The Institutional Sources of Innovation in Korean and UK Online Gaming Firms

by Denise Tsang and Younsuk Park

A Despite their initial differences in knowledge stock regarding games development, Korean and UK firms have achieved world-renowned position in the global online games industry. This paper examines the institutional sources of innovation, with reference to the role of institutions in generating creativity in the earlier stage of the innovation process. This study shows both Korean and UK's firm value, regardless of their different socio-economic contexts, plays an important role in generating innovation. An additional point suggested in this paper is that the Korean game development firms are more likely to take advantage of governmental policy support in order to overcome inadequate institutional settings in conjunction with the initial conditions of the game industry.

Introduction

Global innovation is the main driver of firm growth in knowledge-intensive production such as interactive games (e.g. video games and online games). The fact that interactive games production has exhibited a strong spatial dimension and has clustered in the USA, Japan, Canada and the UK has highlighted the role of national institutions within the innovation process. More recently, Korea and the UK have nurtured some cutting-edge, home-grown firms in the emerging online games sector. It is the purpose of this paper to examine the institutional source of product innovation among these firms between 1997 and 2008, with reference to the earlier innovation process. Special attention is paid to the role of culture and the role of the state as facilitators in generating innovation.

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Amabile (1997) stated that innovation is, 'the successful implementation of creative ideas'. Innovation is particularly important in interactive games as 'fun' is the key attribute that attracts consumers to spend leisure time on gaming. Innovation can take place in products, systems, processes and services (Freeman and Soete 1997). Product innovation has been described in terms of three sub-processes: the production of knowledge, the translation of knowledge into artifacts, and responding to and influencing market demand (Pavitt 2005). The production of knowledge could further be divided into two sub-processes: 1. idea exploration, generation and selection and 2. idea evaluation and accumulation. In this paper, the earlier product innovation relates to the first sub-process of knowledge production. In games development, this sub-process relates to the development of artistic characters, storylines, gameplay mechanics… etc.

The remainder of this paper is organized into the following sections. Section 2 will briefly introduce the Korean and UK online gaming industry. Section 3 will review the theoretical framework on the basis of previous studies in relation to institution and innovation, and will focus on the role of state and culture (which greatly influence product innovation in online games). Section 4 will discuss the methodology. In Sections 5 and 6, the institutional sources of innovation in terms of cultural value and public policy in Korean and UK online gaming firms will be explored. Section 7 will then compare and contrast these institutional sources upon earlier innovation process in Korea and the UK. Section 8 will conclude with policy implications and discussion for future studies.

Korean and UK Online Gaming

Korea and the UK are headquarters to over 300 indigenous interactive gaming firms. The two countries, though they have developed broadband infrastructure at a different pace, are at the forefront of online gaming development. Korea invested heavily in ICT infrastructure during the 1990s; as a result, it obtained a leading position in broadband access among the OECD countries and was ranked second (after Sweden) on the Global ICT development index (OECD 2001; ITU 2009). In contrast, broadband penetration in the UK has grown rapidly only in recent years. Though 97% of households had access to broadband in 2008, it was estimated that only about half of them actually chose it.

Korea is the global leader in the online games market, generating about US$1.9 million in sales and creating hit titles such as Lineage and Maple Story. There are a few, large indigenous Korean firms such as NCsoft, Nexon and Webzen that have grown rapidly since the late 1990s. NCsoft, an early mover in global online games, was founded in 1997 with 20 employees. It had grown to the considerable size of 3,000 employees and over 4 million users worldwide including major markets such as the USA and China by 2008. The growth of NCsoft represents the over 10 percent year-on-year growth of the Korean online games sector for the last decade.

UK online gaming firms, in contrast, grew out of the globally successful video games sector. The skill set within UK games development is world renowned, and is represented not only by its sheer volume of sales but also by its capability to generate hit title series such as Tomb Raider and Grand Theft Auto. The origin of the UK video games industry, in turn, can be traced back to amateur firms' developing products for home computer users such as the Sinclair Spectrum. Early pioneering firms Codemasters, Rare, DMA Design and Climax have grown since the 1980s and nurtured a generation of games professionals. Firms that have successfully positioned themselves in the emerging online games sector include Codemasters, Jagex, Monumental Games and RealTime Worlds. Though the number of indigenous online games firms is relatively small, the sector has the potential to expand due to the transferrable skills embedded in the video games segment.

