinsons	581	4,713	12,220	2.6
Beowulf	766	3,882	10,782	2.8
Average	403	5,038	15,226	3.0

Source: Screen Digest

Paramount-distributed Dream works Animation has also pledged that all of its animated titles will be in digital 3D as of the same year. From distributor and exhibitor perspectives, there seems to be a strong financial case for digital 3D cinema. For example, The Polar Express, which was released in flate screen (2D) on 3,500 screens in the US in 2004, generated \$121 million during the holiday season. When the film was released in 3D the following year, it earned \$40 million on just 68 IMAX screens, greatly outperforming the 2D release. Analysis of box office data for Chicken Little, Monster House, Meet the Robinsons and Beowulf has shown that digital 3D screens generate on average three times more revenue, driven by a 2.4 times higher attendance ratio per screen when compared with 2D screenings for the all important first weekend (see *table 3* below). Moreover, the introduction of a premium pricing strategy has opened up a new profit share structure in which exhibitors share the resulting ‘surcharge’ revenue from higher ticket prices with the Studio, an incentive for both sides of the industry alike (Culkin & Morawetz, 2007).

Case Study 2: The United Kingdom

Through direct government intervention the UK now has the second largest number of digital screens after the United States. The UK Film Council (UKFC) - part of the Department for Culture, Music and Sport - contracted Arts Alliance Media (AAM) to install and operate its network of 240 digital screens. The Digital Screen Network (DSN) is a core element of UKFC's strategy to broaden the range of films available to audiences across the UK and to support specialised films. The network is designed to operate in conjunction with other UK Film Council distribution and exhibition initiatives, such as the Print and Advertising Fund, for specialised films, and the Audience Development Scheme. The DSN was conceived as a 'virtual network' of 240 screens, located in approximately 200 cinemas across the UK. Screens are installed at multiplexes, independent cinemas and single screen venues. AAM completed the first round of installations (50 cinemas) in February 2006, with the rest of the screens installed by August 2007. In return for the UK Film Council's financial contribution towards the equipment, network cinemas are contractually obliged to devote a (self-imposed) set percentage of playing time to specialised programming (e.g. educational orientated content, archive material and short films). Outside of these required slots, exhibitors can operate their digital projectors independently, and the existing business model of film acquisition through distributors will be the same (Culkin & Morawetz, 2007). The DSN will arguably enable local filmmakers to show their films on a regional basis within their own communities. However, with only 7% of its screens converted the UK still remains stuck in Moore's chasm and until an alternative or amended version of the VPF model is agreed – most likely with Arts Alliance who recently signed up four studios to a European digital cinema roll-out – it is unlikely that the Government will offer any further subsidies to the market.

Case Study 3: India

The Indian market for digital cinema is developing rapidly although they are going their own way in terms of standards and systems being installed. The country is virtually self-sustaining in its content producing over 1,000 feature films a year. However, unlike the USA, India is not one but many territories. Of the 1000 films produced only around 250 are Hindi or Bollywood films, of which around 30% is exported to North America and the UK; Mumbai and the North Indian circuit account for rest of the Bollywood product. The other 750 movies are shot in local languages, which can have a fanatical following in the south (Tamil/Telugu) but rarely travel in India.

Before the advent of digital cinema only tier I cinema centres, located in large metropolitan areas would receive first release prints. A typical Bollywood movie may be released to 150-350 cinemas, including overseas release. Tier II & III cinemas located in outlying areas then wait 5-8 weeks to receive the worn prints from the Tier I cinemas, creating several problems. In line with many other territories marketing support tails off after four weeks and with demand; this makes it difficult to make a return on investment.

In addition, presentation quality suffers when working with worn prints. The distributor suffers, too, as the limited availability of the movie in the opening weeks encourages the rampant sale of pirated copies. Thus, the current film distribution model in India has created a downward business spiral for the owners of tier II & III cinemas. Electronic movie distribution would benefit these cinemas, making it possible to

participate in the first week of movie release, increasing revenues not only at the door, but also in ancillary operations such as concessions and parking. In a move not dissimilar to that of the UK Film Council, a number of companies are also acquiring and converting traditional single screen venues to create **digital** screen networks with lower resolution 1.3K or HD projectors, ignoring the DCI 2K/4K business model. This means that **cinemas** are able to show getting hit films into **cinemas** faster at a better quality.

