

## **The Hidden Catalyst for Industrial Convergence between the MMOG<sup>1</sup> Industry and the Online Broadcasting Industry in South Korea**

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*This paper explores the convergence process by focusing on the massively multiplayer online game(MMOG) industry and the online broadcasting industry in South Korea. In doing so, the paper seeks to establish the concept of Hidden catalysts for the integration process between the two industries and explore the roles of the Hidden catalysts in triggering the industry's transition. Further, the modified multi-level socio-technical model we applied in our research allows us both to understand each industry's development towards convergence in various dimensions and also to focus on the activities of the Hidden catalysts. In assessing the role of Hidden catalysts in industry convergence, we found that Hidden catalysts depend on two essential features: first, appropriate technology leading to the new industry dominance; and second, managerial capabilities to deal with conflicts among other new interest groups, to harmonise with government initiatives for industry development and to create new value in the integrated market to please the demand of mixed customers.*

**Keywords: Multiethnic, Party, Japan, India, Electoral Institutions**

### **1. Introduction**

As an industry develops, it is likely to change its previous structure and forms of industry (Utterback and Suárez, 1993) or it tends to integrate with other industries (Stieglitz, 2003). Such industrial change is triggered by complex industrial, economic and social factors (Audretsch, 1995). Research on industry change and convergence provides insights regarding historical transitional periods in industry and insights into the drivers for change in industrial policy and business strategy. To understand industry convergence is therefore critical in terms of understanding the emergence of new industries, industrial development and business strategy.

The advent of the Internet has opened new avenues for businesses to provide products, services, information, news and knowledge, and allowed Internet users to participate in sharing information, knowledge and services (Afuah and Tucci, 2000). The MMOG industry and online broadcasting industry have developed unique industrial trajectories. The MMOG industry provides real-time gaming services linking gamers all around world (Taylor, 2006), and the online

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<sup>1</sup> Massively Multiplayer Online Game

broadcasting industry has become a widely-used media form (Swatman et al., 2006). These two online industries have converged to create new value in a new form. The integration of the MMOG industry and the online broadcasting industry now seems natural. However, the MMOG industry and online broadcasting industry have gone through an interesting industry integration process. The current integrated business system between the MMOG industry and the online broadcasting industry not only creates mutual benefits in terms of market creation, but also creates a single new business model. However, there has seldom been any research exploring the industrial integration between these two industries, so we currently possess inadequate understanding of this integration.

The aims of this study are to explore the development of the MMOG industry and the online broadcasting industry from a multi-level perspective, to find the *hidden catalyst* for industry convergence between the MMOG industry and the online broadcasting industry, and to explore the role and the capabilities of the *hidden catalyst*.

## 2. Literatures Review

### Research perspective for industry transition

Industry transition or industry evolution has been researched from various perspectives, such as vertical disintegration (Jacobides, 2005), sunk costs and uncertain market conditions (Lambson, 1991), institutional change (Hoffman, 1999), technological change (Henderson and Clark, 1990, Anderson and Tushman, 1990), determinants for market change (Klepper and Graddy, 1990) and life cycle of products and services (Abernathy and Utterback, 1978, Klepper, 1997). Most studies of these types focus primarily on the main drivers for industry transition: how such core components affect industrial transition. Often, such approaches might neglect the complex background of the creation of main causes. For this reason, understanding entities such as individuals, firms, or groups situated behind the main drivers for industry transition, is critically important to the proper understanding of the holistic process of industry change or transition and the exploration of the creation of main drivers for industry transition. This research calls these entities *hidden catalysts* in triggering transformation. This concept of the *hidden catalyst* is different from the direct causes of change in the phenomena: the *hidden catalyst* is an invisible factor behind the direct cause or the main reason for the change, which most research frames have neglected.

### *Hidden Catalysts*

*Hidden catalysts* are different from existing concepts, especially comprising the roles of institutions in national innovation systems and leverage in complex theory. In national innovation systems, the institution is regarded as the national system related to R&D activities, education, knowledge networks, and infrastructure (Lundvall, 2007). If the *hidden catalysts* are understood in the context of the national innovation system, the *hidden catalysts* are intangible assets and phenomena creating, changing or triggering institutions and national innovation systems: *hidden catalysts* are the components affecting creation of institutions in national systems of innovation. Furthermore, the *hidden catalysts* are different than simply the drivers or affecting factors for institutions of national innovation systems. The concept of *hidden catalysts* is rarely discussed within national innovation systems. However, without *hidden catalysts*, the institution and the national innovation system seldom work properly. The *hidden catalysts* are often un-designed elements or unexpected accidents or other phenomena, and accordingly *hidden catalysts* are very difficult to define or find before an institution is created. In other words, *hidden catalysts* are de-

signed and un-designed forces, transforming a normal situation into institutionalization. For example, for the national R&D capability as institution, there is much discussion on many affecting factors, such as location and incentives. In this context, the *hidden catalysts* are things affecting directly and indirectly not only drivers, such as location and incentives, but also the national R&D capability, beyond the generic settings for national innovation systems. Therefore, the *hidden catalysts* depend on each unique situation and each context trajectory.

In complex theory, Meadows (1999) introduced the twelve leverage points that could intervene in a system. Such leverage points, Meadows believes, could trigger the change of a system (Meadows, 2008, Meadows, 1999). Given the common agreement of a system as consisting of sub-systems, leverage points and *hidden catalysts* provide different approaches to a system: one believes that if, at certain main points, leverage points are moved, a whole system can be transformed toward a better position, while the other believes that to move certain main points in a way that benefits the system at large, we need to understand the less obvious factors behind those specific points, the *hidden catalysts*.