Institution and Innovation

Innovations within firms are dependent mainly upon the organizational context (i.e. firm culture) and the institutional context in which firms are embedded (economic and socio-cultural). The Nobel Prize winning economist Douglas North states that, 'institutions are the humanly devised constraints that shape human interaction' (1990 p.3). One of the most cited institutions in capitalism is the market, which Williamson (1981) considers to be a fundamental institution. Institutions could be described in concrete and abstract terms; the former relates to research institutes, patent offices, corporate R&D departments… while the latter refers to customs, traditions, laws, property rights… In addition, North (op. cit.) suggests that institutions could be examined in the context of formal institutions (e.g. constitution and contracts) and informal institutions (e.g. norms of behavior). As institutions continuously shape the relationships between individuals or groups within and outside organizations as well as the relationships between organizations formed by individuals and groups, they play a central role in the process of innovation.

The emphasis on the institutional context in innovation could be traced to the 'modularization' of economic activity (Langlois 1988), which disperses information and knowledge relevant to innovation across the economy. Indeed, the basic function of institutions is to enhance information flow. The informational function of institutions served by industry associations, patent offices, regional development agencies, high levels of trust… etc., also reduces the uncertainty inherent within innovation activities (Porter 1990; Lundvall 1992; Whitley 2000; Tsang 2005; Athey et al. 2008; Philip and Jan 2008; Rysman and Simcoe 2008). As Edquist and Johnson suggest, '… in view of all the uncertainties and long lead times involved in innovation, it is not unreasonable to believe that without such institutional support innovations would be rare and the resource allocated to them would be insignificant' (1997 p.53).

One of the key economic institutions is the state, which could channel resources into firm innovation. The role of the state has been one of the most controversial issues in Economics. Most scholars agree that the state has a certain role to play, but there is little agreement from laissez-faire to developmental state as to when and how it should act to stimulate innovation. While the well-functioning market mechanism provides a persuasive explanation for the success of the innovative US economies, the rise of Japan, Korea, Taiwan and Singapore, where the government has implemented strong industrial policy measures to create innovative world-class technology industries, has aroused interest in the active role of the government in innovation (Johnson 1982; Dore 1986; Amsden 1989; Chang 1994). Departing from this stream of study concerning the extent of government created incentives and resources that channel towards industrial innovation, Hall and Soskice (2001) argue that different government policy constitutes one of the key components contributing to the different nature of firm innovation across USA and Germany.

Though culture has been conceptually separated from institution by theorists such as Redding (2008), it will be interpreted in this paper as a socio-cultural institution that determines firm innovation. Kaasa and Vadi (2008 p.2) explain that, 'culture affects innovation because it shapes the patterns dealing with novelty, individual initiatives and collective actions, and understandings and behaviours in regard to risks as well as opportunities'. However, culture is a multi-level concept that encompasses societal culture, local culture and occupational culture. For example, Schumpeter (1934 p.91) addresses 'social habits and conventions' as the driver for innovation among entrepreneurial firms. Saxenian (1994) compared the growth of the electronic and computer industry across the Silicon Valley and Route 128 in the USA and found that innovation was embedded in their local history and culture. Casson (1992), on the other hand, emphasised the importance of professional scientific culture for firm

innovation on the grounds that the work of professionals was associated with 'a curiosity-driven desire to solve a problem to their own satisfaction' (p.4).

