Critical success factors for IPTV growth: a case study approach

Yongkee Jeong [1, *], Sungbum Kim [2]

[1]Senior Manager of Technology Strategy Team, Korea Telecom Advanced Institute of Technology, Seoul, Korea
[2]Faculty of Department IT convergence, Kumoh National Institute of Technology, Gumi, Gyeongbuk, Korea

A R T I C L E I N F O

A B S T R A C T

This research stemmed from the question of what platform strategy must be implemented in order for a company to continuously grow in a rapidly changing, converging environment and put forth a direction for the materialization of an open platform strategy in the field of Internet Protocol Television (IPTV) service industry. This article decomposes the IPTV business environment into understandable elements in view of the service platform and identifies the characteristics of IPTV technology that could be used to sustain new businesses and accelerate the commercialization of the IPTV business. This research only addressed cases of IPTV service companies and the open platform strategy. To realize the Open IPTV strategy, the following should be satisfied: price, quality of service, quality and diversity of content, technology and infrastructure, organizational culture with an open perspective, and the symbiotic relationship between partners.

1. Introduction

The high speed Internet market, wireless and wired communications market, has become overcrowded, shifting telecommunications companies' attention to Internet Protocol television (IPTV) services (Abdollahpouri and Wolfinger, 2012), under the new mottos of "innovation" and "sustained growth". This shift has resulted in a constant increase in users of IPTV services. The IPTV market has shown incredible expansion rate. However, its growth is losing its explosiveness and has turned to gradual growth rate. The IPTV market is facing difficulties. The inherent difficulty in obtaining marketable content and the delay in the spread of full-duplex services has slowed the spread of IPTV. Moreover, the arrival of Cable and Smart TVs has created a competitive market environment (Kang et al., 2014). In response, IPTV businesses have rejected their previous strategy of engaging in a power struggle with the TV businesses and have elected to provide differentiated services to customers (Azgin et al., 2012). Communications companies have benchmarked the success of Apple's App Store in the wireless communications market (Angotra et al., 2010) and are starting to take an interest in Open IPTV as a strategy for obtaining open source content (Azgin et al., 2012; Baltoglou et al., 2012; Chang, 2013). Open IPTV allows viewers to create and sell TV applications (apps) (Yim and Lee,

2013; Ketmaneechairat, 2012) or content such as that on the App Store for smartphones. The popularization of Open IPTV will allow companies to obtain more content and simultaneously decrease expenditures for purchasing content. Therefore, studying the various service platforms related to Open IPTV (Kang et al., 2014) and extracting the characteristics that led to their success and the implementation methods when establishing strategies for business will be meaningful. In the future, we expect to witness numerous platform businesses such as Android and Apple's operating system (OS) which must work with third -party providers as open systems. This requirement highlights the need for a feasible analytical framework that can identify IPTV business environments and methods to accelerate sustainable growth of IPTV.

The objective of this article is to understand the relationships among different concepts and factors in the Open IPTV business environment and to determine the key success factors for the sustainable growth of IPTV. Therefore, studying the definition of platforms—in particular the service platform for understanding open IPTV —will be meaningful.

First, this article decomposes the IPTV business environment into understandable elements in view of service platforms and identifies IPTV's technology characteristics that could be used to sustain new businesses and accelerate the commercialization of the IPTV business (Lemola, 2002; Rothwell and Dodgson, 1992; Windrum and García-Goñi, 2008). Second, this article analyzes the IPTV industry from

* Corresponding Author.
Email Address: it89@kumoh.ac.kr

the perspective of value chain and fundamental competitive forces because some differences may exit in the strategic view given the characteristics of the industry. Third, this article analyzes the current status and future strategy of the players related to the IPTV business as case studies. In this study, the characteristics and success factors of global company's Open service platform will be discussed (Molnik, 2008). Lastly, this study derives the success factors of the IPTV sustainable growth from the service platform, provider, and end-user perspectives and puts forth a strategic direction for the IPTV open service platform (Kim and Lee, 2013; Margaritis and Grosskopf, 2007).

2. Literature review

2.1. IPTV Introduction

IPTV is defined by legislation, under "Internet Multimedia Broadcast" as "full duplex broadcasting that uses a broadband convergence information communication network that insures a constant service quality and provides users content like real-time broadcast programs and data (video, audio, voice), and allows electronic transactions" (Internet Multimedia Broadcasting Business Law). The IPTV camp is allocating all of its effort to provide various extra and Internet-friendly services, expanding the set-top box's functions, creating an IPTV-specific application store, and simultaneously expanding wireless-based IPTV, such as mobile IPTV, to create new value added.

The IPTV service is expected to evolve from the bundling stage (pro-combination products), to the contents and application diversification stage, to the "Communication TV", "Community TV", and "Personal TV" stages. The IPTV associated with communications is "Communication TV", whereas "Community TV" is IPTV combined with components of Web 2.0 allowing users to participate interactively (Santana et al., 2010). "Personal TV" involves the user downloading widgets developed by a third party to the set-top box, personalizing the full-duplex service system, and supplying user content through the broadcast channel, making it possible to personalize the service (Song et al., 2012).

2.2. Platform

"Platform" has several definitions. From a business perspective, platform refers to the collection of components or methods that minimize cost and time through efficient production and purchasing and that allows new technology, goods or services to be released to the market. Therefore, a platform may be regarded as a simplified concept that consists of inter-company subsystems and interfaces (Kim, 2008). Such platforms provide the basis for a communal platform that allows for the effective development of various products, services, and the business, thereby providing a base from

which the company can expand into new fields. A platform can consist of anything from a competitive product to technology, a service, or a design that affects the product.