Increased investment in the Indian exhibition sector could also see the territory's box office gross increase by 30% in the next five years, linked to a strong economy, retail boom and rising middle class disposable incomes in addition to expansions in the downstream exhibition business should boost industry revenues. While multiplexes in India currently account for only 4% of the country's cinema screens, certain films generate up to 40% of their box-office revenue from them due to higher ticket prices. Six companies – Adlabs, PVR Cinemas, INOX Leisure, City Ventures, Shringar Cinemas and Cinemax Cinemas – have plans to fund ambitious nationwide multiplex circuits and between them, are set to open 1,500 screens (Grummitt, 2007).

PVR is taking this a stage further with a recent announcement that it is making a strategic foray into smaller towns through digital theatres under the "PVR Talkies" brand. The company is investing Rs 2 billion to support this roll out. The first cinemas to benefit were in Aurangabad and Latur each with three screens that were digital ready, where computerised tickets are priced at Rs 40 and Rs 60. The company aims to have 200 PVR Talkies across 13 states and over 70 cities in the first phase. According to PVR Cinemas chairman Ajay Bijli, *"In 1997, we enhanced the way India went to the movies.....With PVR Talkies, the people's cinema has arrived. It is my fervent hope that PVR Talkies will induce people to come back to the big screen and rediscover the true magic of the movies."* (Bijli, 2006). Bijli went on to state that *"the digital theatres in the tier II and tier III cities will work on the principle of digitised content being distributed to theatres through satellite or fibre. They will be uploaded to a digital cinema server. Digital projectors will be used for screening, enabling the entire system to have wide releases of a movie across the country."* Driven by the need to reduce significantly the amount of piracy - which has been taking business away from the tier II and II class cinemas – it is argued that nationwide screenings, will also increase the return on investment for producers and distributors. It is interesting to note that PVR has also recently ventured into the business of film distribution and set up PVR Pictures, a fully owned subsidiary of PVR Ltd. PVR. This initiative will potentially solidify PVR's exhibition growth whilst strengthening its content creation space as a part of a backward integration strategy along the movie value chain. To date, PVR Pictures has successfully released films produced by US-based production house Miramax such as Chicago.

Conclusions

It was suggested at the outset that digital cinema has reached a 'tipping point' and the process is irreversible in several territories. It has been stated that those territories, led by the USA, now have the momentum to carry other major territories through and beyond Moore's 'chasm' despite the fact that the number of digital screens is rising, and stood at around 5,500 as at December 2007. However, the fact that the global exhibitor industry has now not fully recognised a preferred single standard - driven by the US studios – suggests an adoption model that espouses a Schumpeterian view that, *'every social*

environment has its own ways of filling the entrepreneurial function' as opposed to a path-independent processes leading to a set of predictable outcomes (e.g. one global standard).

Global standards may yet be set but that would require (large and largely self sufficient) territories such as China and India decide that the DCI standard has benefits above and beyond the technology they are currently employing – one which recognises the value Christensen deemed important in the adoption process – simpler, cheaper, and more reliable and convenient than established technologies. Unlike TV technology, it has been argued that the market for d-cinema is not large enough to support more than one standard. Furthermore, multiple standards would require multiple inventories, and a primary advantage of film – one standard, namely 35 mm – would be lost (Culkin & Randle, 2003a). Territories such as Europe which are trying to follow their own path run the risk of being forced to change direction as their position becomes potentially untenable without direct government involvement.