Public Policy and Innovation

Despite ongoing debate on the role of state in economic growth, there is a broad consensus in relation to the rationales behind policies for innovation from Neo-classical Economists to Evolutionary Economists (Laranja et al. 2008). The neoclassical rationale for public intervention in innovation focuses on market and information-transmission failure, while systemic and evolutionary approaches acknowledge the need to avoid 'systemic incoherence' or 'lock-in' situations (ibid. p. 831). Furman et al. (2002) argue that the differences in 'national innovation capacity', which they defined as 'the ability of a country to produce and commercialize a flow of innovative technology', reflects variation in both 'economic geography (e.g. the impact of knowledge and innovation spillovers among proximate firms) as well as cross-country differences in innovation policy (e.g. the level of public support for basic research or legal protection for intellectual property (IP)' (p. 900). Technological opportunities are most likely to be associated with public policy in building innovation 'infrastructure' to stimulate knowledge production and transfer.

Given that the online gaming industry has a technology- and knowledge-intensive feature, we focus on the three policy issues related to product innovation. First, it emphasizes the role of entrepreneurship policy as a conduit of knowledge transfer (Audretsch 1995, Acs et al. 2005, Acs et al. 2009). Entrepreneurship provides a unique and valuable asset to economic prosperity by serving as an intermediary for the spillover and transfer of knowledge and ideas (Acs et al. ibid.). Second, it discusses innovation policy with emphasis on geographical agglomeration and clustering. It is a well-established fact that firms which are located within such agglomerations would tend to be more innovative than firms located elsewhere as knowledge has a strong tendency to circulate locally (Iammarino and McCann 2006). Finally, the effects of industry-specific policy on the online gaming sector are worth looking at. It provides us with a comparative view of Korea and the UK, since these two countries have different historical backgrounds in terms of the role of government.

Cultural Values and Innovation

As values underlie the conceptualization of culture (Hofstede 1991), there has been research concerning the relationship between values and innovation at different analytical levels. When looking at the different rates of innovation across nations, Shane (1993 p.59) concludes that, 'an acceptance of uncertainty appears to be necessary, probably because innovation requires a tolerance of risk and change. Individualism seems to be important, perhaps because of its association with autonomy, independence and freedom.' Hoffman and Hegarty (1993) propose that cultural values would impede firm innovation as top managers from different cultures emphasize different functional expertise (e.g. finance expertise in the UK and general management expertise in the Nordic countries). Within the setting of a single industry and top management teams that were dominated by home country nationals, Tsang (2002) found that the cultural value of individualism supported US personal computer firms' product innovation in business software whereas the value of continuous improvement enhanced Japanese and Korean personal computer firms' process innovation in DRAMs.

The prevalence of cultural values has further led to the study of the interplay between firm culture across national firms and product innovation. Three important points concerning culture at the firm level can be observed. First, innovative firm values have been discussed by theorists such as Quinn and Associates (1983 and 1988) and are widely acknowledged as critical firm resources. Second, founders (who are influenced by their respective national cultures) tend to shape their firms according to

enduring values which embody their cultural values (Pettigrew 1979; Giberson, Resick and Dickson 2005; Tsang 2006). Finally, the perpetuation of firm values is supported by the continuous process of attrition, where employees who do not share the values will leave the firm. (Hofstede 1985; Schneider 1987; Judge and Cable 1997; Krishnamurthy 2008).

Methodology

Based on the interpretive research paradigm, this research will adopt the qualitative methodology that focuses on detailed case studies of the most cited innovative Korean and UK online games firms. We used concepts and theories from the existing literature to increase understanding of the phenomenon of innovation within the Korean and UK online gaming industry. Primary data includes in-depth face-to-face interviews and reviews of public domain information of 8 leading online games firms in the two countries, which include NCsoft, Nexon, Webzen, Dragonfly, Codemasters, RealTime Worlds, Jagex and Monumental Games. Table 1 provides a snap-shot view of key data such as number of employees as well as examples of intellectual properties. All the aforementioned firms have forward integrated into games publishing and are embedded in regional high tech clusters.

The response rate for the face-to-face interviews which took place in the firms in 2007 was 38%. Semi-structured questionnaires guiding the interviews included questions designed to gather information on firm history, firm strategy, nature of external relationships and critical events. All interviews were taped and transcribed. In addition, longitudinal secondary data which included government publications, industry reports and news articles were also collected. They provided useful information regarding the personal history of founders, the evolution of the industry over time and the technological and marketing challenges facing firms.