This new concept can be understood as the indirect factors affecting a main cause for change. The important aspect of the *hidden catalyst* is, however, that it does not in itself bring about significant change, but sparks the beginning of change when the change phenomena are in a position to be transformed. Accordingly, the concept of *hidden catalysts* and research on the role of *hidden catalysts* in industrial change is important for understanding the phenomena for any transition, industrial convergence or integration into society. It is important to understand the characteristics of *hidden catalysts* in terms of creating new dominant design of products (Utterback and Abernathy, 1975) or dominance for a new industry (Suarez, 2004) or for integrated industry. The *hidden catalysts* create new dominance in the process of industry integration. The *hidden catalyst* can be also considered as an attacker (for the concept of the attacker, see Foster, 1986). Furthermore, industry convergence expand the technology development and the industry cycle (Abernathy and Utterback, 1978, Utterback and Abernathy, 1975, Utterback and Suarez, 1993) can be expanded by the discussion on the strategic positions of the hidden catalyst in industry convergence.

### **Research methodologies for industry transition (change)**

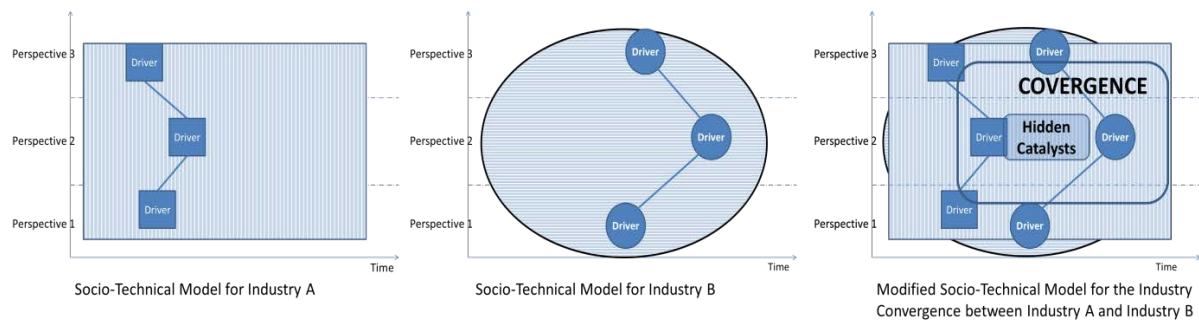
Many research methodologies have been applied to explore various research perspectives on industry evolution, such as a case-study (Patibandla and Petersen, 2002, Arora et al., 2001), network analysis (Krätke, 2002, Smith and White, 1992) and a regression model (Jayaratne and Strahan, 1998). Beyond the simple dimension perspective, there is an attempt to understand system or transition (or industry convergence) from the point of view of a large complex system (Van de Ven, 1993, Van de Ven and Garud, 1987). In addition, other methodology are suggested by examining the role of institutions in the development of technology (Lynn et al., 1996, Reddy et al., 1991). Furthermore, Malerba and his colleagues (Malerba et al., 1999) suggested the historic-friendly model to explain transition. Integrating a complex theory and historical-friendly model, Geels (2004) develops a 'socio-technical system with multi-level perspective' emphasising the meta-coordination between technical variations and the selection environment. In Geels's proposed research (2004), interrelated analytic analysis among socio-technical systems, rules and institutions and organisations, including human actors and social groups, is useful for understanding the interdependencies among groups.

Such recent developments in research methodology, in particular, Geels's perspective (2014), are of help in looking at transition and industry change over a long period of time. However, the perspective is of limited use in looking at industry convergence. This is because the socio-technical model mainly focuses on the generic development of transition, rather than seeking the triggering factors for industry convergence. In other words, socio-technical models often neglect the detailed story or factors behind the complex interplay between two different industries.

There are two reasons that the socio-technical model is not entirely suitable for researching the *hidden catalysts* in the process of industry convergence. First, with this socio-technical model, it is hard to both explore longitudinal change in two industries and perform cross-sectional analysis of the *hidden catalysts* at the same time. The theory of *hidden catalysts* attempts to both explore the historical background of industry convergence and its main drivers from a multi-level perspective and to analyse the *hidden catalysts* per se. Accordingly, the methodology for studying *hidden catalysts* needs two capabilities/attitudes: one for looking at historical industry process with a multi-level perspective, the other for analysing the *hidden catalysts* interacting on multi-level systems. Second, with the socio-technical model, it is not easy to identify *hidden catalysts*, because the *hidden catalysts* are often obscure within the development process of two industries or between two industries. The socio-technical model, in emphasising interaction among the various levels in transition, often neglects the interaction factors for two different industries.

Here, accordingly, in order to explore the historical perspective (long-term) of two-industry convergence, we propose the modified socio-technical model. The modified socio-technical model can be used to identify the causes of industrial change and to understand the hidden connection between cause and effect in industrial transition in the context of complex interdependent relationships among the main social and technological factors. This approach, we believe, is particularly appropriate for examining the transformation from quasi-stable to stable conditions in societies, communities and organisations. Also, the modified socio-technical model has rich implications for analysing future industry change and convergence. Therefore, we believe that this approach can assist in the development of industrial policy recommendations in the context of various social factors. For the modified socio-technical perspective of this paper, the following dimensions were chosen: science/technology, social phenomena, market change, innovation capabilities, relevant government policy, and business development. Once the interrelationship of socio-technical factors has been determined, the *hidden catalyst* can be identified. The *hidden catalyst* in this paper refers to an event, an unexpected accident, a phenomenon, or a plan of a firm, industry, university or government which triggers industrial change, including industry convergence.

In short, in order to overcome the shortfalls of the socio-technical model in hidden catalysts research, we developed the modified socio-technical model. This modified socio-technical model focuses on following three goals: (1) industry development in multi-level perspective, (2) to examine *hidden catalysts* from a multi-level perspective and (3) to analyse the hidden catalysts (see Figure 1).