In certain territories a combination of the studios and exhibitors are funding the change (Adner, 2002). Therefore they are likely to have the final decision on any particular aspect of d-cinema and will determine standards locally as in the USA. It has been argued that it would be uneconomic for others to establish alternatives. However, 3D lies outside the current standards and Sony, in particular, is focusing on the development of competitive systems that only require a single projector for 2D and 3D. One consequence of reduced distribution costs is a greater degree of flexibility providing improved choice to the consumer, in terms of scheduling and content. It may also lead to an increase in smaller local cinemas showing a greater variety of films to smaller audiences. Entrepreneurs are already noting that such developments will create a need for more sophisticated customer relationship management techniques, as well as better marketing, in the cinema business.

The final word should perhaps be left with an entrepreneur operating in San Francisco, not far from Hollywood. In a recent interview Gary Meyer, a co-founder of Landmark Theatres said. "I have hope that in a couple of years, when digital becomes more available....With film, there are \$150 shipping costs, and I have to pay a projectionist \$16 an hour to work from noon to 11. Digital would reduce the cost and make it feasible. There are creative ways. Exhibitors can either go to bed angry or wake up and change...." (LaSalle, 2008). The change may just not be what the studios were hoping for or expecting.

References

- Adner, R. (2002), When are technologies disruptive? A demand-based view of the emergence of competition, *Strategic Management Journal*, 23: 667-688.
- Antonelli, C. (2006), Path Dependence, Localised Technological Change and the Quest for Dynamic Efficiency, in Antonelli, C., Foray, D., Hall, B. H. and Steinmueller, W. E. (eds.), *New Frontiers in the Economics of Innovation and New Technology: Essays in Honour of Paul A. David*, Edward Elgar Publishing Ltd.
- Antonelli, C. (2006a), Diffusion as a Process of Creative Adoption. *Journal of Technology Transfer*, 31, 211–226.
- Arthur, W. B. (1994), *Increasing Returns and Path Dependence in the Economy*, Ann Arbor: University of Michigan Press.

- Bathelt, H., Malmberg, A. & Maskell, P. (2004), Clusters and knowledge: Local buzz, global pipelines and the process of knowledge creation, *Progress in Human Geography*, 28, pp. 31–56.
- Bijli, A. (2006), PVR to launch digital cinema in small towns, plans Rs 2 billion investment, Retrieved 20th February from Indian Television.com at <http://www.indiantelevision.com/headlines/y2k6/sep/sep186.htm>
- Christensen, C. (1997), *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Cambridge, MA: Harvard Business School Press.
- Christensen, C. (2003), *The Innovator's Solution: Creating and Sustaining Successful Growth* Harvard Cambridge, MA: Business School Press.
- Christopherson, S. and Storper M. (1986), The city as studio; the world as backlot: The impact of vertical disintegration on the location of the motion picture industry, *Environment and Planning. D: Society and Space* 4, 305-320.
- Culkin, N. and Morawetz, N. (2007), *Facing the Digital Future [3rd Edition]: Digital Technology and the Film Industry*, CfED Report.
- Culkin, N. and Smith, D. V. L. (2000), *An Emotional Business: A Guide to Understanding the Motivations of Small Business Decision Makers*, *Qualitative Market Research: An International Journal* Vol. 3 No. 4 MCB University Press.
- Culkin, N. & Randle, K. R. (2003). *Stelios v America, the latest big screen bout*, *The Guardian*, August 25, p19.
- Culkin, N. & Randle, K. R. (2003a). *Digital Cinema: Opportunities and Challenges, Convergence: The Journal of Research into New Media Technologies*. Vol. 9 No. 4.
- Daniels, B., Leedy, D. and Sills, S. (1998), *Movie Money: Understanding Hollywood's (Creative) Accounting Practices*. Los Angeles: Silman-James Press.
- Darwin, C. R. (1869), *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. London: John Murray. 5th edition.
- David, P. A. (1985), *Clio and the Economics of QWERTY*, *The American Economic Review*, Vol. 75, No 2, *Papers and Proceedings of the Ninety-Seventh Meeting of the American Economic Association*. (May), pp. 332-337.
- David, P. A. (1987), *Some New Standards for the Economics of Standardization in the Information Age*, in P. Dasgupta and P. Stoneman (eds.), *Economic Policy and Technological Performance*, Cambridge: Cambridge University Press, pp. 206–240.
- Elberse, A. & Eliashberg, J. (2003), *Demand and Supply Dynamics for Sequentially Released Products in International Markets: The Case for Motion Pictures*. *Marketing Science*, 22(3), pp329-54.
- European Audiovisual Observatory (2008), *Italy, the Russian Federation and the Czech Republic stand out as 2007 European cinema attendance dips*. Retrieved 20th February from EAO at <http://www.obs.coe.int/about/oea/pr/berlinale2008.html>
- Gerbrandt, L (2006), *The Modern Movie Experience*, Nielsen Analytics, November.
- Griliches, Z. (1957), *Hybrid Corn: An Exploration in the Economics of Technological Change*, *Econometrica*, Vol. 25, No. 4. pp. 501-522.
- Grummitt, K. (2007), *Digital Cinema Report*, Leicester: Dodona Research
- Guba, E. G. (1990), *The alternative paradigm dialog*, in E. G. Guba (Ed.), *The paradigm dialog* (pp. 17–27). Newbury Park, CA: Sage.
- Hancock, D. (2007), *Digital Cinema: Global and European roll-out, business models and forecasts to 2012*, London: Screendigest.