Table 1: Case Study Online Games Firms in 2008

Firms	Year of establish-ment	No of employ-ment	Example of innovative titles	Founders
Korean Firms				
Nexon	1994	600	Maple Story	Cheungju Kim, Jake Song
Dragonfly	1995	130	Special Force	Cheolsong Park
NCsoft	1997	2600	Lineage	Tackjin Kim
WebZen	2000	340	Mu Online	Namju Kim, Suyoung Lee
UK Firms				
Codemasters	1986	500	Archlord Darling	David Darling, Richard Darling, Jim
Jagex	2001	400	Runescape	Andrew Gower, Paul Gower, Constant Tedder
RealTime Worlds	2002	300	All Points Bulletin	David Jones, Ian Hetherington, Tony arman

Monumental Games	2005	60	Football Super-stars	Rik Alexander, Rocco Loscalzo

Korean case study

As mentioned in the earlier section, the rapid expansion of the ICT infrastructure in the late 1990s paved the way for the growth of online gaming firms in Korea. Two pioneering firms, shown in Table 1, founded in this period stand out - Nexon and NCsoft. Nexon was renowned in the history of the online gaming as it developed the first online graphic MMORPG Nexus: The kingdom of the Winds in 1996. This game was published a year before Electronic Arts' Ultima Online and was credited with popularizing the genre. Nexon's early innovative achievement underpinned its subsequent successes such as Kart Rider in 2001 and Maple Story in 2003. NCsoft, on the other hand, developed and published the mega-hit title Lineage in 1998. NCsoft's founder, Tackjin Kim, has a strong technological background in software and started his first company Hanmesoft, when he was a university student. Lineage's international success inspired young talents and encouraged them to start-up their own online gaming firms, using NCsoft as a role model. One of these companies was WebZen, which developed the 3D Mega-hit game, Mu Online in 2003. Unlike the other three Korean firms in this paper, Dragonfly started as a PC game-developer in 1995. Since extending its platform to the online format, it pioneered FPS online games such as Karma Online in 2002 and Special Force in 2004. In particular, the unexpected success of Special Force contributed to the diversity of the online games market previously dominated by MMORPGs.

Though the legal framework for the protection of intellectual property has not been and is still not favourable for game development in Korea, Korean online gaming firms have benefited tremendously from the government's entrepreneurial policy. The restructuring of chaebols as required by the IMF during the Asian Financial Crisis of 1997 has led to a change of policy focus from chaebols to innovative SMEs. Since then, fostering entrepreneurship for innovation is at the heart of SME policy and even the country's overall economic policy focus (OECD 2009). Among others, two policy measures are worth mentioning: better access to finance and the fostering of venture businesses. KOSDAQ was created and geared up for equity funding in the late 1990s, benefiting NCsoft and WebZen. Both firms secured financial sources from KOSDAQ to finance games development projects. It was reported that the two firms raised over US$2,500 million even before their first trading at KOSDAQ in 2001 and 2003, respectively.

However, investment from venture capital, which was supported by the Korean government financially, was the most commonly used route for game financing. In particular, WebZen obtained US$ 1 million in 2001 from a specialized game fund organized by Hansol Capital Investment for MU Online. As a result, the firm yielded a record increase of profit of 1,300 percent in the succeeding year. The financing of Dragonfly's most successful game, Special Force, was only made possible after it received US$ 1 million from Next Venture Investment in its early stage of development in 2003. Since online gaming falls under the category of the software sector, online games firms are recognized as venture firms by the Law of Special Measures to promote Venture Business 1997, which is vital for firm success. This provisional Law contains highly favourable measures for high-technology based start-ups including additional tax incentives, lower standards for KOSDAQ, and special treatment for R&D programmes. Therefore, all four case study firms were recognized as ventures during their start-ups between the late 1990s and the early 2000s and were able to benefit from these policy measures.