**Figure 1: Comparison between the traditional multi-level socio-technical model and the modified socio-technical model.**

### 3. Methodology

Before we analyse the convergence process, it is worth clarifying the scope of this paper in relation to industrial convergence. This paper explores only the convergence between the MMOG industry and the online broadcasting industry in South Korea. The research focused on the period between 1990s and year 2012 and the geographical scope of our research was limited to South Korea. Although there may be other instances related to the MMOG industry and the online broadcasting industry, these other convergence phenomena are marginal from the perspective of this research. Thus the other forms of convergence have been excluded from this paper.

While looking at the historical process of industrial convergence between the Korean Internet-based gaming industry and the online broadcasting industry during the last two decades, we also try to find the main trigger factors for convergence between the two industries. We analysed the development of each industry based on the following dimensions: technology, social phenomena, market change, innovation capabilities, relevant government policy, and business development. In relation to the *hidden catalyst*, we selected the following aspects to analyse: entrepreneurship, speed of convergence, rules, norms and laws, interaction intensity increase, conflict, socially agreed solutions to conflict and the emergence of a new interest group. We also conducted extensive interviews with individuals working in the MMOG industry and the online broadcasting industry and with employees at GreTech.

### 4. Analysis

#### 4.1 The MMOG Industry

In this section, we delineate the development processes of the MMOG industry in terms of the following dimensions: technology, social phenomena, government policy, stagnant market and the limits of innovation capabilities and business development. This analysis provides the background for our examination of industrial convergence in the online gaming industry, and shows how these dimensions offer the necessary and sufficient conditions for industry convergence

##### 4.1.1 Niche

The growth of the MMOG industry in the last two decades is closely connected with two domains of technological progress: information technology (IT) including broad-bandwidth and the technology relating to personal computers (PCs) (Kent, 2008). These have developed inter-

dependently and have positively affected key aspects of the gaming industry. Advances in IT technology particularly important in providing online gaming services include: multi-connectivity, real-time connectivity, stable high-capacity servers and storage, and high-speed broadband connections. Developments in PC technology have contributed to improving player satisfaction due to increased operating and processor speeds and advances in multimedia capabilities which heighten the visual and auditory appeal of MMOG.

Because of the necessity of connecting with a game service provider and other game players, the MMOG business is heavily dependent on IT technology. Of the many aspects of IT technology, multi-connections, real-time connectivity, the stability and capacities of servers, storage and broadband speed are particularly important in running a MMOG business. Korean broadband services have improved dramatically during the last two decades – more so than in any other part of the world – and MMOG companies have also benefited from the development of servers enabling the provision of network services.

Improvements in Central Processing Unit (CPU) speed are most important development in PC technology. According to Frauenfelder(2005), In 1989, 486 PC (32 bit) enabled the use of a mouse for the first time; and, in 1993, the Pentium PC (64 bit) for the first time introduced a special slot for a graphics card called AGP. In 1995, the Pentium pro came onto the market, and Audio Video Interleaved files and MP3 music files became popular. Then, in 1998, Pentium 2, the first CPU for personal laptops and Random Access Memory (RAM) was released. With the advent of high speed broadband, ADSL and the popularity of StarCraft, Pentium 3 became a commercial success'. In 2000, Pentium 4, the seventh generation architecture microprocessor, and LCD monitors were launched. Also, due to the huge success of MMOG, the graphics card GeForce series and Radeon series were released. Pentium-D and DDR2 one Giga Ram appeared in 2005, Intel Xeon 5330 in 2006, and the Intel Core i-series, such as i3, i5 and i7 followed in 2010. Further, the development of graphics cards and graphics engines has also been critical for the industry. 'Graphics cards' or 'video cards' refer to expansion cards enabling the display of output images as 3D or 2D graphics, while graphics engines are the computer software programmes in charge of describing graphics. A range of graphics cards have been developed from the simple black and white MDA (Monochrome Display Adapter), to EGA (Enhanced Graphics Adapter) and VGA (Video Graphic Array), which make high-quality graphics expression possible (Frauenfelder, 2005).

As we can see, extensive progress has been made in the development of CPUs. However, after these critical points in technology development, its impact becomes less critical for customer satisfaction, as well as for the provision of services. In relation to server stability, there is now no need for multi-connection beyond 1000 million customers at the same time. Also, there has been no real technology break-through in terms of operating MMOG. This kind of technology stagnation leads to pressure on gaming companies to expand their marketing budgets and adopt a new approach to marketing in order to compete with other MMOG companies which provide similar game services to consumers.

#### **4.1.2 Regime**

In South Korea, we found two interesting social phenomena related to MMOG. First, Korean society has recognised the value of massive multi-player online games as a business opportunity, and that there are new jobs in this sector, such as being a professional gamer. Among MMOG players and the public, the professional gamer is greatly admired(Jin and Chee, 2008). This public and consumer interest in professional MMOG gamers created the demand for online and tele-

vised competitions between professional MMOG gamers (Jin and Chee, 2008). For example, one of the Korean cable TV channels was established in 2001 to broadcast a video of professional gamers playing MMOG, such as StarCraft, and the programme was extremely popular with the Korean public.

The popularity of MMOG in South Korea led to the establishment of a new national institute, the Game Rating Board for gaming and the creation of a system of legal regulation to govern the activity. Since the early 1990s, MMOG in South Korea has been regarded as a form of sport, with MMOG in the late 1990s becoming known as an e-sport (Hutchins, 2008). The category of e-sport under which a particular game falls under is decided by examining the game's elements, access to the game, its relevance as an e-sport, and the possibility of broadcasting it. More importantly, the Korean public not only watch MMOG being broadcast, but also want to find out about the style of each professional gamer and his or her record in playing the game (Taylor, 2012). Therefore the demand for detailed information about the game and its players increased with MMOG broadcasting.