- Hardy, J., Haslam, C., Morawetz, N. and Randle, K. R. (2007), Finance and the film industry, *Industry and Innovation*, 14, 4.
- Johnson, R. B. and Turner, L. A. (2003), Data collection strategies in mixed methods research, in A.Tashakkori, and C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp.297–319). Thousand Oaks, CA: Sage.
- Johnson, R. B. and Onwuegbuzie, A. J. (2004), Mixed Methods Research: A Research Paradigm Whose Time Has Come, *Educational Researcher*, Vol. 33, No. 7, pp. 14–26.
- LaSalle, M. (2008), Audience fading for repertory movie theatres, Retrieved February 11 2008 from San Francisco Chronicle at <http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2008/02/11/MNVVURG40.DTL>
- Liebowitz, S. J., and Margolis, S. E. (1995), Path Dependence, Lock-In, and History, *Journal of Law, Economics, and Organization* 11: 204-26.
- Maskell, P., Bathelt, H. and Malmberg, A. (2006), Building global knowledge pipelines: The role of temporary clusters, *European Planning Studies*, 14:8, 997 – 1013.
- Moore, G. (1991), *Crossing the Chasm*, New York: Harper Business Press.
- Puffert, D. (2008), Path Dependence, Retrieved 10th February from EH.Net Encyclopaedia, edited by Robert Whaples at <http://eh.net/encyclopedia/article/puffert.path.dependence>
- Rogers, E. M. (2003), *Diffusion of innovations* (5th ed.), New York: Free Press.
- Schumpeter, J. A. (1949), Economic theory and entrepreneurial history, in Research Center in Entrepreneurial History (ed.), *Change and the Entrepreneur Postulates and Patterns for Entrepreneurial History*, Cambridge, MA: Harvard University Press.
- Schumpeter, J. A. (1942), *Capitalism, Socialism and Democracy*, London: Unwin.
- Scott, A. J. (2005), *On Hollywood: The Place, The Industry*, New Jersey: Princeton University Press.
- Slater, S. F. and Mohr, J. J. (2006), Successful Development and Commercialization of Technological Innovation: Insights Based on Strategy Type. *Journal of Product Innovation Management* 23:1, 26-33.
- Stoneman, P. (2002), *The Economics of Technological Diffusion*, Oxford: Wiley-Blackwell Publishing Ltd
- Toumarkine, D. (2007), Digital Dimensions, Retrieved February 15th from Film Journal International at http://www.filmjournal.com/filmjournal/features/article_display.jsp?vnu_content_id=1003679772
- Waterman, D. (2005), *Hollywood's Road to Riches*, Cambridge, MA: Harvard University Press.