One of the major intervention areas in innovation policy is facilitating networks between industry, academia and research institutions. Universities such as KAIST and SNU were indeed the birthplaces of the first generation of game developers and founders in the late 1990s. They had the special privilege

of early high-speed networks within different schools, which enabled students to develop games for fun and circulate them through the network at their leisure. Founders of NCsoft and Nexon were graduates of the two universities.

However, the level of technology and knowledge transfer from universities to gaming firms has been regarded as a 'missing link' despite the Technology Transfer Promotion Act in 2000 and the Government's efforts to promote it. Only Nexon took part in a consortium for the development of online simulation game systems in 1997. Linkages between gaming firms and universities are getting stronger in recent years, showing the importance of official recruitment from game-specific departments in universities and the commercial benefits of getting new ideas and feedback from young students. NCsoft announced that it agreed an MOU with Younsei Digital Game Institute and established a co-operation framework for developing its games by exchanging ideas, technologies, and experiences. Nexon also set up 'Nexon Game Track' with Korea Game Academy, Korea University, and Carnegie Mellon University. This programme intends to nurture future global game developers, to provide internship and overseas study in Carnegie Mellon, and is sponsored by the Korea Game Academy and Nexon.

With regard to industry-specific policy, the online games industry has not been a component of Korea's industrial policies (e.g. steel or automobile) and has attracted much less attention until recently. However, the establishment of Korea Game Industry Agency (then, Game Creation Support Centre) under the Ministry of Culture and Tourism in 1999 played a key role in supporting early game developers. The main task of KGIA is to build up the knowledge infrastructure for gaming firms such as providing game-specific information, export promotion, training game manpower and nurturing start-ups. KGIA's incubation centre gained its reputation by developing over 100 game firms including WebZen and Dragonfly while they were producing global-hit games. Another major contribution from KGIA is to run Korea Academy, a two-year game specific training program. This program has been sponsored by the Government since 2000; it has provided hundreds of graduate developers who joined major game firms such as NCsoft and Nexon.

Though the Korean culture has been widely characterized as collective by theorists since Hofstede's study (1980), Chang and Chang (1984, p. 12) describes Korea as 'individualism within a group setting' whereas Song (1990, p. 199) writes 'while Koreans are relatively group-oriented, they also have a strong individualistic streak like most Westerners.' Indeed, one out of four Koreans is Christians, a religion that emphasizes individual rather than collective relations with God. The rise of Christianity since the Second World War in Asia, has made Korea the largest Christian population behind the Philippines. It should also note that such a view concerning the individualistic streak among collectivism has not been a case among Korea's culturally similar neighbours such as Japan and China.

The success of leading Korean online gaming firms is based on their innovative games. With the exception of NCsoft who started as a business software developer, founders of the remaining three firms set up firms to develop games that they could share with friends or ex-colleagues. Cheongju Kim and Jake Song, cofounders of Nexon, used to attend the same class in KAIST. They built on their friendship and established the firm to exploit an earlier version of Nexus in 1994. Kim mentions that: 'Nexon's core competence is its firm value, which develops "new" games in any aspect… Since the game industry is selling fun, it is critical to create an environment that developers could enjoy their work freely and openly, and without an atmosphere of tight regulation" (Chosunilbo 2007). WebZen, the pioneer of 3D graphic online games, was founded by 2 ex-employees of MirinaeSoft that developed PC games titles. Since its formation, NamJu Kim has insisted WebZen maintained its leadership in 3D graphics technology and transferred its craftsmanship consistency to all WebZen games (ETNEWS 2005).

Unlike the Korean chaebols, the model of Korean online gaming firms is not diversified, gigantic in size and hierarchical. They follow the US game studio system and place great emphasis on creative ideas utilizing the flat, open and flexible structure. Moreover, the community of games professional tends to know one other well and even share information and ideas, revealing the sharing of innovative value and norms within the industry. However, these online gaming firms also draw from the individualistic streak of the Korean culture. For instance, job-hopping is very common among those working in the gaming sector even at the time when Korean firms widely adopted life-time employment for its core employees. Compared to other industries, the online gaming industry has attracted firms using non-traditional methods such as instant recruitment by portfolios and recommendations of 'communities of practice'. Indeed, Sungwon Ko, Development Manager of Special Force in Dragonfly, was employed on the spot when he demonstrated his amateur FSP game to the founder/CTO. Though there is the growing number of graduates and trainees from game degree courses from the university sector in recent years, programmers with formal education still accounts for only 1.86% in top 10 Korean gaming firms (ETNEWS 2009).