Along with professional game players and the growing demand for broadcasting gaming competitions, the big success of MMOG in South Korea led to a unique social phenomenon: the advent of PC Room businesses (Jin and Chee, 2008) and the contrasting reactions of the public to MMOG (Huhh, 2008). A PC Room is a place where customers are able to use high-quality computers with high-speed broadband to play games online (Choudrie and Lee, 2004). Initially, this new type of business in South Korea started as an internet café; however, later the business transformed into a specialised place for Korean teenagers to enjoy MMOG with their friends. This type of business is rarely found in other countries.

#### **4.1.3 Landscape**

Apart from contributing the development of high speed Internet environments, the Korean government has two slightly conflicting policy objectives in relation to the emerging MMOG industry: to boost the domestic MMOG industry; and to try to prevent youngsters becoming addicted to MMOG. First, in the 1990s, Korean industrial and cultural policy, aimed at establishing a creative industry in addition to manufacturing capabilities, was formulated at the same time as the boom in the MMOG industry (Jin, 2006). For this reason, having recognised MMOG as one of the country's main creative industries, the Korean government aggressively supported its development (Taylor, 2012). Therefore, as Korean gaming companies increased their reputation, the government set up many policy initiatives to help this new industry, such as the establishment of the Global Game Hub Centre, the Korean Game Science High School, the Korean Game Industry Association, and the Korean Game Developers Association. Along with the advent of these new institutes, the Korean government agreed to waive the two-year military service requirement for the main e-sport players.

On the other hand, however, the Korean government attempted to reduce the negative impact of MMOG: addiction to gaming among young people. The Korean government had serious concerns about the negative impact of MMOG, in particular in relation to the effects of violence and horror in first-person perspective games. The degree of violence in MMOG and the addictiveness of MMOG were heavily criticized both in the media and in academia. In recent years, the government has restricted the opening hours of PC Rooms to young people, and reduced the hours of service for MMOG in South Korea for certain-age groups. Further, under the supervision of the Ministry of Culture, Sports and Tourism, in 2006 the Game Rating Board started reviewing the degree of appropriateness of MMOG for young people.

During the last twenty years, the number of MMOG available to play has increased (Jin and Chee, 2008). However, it seems that the number of MMOG players is now not growing in South Korea. The recent sales volume of MMOG is not also growing dramatically in South Korea. In other words, the MMOG market has reached its market saturation point. Along with market saturation, the number of new MMOG released has been increased, and the increasing market competition among MMOG companies has made it far more difficult for existing and new MMOG companies to make profits from the long-term development of, and large investment in, new games. (Jin and Chee, 2008)

Game manufacturers have increased their knowledge in terms of creativity, story-making, graphics development, character development, background design, 3D design, and sound effects (Jin and Chee, 2008). In addition, the MMOG companies have learnt how firms can test each game with early-adopter gamers before the new game is released. In other words, game firms have innovated in relation to producing and providing services with their games over the last two decades. However, recently, innovations have become rare in newly released games. As the MMOG market in South Korea has become mature, the games firms have struggled to provide innovation to costumers in terms of technology, stories and graphics. A new break-through therefore has become necessary. Furthermore, the recent developments in Internet and PC technology has not improved the provision of MMOG services or satisfied customers' desire for better experiences of gaming.

## **4.2 The Online Broadcasting Industry via Personal Computers**

In this section, we explore the development of online broadcasting via personal computers. Many similar terms, such as online media, electronic media and digital media are used to explain the same broadcasting activities. In this paper, with the emphasis on company-level broadcasting to public via Internet, we use the term, online broadcasting industry. Like the previous section, we consider the industry in the context of technology, social phenomena in South Korea, government policy and market expansion.

### **4.2.1 Niche**

Broadcasting firms have developed freely-available motion picture players and have distributed their programmes freely. For example, Microsoft released the Windows Media Player series as part of a bundle included in the Windows operating system. All PC users who use PCs with the Windows operating system can use Windows Media Player. Thanks to Microsoft's free software, users can play video files. In South Korea, however, in contrast to other parts of the world, the popularity of Windows Media Player has been short-lived. A Korean SME, GreTech developed its own free software called 'GOM Player', enabling its customers to watch any video files via PCs. In addition, unlike Windows Media Player, GOM Player provided various codecs based on customers' requests in real time. A codec is a type of software which changes sound and video signals into digital files for PCs. By providing different codecs for GOM Player users, GreTech attracted huge demand for this service in Korea. Most Korean PC users have and use the GOM Player programme, rather than Windows Media Player.

### **4.2.2 Regime**

Since the late 1990s, the TV market in South Korea has become a mature market. Further, although Korean TV content, such as Korean dramas, has become popular in international mar-



kets(Chua and Iwabuchi, 2008, Shim, 2006), the increasing production costs of these programmes require higher profitability. In the early 2000s, the cable TV market also became limited. Here it is important to see the profits or sales figures for Korean public TV in terms of the sales of Korean drama to other broadcasting outlets, such as cable TV. Initially, the public TV companies tried to provide their content to users via their own websites. However, this method proved unattractive to users for two main reasons. First, users needed to register on the websites to use them. Second, the TV websites only provided content for which public TV had a licence, and therefore the service provided was limited.

If content providers or TV companies were able to expand their range of TV programmes to include content from other broadcasting networks, the content-creating companies could expect more income without any additional production costs. This is the merit of having a large TV content-creating market. Also, if the content provider can expand the broadcasting platforms, the company can increase its advertisement income, such as in the case of PPL. With Korea's high number of Internet users and customers of broadband services, Korean public TV companies started to get interested in the online broadcasting market.

### **4.2.3 Landscape**

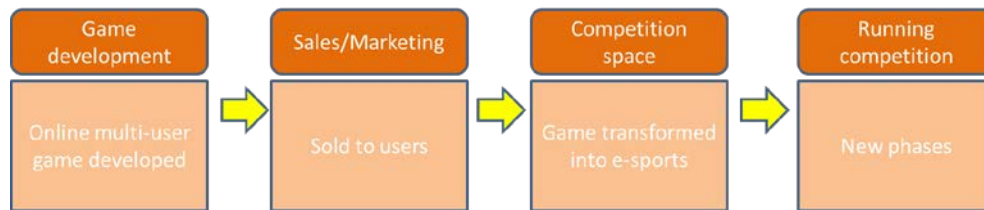
There are two main reasons behind online broadcasting market growth: the increasing demand of the Korean public for video content via PCs, such as news, TV dramas, and sports; and the successful evolution of the Korean broadcasting industry during the last two decades.

In South Korea, these developments may be called market demand innovation or consumers' demand innovation. The Korean public enjoy watching video contents via PCs, and mobile phones, partly due to the prevalence of high-speed broadband and to the high PC and smart phone penetration rate in Korea. Also, this phenomenon was indirectly brought about by the growth in the TV production industry in South Korea(Peichi, 2008). Since the early 1990s, Korean TV production firms have created huge successes with TV drama series in Korean sold to other parts of the world(Jin, 2006). Also, the extensive popularity of Korean pop music and music dramas has led to high investment in the broadcasting industry(Peichi, 2008). Therefore, over the past two decades, due to the huge popularity of Korean dramas and music and the government's supports, Korean broadcasting companies have had opportunities to create high-quality products in a short space of time(Jin, 2006). These are the complex phenomena created by the increasing production capability and the demand for market growth. However, high-quality production and casting for A-list actors leads to high investment, and this initial investment needs to find market diversification.

## **4.3 Industry Convergence via the Hidden Catalyst**

### **Growing demand for a new market breakthrough**

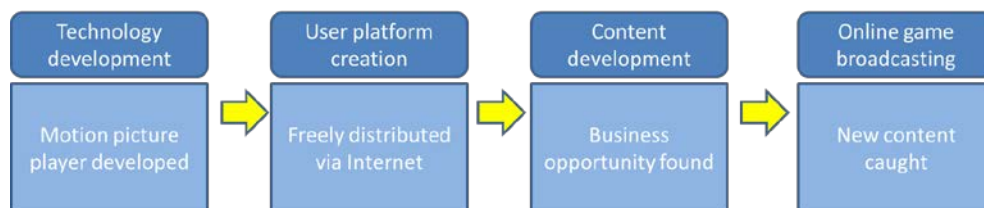
The development of the MMOG business can be understood in four steps (see Figure 2). Amidst changes in technology, social phenomena, the market, and the role of the government, the business of MMOG has also evolved. Initially, the business concentrated on developing new types of MMOG. However, MMOG firms soon recognised the importance of marketing: the advent of esports in Korean inspired MMOG companies in terms of new business opportunities and marketing chances. Later, MMOG companies actively started participating in running MMOG competition events.



**Figure 2: MMOG Business Development**

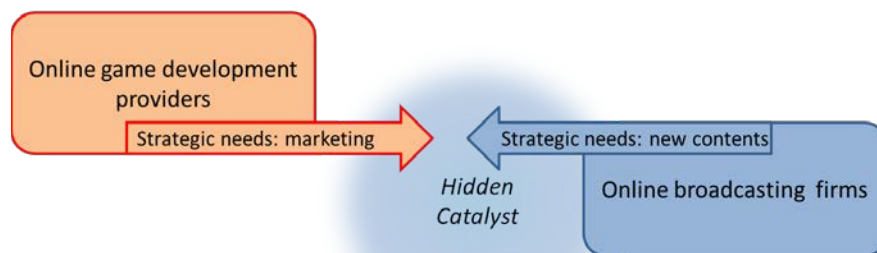
**Growing demand for contents**

The development of online broadcasting business is interpreted as four steps (see Figure 3). In technology, online broadcasting websites and free motion players competed to attract many viewers. GOM-Player, one of the free download programmes became popular among the online broadcasting market and PC users. As most online broadcasting companies struggled to get content resources from TV broadcasting firms and film productions, online firms started to seek other types of content to meet viewer’s demands. Online broadcasting firms started not only to provide MMOG competitions to viewers, but also, the online broadcasting companies began to invest and create the production of MMOG competitions.



**Figure 3: Online Broadcasting Business Development**

As the MMOG industry and the online broadcasting industry become mature respectively, two industries demand higher new breakthrough to expand their industry market. As shown in Figure 4, due to that two industries were close in industry natures, these two industries could create a positive friction which can lead to hidden catalysts.



**Figure 4. Positive Frictions between the MMOG Industry and the Online Broadcasting Industry**

#### **4.3.1 Hidden Catalyst in the Transition**

Both the MMOG industry and the online broadcasting industry in South Korea have become mature markets. Furthermore, in the late 2000s technological innovation has decreased over time, leading to market saturation and increased investment in R&D. In addition, government regulation of these industries has become tighter. In response to these pressures from technology, market and regulation, the MMOG industry and online broadcasting industry both needed to find a breakthrough to expand their markets.

In the meantime, when pressure increased on the two industries, GreTech, one of the Internet service firms, created a starting point for industry convergence between the MMOG industry and the online broadcasting industry. GreTech started its business with file saving and downloading services on the Internet. In an effort to provide a better service for its users, the Korean Internet company developed its own free, downloadable video playing programme called GOM Player in 2003, which, as mentioned above, became very popular in Korea in a short period of time. With the success of the GOM Player programme, in 2004 GreTech transformed its business model from mainly a free file transaction service to online broadcasting services.