The importance of innovative value among Korean online gaming firms also means that the headquarters-subsidiary relations are different with those pursued by the chaebols. For instance, NCsoft's US subsidiary ArenaNet was assigned to develop its own series with complete freedom. Its first title Guild Wars was an instant No. 1 seller around the world, with more than 250,000 accounts created in the first week after the game's launch (ArenaNet 2009). Similarly, Nexon's WiZet and devCAT are also given authority to handle its creative development such as Maple Story and Mabinogi respectively.

UK case study

Though three of the UK online gaming firms were created in the 2000s, their founders were industry veterans who have accumulated work experience in the video games sector with indigenous firms or foreign firms. David Jones of RealTime Worlds, for instance, was behind the successful, original game series Grand Theft Auto and Lemmings. These games each had cumulative global sales of over 20 million units. The other co-founders of RealTime Worlds were previously Managing Directors of Sony Europe and Directors of Development and Acquisition for Nintendo America. However, the Gower brothers in Jagex were games enthusiasts who identified new market opportunities for online games. As teenagers, Andrew and Paul Gower created video games for Atari ST under Cunning & Devious Games and later Java Games on the Games Domain web site. They wrote and hosted the original version of RuneScape in Andrew Gower's house while he was an undergraduate student at the University of Cambridge. The game was an instant success, and together with Constant Tedder, they established Jagex in December 2001. This pattern of firm formation was, therefore, similar to that of Codemasters during 1986 where the Darling brothers set up the firm in their father Jim Darling's barn. Codemasters has since then developed and published successful titles such as the Colin McRae Rally series and has expanded at their original site in Lemington Spa. It became a publisher of online games in 2006 with RF Online, which was developed by Korea's CCR. Since then, Codemasters has hosted and serviced its online games at the Lemington Spa HQ.

The four UK firms have benefitted from the talent pools available in the UK video games industry. For example, the closure of Visual Science in Dundee in 2006 (as a result of its publisher terminating the contract) paradoxically provided opportunities for its neighbour RealTime Worlds to expand. In addition, firms in Southern England such as Codemasters were also able to recruit staff by offering relocation packages. The availability of talent further enhanced these firms' production in areas such as graphics, sound… etc.

In terms of public policy framework, the UK government has generally adopted a market approach in the gaming industry. One of the industry observers commented that because of the negative perceptions associated with the industry such as violent behaviour as well as passive consumption and obesity, the government was rather reluctant to be involved in providing financial support. Nevertheless, online gaming firms could apply for R&D tax credits, which were implemented as a result of lobbying efforts by the industry association TIGA. The UK government further suggested in 2008 that it might provide the industry 'the same favourable tax treatment as the UK film industry' in response to its French counterpart's provision of cultural tax relief to games development firms.

Scotland, however, has a different model and is proactive in terms of encouraging firm formation and clustering. Financial investment (usually 5 % equity) undertaken by Scottish Enterprise is not uncommon in the technology sector. In addition, firms in the deprived city of Glasgow are eligible for grants from the Regional Selective Assistance Agency under the EU framework. Indeed, the Dundee-based RealTime Worlds received early funding from Scottish Enterprise in 2004. The joint US$1.75 million investment by Scottish Enterprise and CIM Venture Fund for Creative Industries was used 'to deliver new technologies, including two upcoming titles, one of which will be the company's first offering into the online games market" (Business Wire 2004).