However, although the Korean Internet company has an increasingly large number of users for its video playing programme, GreTech struggled to obtain broadcasting content. In the early 2000s – the initial stage of the online broadcasting industry in South Korea – major public TV broadcasting companies were reluctant to license their copyrights to Korean internet online broadcasting firms including GreTech due to a low level of trust between most Korean public TV broadcasting firms and the internet media companies. In South Korea, for GreTech and other online broadcasting firms, providing services with a movie contents are much more profitable than providing public TV services. However, in order to attract movie viewers, it is necessary to provide public TV content. That is why the outcome of deals providing legitimate public TV contents affects the very existence and viability of online broadcasting companies. Furthermore, the Korean public broadcasting firms wished to create their own internet broadcasting markets in order to control the business and to gain a higher margin of the profit.

In attempting to deal with Korean public TV service stations, GreTech saw a new business opportunity from the MMOG phenomenon. GOM Player users wanted to see MMOG broadcasts in which professional MMOG were participating. Until in 2004, a small number of cable-TV companies provided MMOG only to cable TV viewers in South Korea. At the time, thanks to the popularity of the MMOG programme ‘StarCraft’ among the Korean public, there was increasing demands for the broadcasting of MMOG competitions. However, access to the Cable-TV programmes for MMOG was restricted to game users who had cable-TV licenses. This presented a problem since Korean online-gaming fans and clients wanted to watch MMOG content via computers without any restrictions on accessing the games.

Along with the requests of viewers, there were increasing demands from MMOG companies for the wider broadcasting of gaming contents. By allowing internet broadcasting of their gaming competitions, MMOG companies were able to put this opportunity to practical use: first, to meet the requests from game users; and, second, to advertise their MMOG products. Increasingly, MMOG users wanted to see real-time MMOG competitions played between professionals. Also, as the MMOG industry became more competitive, the gaming firms needed to invest their efforts and money into marketing. For these reason, broadcasting game competitions via the internet benefitted both the game users and the initial game creators.

### 4.3.2 Technology Capability of Hidden Catalysts

In South Korea, computer users wanted to open files while they were still downloading, and GOM Player enables users to open any file they wish to even if the files are damaged. For video files, different files need various codecs. ‘Codecs’ refer to computer programmes’ coders and decoders which help to open video files for PC users. While Windows Media Player failed to provide codecs, GOM Player offered the various codecs for all its different video files so that its customers could easily open the video files. In terms of technology, the quality of broadband in South Korea positively affected the online broadcasting industry. High speed broadband has been established from the initial stages of the Korean IT industries, and this broadband created a unique wireless Internet environment. With these technological advantages, Korean small enterprises were in a strong business position in terms of online broadcasting MMOG and other content across the world in the middle of the industry’s transition from MMOG providers to online broadcasting firms.

### 4.3.3 Managerial factors in the role of hidden catalysts

In order to explore the roles of the *hidden catalyst*, the complex process of transition needs to be explored in detail. The transition can be divided into four phases: ‘the emerging conflict phase’, ‘the battle for dominance phase’, ‘the temporary monopoly phase’, and ‘the new dominance emergence phase’ according to conceptual discussion of hidden catalysts and market share (see Table 1).

Phase	Conceptual-level discussion	Market-level discussion
Emerging Conflict Phase	<i>Hidden catalyst</i> causes unintended conflicts.	<b>New business opportunity and its benefits are detected.</b> New interest groups emerge (into the market).
Battle for Dominance Phase	Various conflicts and many solutions co-exist.	<b>Conflict becomes grave and severe. Many solutions are suggested.</b> Power games take place among various existing participants and the new interest group.
Temporary Monopoly Phase	Tentative solution prevails over the main conflict.	<b>Interest groups agree on one tentative solution.</b> Power games decrease.
New Dominance Emergence Phase	The tentative solution is agreed and becomes the social norm.	<b>The tentative solution becomes the norm.</b> The general public accepts the norm as a generic rule.

**Table 1. Understanding Industrial Transition**

#### **4.3.2.1 Emerging Conflicts Phase**

Phase one refers to the phase during which *the hidden catalyst*, GreTech as a hidden catalyst, started online broadcasting services among competitions. In particular, GreTech's exclusive broadcasting of the online StarCraft competition sparked existing cable-TV companies' and other online broadcasting companies' opposition. The GomTV Classic was the StarCraft game league officially supported by Blizzard Entertainment Mass Media from GomTV Star Invitation-al in 2008 to TG Sambo-Intel Classics season one, season two and season three. As such new business opportunities emerged, existing cable-TV, MBC Game and other online broadcasting companies, the Korean e-sports association, and MMOG players formed a new interest group separate from GreTech.

#### **4.3.2.2 Battles for Dominance Phase**

Phase two is the phase during which e-sport became an established sport in South Korea and the online broadcasting market for the MMOG industry increased in size. Also, the conflict between the original MMOG producer, in the case of StarCraft Blizzard Entertainment Mass Media, and the other existing cable-TV and online broadcasting companies became more serious. In particular, there were many legal arguments over whether MMOG producers had the intellectual property rights for the second type of their MMOG product, including MMOG broadcasting rights. Apart from GreTech, other online broadcasting firms insisted that Blizzard Entertainment Mass Media had no legal right to broadcast the StarCraft competition all over the world because the final users were not online broadcasting companies, but MMOG gamers. Amidst this conflict, online broadcasting companies attempted to achieve a better position in terms of legal issues. Newspapers in South Korea dealt with this conflict and possible solutions between international game producers and Korean online broadcasting firms and cable TV companies. In this phase, different online broadcasting arrangements for MMOG co-existed: broadcasting under an agreement with the game producers; broadcasting without the agreement of the game producers; and broadcasting with the provisional approval of the game producers.