The most critical innovation policy associated with UK online games development is related to intellectual property. The UK has well established IP laws and a vigorous legal framework to protect innovative ideas and designs, which allows firms to appropriate economic rents in conjunction with product innovation. As to the extent of the knowledge spill-over aspect of the innovation policy, the impact could be considered insignificant. In a recent roundtable discussion among Jagex and other Cambridge based gaming firms, Frontier Development acknowledges that, though there is now a critical mass in development and in adjacent technical areas in the city, games development firms tend not to have strong linkages among them or with Cambridge University. For example, Ninja Theory's linkage with Sony Cambridge existed only during their period of joint development work. Jagex reiterates this point and mentions that its linkage with the university concerns Andrew Gower's academic project that subsequently evolved into Runescape and its role in student work placement schemes.

However, individual links seem to play a role within the agglomeration aspect of the innovation policy. Individuals serve to transmit knowledge when they change jobs or exchange information informally. Frontier Development describes the individual links in Cambridge as: 'A lot of people meet up in pubs. A lot of people know each other socially. I am sure there's a lot of gossip going on'. In addition, Monumental Games was created by ex-Climax employees, i.e. the General Manager and Technical Director of Climax Online. As the Technical Director, Loscalzo had not only worked on Warhammer Online, but also overseen the MMO game development technology platform Leviathan. Climax closed its online games studio in Nottingham after GamesWorkshop terminated the Warhammer project. The current CEO of Monumental Games, Rix Alexander, who had been looking for an opportunity to set up a firm took the risk and established the firm with Loscalzo. The founders not only benefitted from their accumulated online games development expertise in Climax, they were also able to persuade the experienced, entrepreneurial founder of Climax to serve on the start-up's management board.

Though some English universities have provided games development degree courses in recent years, their initiatives could not be considered as industry-specific policy as they launched these programs independently and without government coordination. However, the Scottish government has been more proactive and recently invested £3 million in the University of Abertay, Dundee, to facilitate the first UK Centre for Computer Games Excellence. The Vice Chancellor of the university made the following statement about the investment by the Scottish Government: 'It recognizes that Scotland can

be a global leader in this sector, and that Abertay can drive that ambition by providing graduates with the necessary world-class skills to succeed.' It should be noted that Abertay University has won an industry award for its contribution to games education in the UK; however, UK games programming courses in general have been continuously criticized by indigenous and multinational firms in terms of content.

According to the cultural studies undertaken by Hofstede (1980), Trompennars (1992), Schwartz (1992) and House et al. (2004), UK is an individualistic country where there is great emphasis on the uniqueness of each human being. Booth (2007 p.339) explains: 'An example of the individualism of the British is their attitude toward obeying the law when it comes to matter of conscience. In a recent survey (Brook and Cape 1998) only 36% would obey the law if it clearly went against their conscience, where 57% would follow their conscience rather than the law'.

Innovation is highly regarded in the individualistic culture within the UK. For example, the renowned BRIT Awards and the BAFTA Awards recognizes the creativity in popular music, film and television production annually. Innovation has been and is the driving force behind the self-selected games development community. This community is a self-selected group, in a sense that, those who could not cope with the pay and work condition in the industry tend to leave on their own accord, and join the business software sector or other professional sectors after a year or two. Overall, individuals engaged in games development are games enthusiasts that take pride in the completion of innovative projects. In addition, this self-selected group also works in an uncertain market environment; for example, those with over twelve years of experience have witnessed the boom and bust of the industry and have often have been made redundant during their working lives.

Indeed, the founders of the four UK firms are widely considered as innovative individuals. For example, the Darling Brothers 'were famous for putting ringing endorsements of their games on the packaging' in the early 1980s, which were 'usually quotes from the creators of the game or the Darling brothers themselves'. David Jones had previously founded DMA in 1987 as he felt that 'there were no established developers as such' in Scotland he could work for. DMA's titles were 'praised for their polished gameplay and compelling design'. It developed Lemmings and Grand Theft Auto before it was acquired by Gremlin Interactive.