#### **4.3.2.3 Temporary Monopoly Phase**

For phase three, Blizzard Entertainment Mass Media and GreTech maintained a strategic partnership for online broadcasting of StarCraft. As this business relationship strengthened and more members of the public followed the game league supported by the MMOG producers, Blizzard Entertainment Mass Media, other interest groups, such as other online broadcasting firms and the Korean e-sports association, recognised the necessity of having a good working relationship with the original gaming firm. Meanwhile, GreTech established and maintained the sole exclusive online broadcasting business position for StarCraft gaming.

#### **4.3.2.4 New Dominance Emergence Phase**

In phase four, most online broadcasting firms ran a gaming competition with the agreement of the original game producer, the game's legal right holder. Also, there was a tendency for GreTech to co-operate with other online broadcasting firms. Furthermore, GreTech, other MMOG firms, the Korean e-sport association and other MMOG producers recognised the higher value coming from the collaboration and from accepting other parties as business partners. As this form of collaboration and better value creation attracted more viewers and gamers, the tentative solution became agreed and ultimately became the social norm regarding convergence between MMOG industry and online broadcasting industry.

## 5. Implications and Discussion

As two Internet industries become mature in terms of their technology and their markets, these industries tend to look for a new breakthrough in order to expand their markets. Under such pressure, if two industries are close enough to interact and create new value and benefits for each industry, the two industries have a tendency – in part at least – to merge, or to share their markets. Moreover, there are often *hidden catalysts* for such industry convergence. The type of industry convergence discussed in this article should be categorised as convergence which creates market integration by a *hidden catalyst*. The *hidden catalyst* in this case comes from one of the firms in one of the two industries. In contrast to other cases where *hidden catalysts* have perished in the middle of industry convergence, GreTech not only took initiatives in industry convergence as a hidden catalyst, but also led the changed market as one of the key players.

In mass communication or journalism theory, online broadcasting is the new way of delivering content, far beyond what is possible in newspapers, on cable television channels, and on DVD players. Like CompuServe, which delivers its content only to subscribers, or so-called ‘special-interest groups (SIGs)’ (Severin and Tankard, 1988), this form of online broadcasting also creates exclusive SIGs. In particular, in the case of the Gom Player, MMOG viewers are SIGs, and the Gom Player SIGs have a unique position in terms of journalism and communication theory. The unique qualities of SIGs have affected the evolution of the Gom Player business as a form of online broadcasting.

From the perspective of business, to succeed in triggering and leading industrial convergence, the *hidden catalyst* needs an environment featuring various innovative capabilities: technological capabilities which can lead to industrial convergence; in-depth understanding of industrial convergence and the nature of two different industries; and strong leadership. In particular, in a rapidly changing business environment, such as the Internet, policy makers and business people need to develop these innovation capabilities in order to take the advantage of *hidden catalysts*.

In terms of methodology, we applied the modified multi-level socio-technical model by focusing on the behaviour patterns of the *hidden catalyst* in order to understand industry convergence processes. In our research we confirmed that, while the multi-level socio-technical model is helpful in exploring the longitudinal change of one phenomenon, the model is also a meaningful framework with which to identify the *hidden catalyst* triggering industry convergence, and within which to undertake research on industry convergence across a period of time. The business model and technological capability of GreTech created an opportunity which increased the possibility of combining two industries. This understanding of the role of the *hidden catalyst* in bringing together two industries leads to a wider, holistic and deeper picture for users. Throughout our analysis, we found that industrial integration (or at least partial integration) was triggered by the complexity of increasing change in two industries, and the hidden role of a company in one of these industries. Further, the innovation of the company triggering the industrial change cannot always be attributed to technology: creating a new business model can also be critical.

## 6. Closing Remarks

This paper has explored the process of industry convergence between two Internet businesses in South Korea and identified the roles and activities of a *hidden catalyst*. In contrast to the slow process of convergence in traditional manufacturing industry, the speed of convergence between

the MMOG industry and online broadcasting was fast. Because the convergence happened so much more rapidly than it would have done in traditional industry, the emerging and developing role of the hidden catalyst was largely obscured. However, the attempt to interpret the *hidden catalyst* leads to a better understanding of industrial convergence. Also, it provides various insights for business and government policy. Firstly, companies facing industry convergence need to prepare themselves not only in terms of technology and marketing, but also in terms of dealing with conflict during the convergence. Secondly, government should be able to manage social and business conflict during industry convergence. Thirdly, in terms of research methodology, this paper has successfully showed that the *modified* multi-level socio-technical framework is a useful research framework for exploring industry convergence and, furthermore, for identifying the activities of a *hidden catalyst*.

In the future, we would like to explore cases of other *hidden catalysts* in a range of industry convergences. By doing so, we believe that we can identify the generic role of *hidden catalysts* within different industry settings and trace the operating patterns of *hidden catalysts*. Also, by tracing the long-term industry convergence processes which take place after the initial convergence process, we would like to explore the changes brought about by the *hidden catalysts* over a longer time period.

## Reference

- ABERNATHY, W. J. & UTTERBACK, J. M. 1978. Patterns of innovation in industry *Technology Review*, 80, 40-47.
- AFUAH, A. & TUCCI, C. L. 2000. *Internet Business Models and Strategies: Text and Cases*, McGraw-Hill Higher Education.
- ANDERSON, P. & TUSHMAN, M. L. 1990. Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change. *Administrative Science Quarterly*, 35, 604-633.
- ARORA, A., ARUNACHALAM, V. S., ASUNDI, J. & FERNANDES, R. 2001. The Indian software services industry. *Research Policy*, 30, 1267-1287.
- AUDRETSCH, D. B. 1995. *Innovation and Industry Evolution*, MIT Press.
- CHOUDRIE, J. & LEE, H. 2004. Broadband development in South Korea: institutional and cultural factors. *European Journal of Information Systems*, 13, 103-114.
- CHUA, B. H. & IWABUCHI, K. 2008. *East Asian pop culture: Analysing the Korean wave*, Hong Kong University Press.
- FOSTER, R. N. 1986. The attacker's advantage. *New York*.
- FROUENFELDER, M. 2005 *The Computer: A History*
- GEELS, F. W. 2004. From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research policy*, 33, 897-920.
- HENDERSON, R. M. & CLARK, K. B. 1990. Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly*, 35, 9-30.
- HOFFMAN, A. J. 1999. Institutional Evolution and Change: Environmentalism and the U.S. Chemical Industry. *Academy of Management Journal*, 42, 351-371.
- HUHH, J.-S. 2008. Culture and Business of PC Bangs in Korea. *Games and Culture*, 3, 26-37.