The four firms have also illustrated the value of innovation. For example, Jones explains the purpose of RealTime Worlds as: 'We have a desire to create games with strong online hooks. We feel that it is getting harder to innovate with single player gaming… It is really hard to find games that really give you the sense of excitement, adventure and innovation, that we had in the early days… We want to build games that start to offer some of these new and fresh ideas' (dela Fuente 2004). Codemasters' innovative culture has led to intense focus on creative ideas generated internally and externally. It invites all employees to submit innovative product ideas for consideration every week, and the incentive to do so is the prospect to participate in the associated royalty pool when the title created becomes successful. Codemasters' A&R Group also interfaces with games developers and is always searching for talents.

Discussion

Narula (2003, 56) states that 'Institutions create the milieu within which innovation is undertaken and establishes the ground rules for interaction between the various economic actors, and represents a sort of a culture.' The Korean and UK case studies have shed light on the institutional sources of innovation, namely public policy and cultural value. The role of public policy towards early product innovation differs across Korea and the UK. The strong government support towards entrepreneurship

has enabled Korean firms to enter and compete in the global online games industry since the mid-1990s, which was ahead of UK firms' entry in the online gaming sector.

Nevertheless, the Korean government's support could be contrasted with Scottish Enterprise's initiative to foster technology clusters such as Dundee for games development. In terms of geographical agglomeration and clustering, both Korean and UK firms compete independently and do not exhibit strong regional linkages. The absence of inter-firm linkages seem to support the notion that research and development 'is moving out of firms' and universities' R&D labs, and becoming more broadly distributed among innovative, independent individuals' (Lettl et al. 2009, 243). As knowledge is critical for innovation, one of the puzzling issues is therefore how these individuals manage their knowledge bases within an industry that evolves at a rapid pace since its inception.

Though the protection of intellectual property rights differ across Korea and UK, the ineffective system in Korea has not hindered the emergence of online gaming firms during the 1990s. The reason is that the innovative software was stored in the publishing firms' official servers and was not targeted by illegal online game domain counterfeiting operation. Hence, online game developers and publishers such as NCsoft could appropriate the economic rents in relation to their innovation within a less than ideal legal framework. However, the emergence of pirate servers that publish illegal version of online games in Asia in recent years has threatened Korean firms future profitability as a high proportion of their sales revenues are derived from the region. The issue of intellectual property rights therefore might deter their future growth in their traditional stronghold such as China and Korea.

The Korean case has highlighted the role of industry-specific policy in accelerating the growth of globally competitive firms. Similar success can be seen in Scotland where the University of Abertay has contributed to graphic design and games development towards the UK games industry. However, there has been mixed responses in relation to the university-led (rather than government-led) games development courses that have appeared in the UK during the last decade. Multinational firms such as E.A. have indeed openly proclaimed that these courses did not provide graduates with the skill most critical for programming.

Though Korea and UK display different prime cultural value, innovative firm value are shared by leading Korean and UK online gaming firms and are critical source of product innovation. The Korean case supports the notion as writers have suggested, of the individualistic element within Korean culture, which stands out in Eastern Asia. It seems that founders of knowledge-intensive Korean online gaming firms, which have grown in the 1990s, were able to create as a model, a new industry utilizing the firm culture of American firms eg. Electronic Arts. The fact that these founders were able to rebel against existing orthodoxy within Korean's Confucian based culture and set up a business that targeted interactive entertainment also illustrates that they belong to a non-conforming group within the collective culture.

Conclusion

Previous studies on inter-country differences on innovation have focused on the role of formal institutions. In this paper, we have attempted to integrate the role of both formal and inform institutions. It shows that the combination of public policy initiative and the prime cultural value has facilitated the rapid growth of online gaming firms e.g.in Dundee and Seoul. Summing up, the success of Korea and UK in online gaming firms draw upon different institutional framework. The case of Korea's leadership in online games suggest that given the appropriate policy support, it is possible to leapfrog the console gaming sector and enter the emerging sector of online gaming. On the other hand, the relative late entry of the UK into online games might be due to the government's lack of commitment in supporting the somewhat controversial games industry, which is paradoxically linked to

the high profile music industry, the advertising industry as well as the television and film industry. Finally, this paper shows both innovative UK and Korean firm value, regardless of their different socio-economic contexts, plays an important role in generating creativity and provides firms ownership advantages.

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