- HUTCHINS, B. 2008. Signs of meta-change in second modernity: the growth of e-sport and the World Cyber Games. *New Media & Society*, 10, 851-869.
- JACOBIDES, M. G. 2005. Industry Change through Vertical Disintegration: How and Why Markets Emerged in Mortgage Banking. *The Academy of Management Journal*, 48, 465-498.
- JAYARATNE, J. & STRAHAN, P. E. 1998. Entry restrictions, industry evolution, and dynamic efficiency: Evidence from commercial banking. *JL & Econ.*, 41, 239.
- JIN, D. Y. 2006. Cultural politics in Korea's contemporary films under neoliberal globalization. *Media, Culture & Society*, 28, 5-23.
- JIN, D. Y. & CHEE, F. 2008. Age of New Media Empires: A Critical Interpretation of the Korean Online Game Industry. *Games and Culture*, 3, 38-58.
- KENT, M. 2008. Massive Multi-player Online Games and the Developing Political Economy of Cyberspace. *Fast Capitalism*, 4.
- KLEPPER, S. 1997. Industry Life Cycles. *Industrial and Corporate Change*, 6, 145-182.
- KLEPPER, S. & GRADDY, E. 1990. The evolution of new industries and the determinants of market structure. *The RAND Journal of Economics*, 27-44.
- KRÄTKE, S. 2002. Network Analysis of Production Clusters: The Potsdam/Babelsberg Film Industry as an Example. *European Planning Studies*, 10, 27-54.
- LAMBSON, V. E. 1991. Industry evolution with sunk costs and uncertain market conditions. *International Journal of Industrial Organization*, 9, 171-196.
- LUNDEVALL, B. Å. 2007. National Innovation Systems—Analytical Concept and Development Tool. *Industry and Innovation*, 14, 95-119.
- LYNN, L. H., MOHAN REDDY, N. & ARAM, J. D. 1996. Linking technology and institutions: the innovation community framework. *Research policy*, 25, 91-106.
- MALERBA, F., NELSON, R., ORSENIGO, L. & WINTER, S. 1999. 'History-friendly' models of industry evolution: the computer industry. *Industrial and Corporate Change*, 8, 3-40.
- MEADOWS, D. H. 1999. Leverage points, Places to Intervene in a System. Hartland, Vermont, USA:: The Sustainability Institute.
- MEADOWS, D. H. 2008. *Thinking in systems: A primer*, Chelsea Green Publishing.
- PATIBANDLA, M. & PETERSEN, B. 2002. Role of Transnational Corporations in the Evolution of a High-Tech Industry: The Case of India's Software Industry. *World Development*, 30, 1561-1577.
- PEICHI, C. 2008. New Media for Social Change: Globalisation and the Online Gaming Industries of South Korea and Singapore. *Science Technology & Society*, 13, 303-323.
- REDDY, N. M., ARAM, J. D. & LYNN, L. H. 1991. The institutional domain of technology diffusion. *Journal of Product Innovation Management*, 8, 295-304.
- SEVERIN, W. J. & TANKARD, J. W. 1988. Introduction. In: SEVERIN, W. J. & TANKARD, J. W. (eds.) *Communication theories: Origins, methods, uses*. Second ed. N.Y. : Longman New York.
- SHIM, D. 2006. Hybridity and the rise of Korean popular culture in Asia. *Media, Culture & Society*, 28, 25-44.
- SMITH, D. A. & WHITE, D. R. 1992. Structure and Dynamics of the Global Economy: Network Analysis of International Trade 1965–1980. *Social Forces*, 70, 857-893.
- STIEGLITZ, N. 2003. Digital dynamics and types of industry convergence: the evolution of the handheld computers market. *The industrial dynamics of the new digital economy*, 179-208.



- SUAREZ, F. F. 2004. Battles for technological dominance: an integrative framework. *Research Policy*, 33, 271-286.
- SWATMAN, P. M., KRUEGER, C. & VAN DER BEEK, K. 2006. The changing digital content landscape: An evaluation of e-business model development in European online news and music. *Internet Research*, 16, 53-80.
- TAYLOR, T. 2012. *Raising the Stakes: E-sports and the Professionalization of Computer Gaming*, MIT Press.
- TAYLOR, T. L. 2006. *Play Between Worlds : Exploring Online Game Culture*, {The MIT Press}.
- UTTERBACK, J. M. & ABERNATHY, W. J. 1975. A dynamic model of process and product innovation. *Omega*, 3, 639-656.
- UTTERBACK, J. M. & SUAREZ, F. F. 1993. Innovation, competition, and industry structure. *Research policy*, 22, 1-21.
- UTTERBACK, J. M. & SUÁREZ, F. F. 1993. Innovation, competition, and industry structure. *Research Policy*, 22, 1-21.
- VAN DE VEN, A. H. 1993. A community perspective on the emergence of innovations. *Journal of Engineering and Technology Management*, 10, 23-51.
- VAN DE VEN, A. H. & GARUD, R. 1987. *A framework for understanding the emergence of new industries*, Strategic Management Research Center, University of Minnesota.