From an Internet Technology (IT) perspective, platform refers to the sum of the interfaces produced on a horizontal layer for the development of a solution. Platforms have a significant influence through the "Interface Policy" that allows the formation of a platform-based environment. In addition, a platform may be defined as the base for the manufacture and development of supplementary products and services with common application elements as its background. A platform is, in essence, a general concept that includes not only the products themselves but also the components that comprise the products and the services or software that allows connection to other services.

The product platform concept became the core of the innovation process. Such an approach made a significant impact on not only product development, but also the electronic innovation process that includes the relationship between suppliers and consumers. In particular, adopting a platform-oriented perspective has come to be associated with platform flexibility among products, standardization and cost savings through buying resources in bulk, and an increase in productivity under a large-scale manufacturing system, which allows the implementation of economies of scale and a competitive edge in globalization. Meanwhile, Meyer and Marc et al. (2001), who defined the product platform as the obvious solution to introducing new technology into the market and simultaneously reducing costs through efficient manufacturing and purchasing, conducted their research from a business perspective (Marc et al., 2001). In particular, they commented that the growth of HP, IBM, USN, and Cisco is attributed to the platform strategy and explained how to best use platform strategies and how to partner specific structures and technologies.

Mohanbir (1998) took a marketing perspective and suggested that marketers need to adopt a platform perspective to achieve significant diversity and growth without an increase in product prices or complexity. In other words the company needs to adopt the platform perspective for its most popular product, target marketing, brand, area of business and process to yield positive results in speed, production costs, design quality, coherence, relevance, and option values (Mohanbir, 1998).

The service platform for IPTV businesses will consist of the hardware and software (Björkqvist and Virtanen, 2006) necessary to provide multimedia services through the IP network, the multimedia content, and the production and distribution interface (Xin et al., 2014; Yu et al., 2012). The social network service (SNS) platform will consist of the hardware and software needed to run the SNS programs, and interface. Conventional methods for studying platform strategies started

from the concepts related to the development of new products and services.

2.3. Software platform

To achieve standardization of product parts and technology, moving from a hardware-based platform to a software-oriented platform such as "web platforms", "service platforms", or "software platforms" is necessary. The interest in the software platform has increased as the importance of computing power has begun to carry more weight even in the rapidly expanding mobile market (Simmhan et al., 2013). The establishment of a service platform will attract users. On top of that, new applications will be developed, the most popular of which will spread through the user groundwork, and the collection of these services creates significant added-value. In "invisible engines" the importance and power of software platforms are explained given their ability to create significant

added value and their application to various industries for various purposes. A software platform provides services for both the application developer and the platform user and creates value that supports multi-side business, enabling different groups of customers within a platform to interact. In addition, the flexibility of source codes creates an environment that is open to a software platform's entrance or its introduction into new industries (Kim, 2006).

The importance of platforms can be found in what are considered the most notable success cases that dominate the platform found in computer industry cases (Xin et al., 2014) such as Intel, Microsoft and Apple (Table 1). Platform businesses can create an ecosystem centered on the company by providing a service platform, dominating the industry, and creating significant value added (De Pauw et al., 2011).

Table 1: Global IT corporations' platform competition status

Type	Company	Platform Competition Status
Game	Microsoft	Xbox Games, IPTV, Multimedia Service
	Sony	PS3 Games, Entertainment Contents Service
Mobile	Google	Linux, Android base mobile phone
	Nokia	Symbian open, OVI service
	Microsoft	Windows Mobile 7
	Apple	Mac OS X
	LiMo foundation	Linux based LiMO platform
	Intel	MeeGo OS base mobile phone with Nokia
Software	Microsoft	NET
	Sun(Oracle)	JAVA
Smart TV	Google	Android+ Crome OS base
	Apple	Mac OS base

2.4. Open IPTV

At the moment, the Korea domestic market is passing through the bundling and application diversification stage in which consumers can only use the content and applications supplied by IPTV businesses. The factor that will create a competitive advantage for a company is not the price of the packages but the amount of content available for use. However when the market enters the personal TV stage, in which TV is combined with Web 2.0, the most important factor for obtaining a competitive advantage is establishing a related ecosystem. In this stage, IPTV companies will have difficulty providing a sufficient supply of content on their own. Therefore these companies must establish an ecosystem that allows for various contents and for application developers and players to form a service development and distribution cycle. The IPTV evolution does not have to occur in order; each step can occur simultaneously or one step may precede the other. In addition, acquiring quality content must occur in all stages of the evolution of IPTV.

By definition Open IPTV is an IPTV service managed in an "open" manner. Players transformed their IPTV into an open type of participatory media to reborn as a competitive broadcast medium in an

era in which broadcast and Internet have fused together and opened such a platform. End users and developers can participate in the production of content and applications, allowing these products to be freely traded in this open type of ecosystem.

Open IPTV may be confused with the web-based Open IPTV because it also opens up the network to provide IPTV services. For these reasons, the Open IPTV service provided by communications businesses is referred to as Open-type IPTV. The Open-type IPTV put forth by players is indicated in Fig. 1. According to the concept definition, "open-type" refers to allowing non-specified platform provider (PP), content provider (CP), individuals, and developers to provide IPTV services. To achieve this goal, making an application programming interface (API) public and providing software development kit (SDK) are required in the service strategy.

From a service perspective, an open-type IPTV's service can be considered to consist of Channel Open, VOD Open, TV App Store, Open-type CUG, SNS, and Open Commerce. First, Channel Open opens the channel to the content supplier, thus allowing reception of IPTV without being sorted. Through VOD Open when content is registered on QOOK TV (the Korea Telecom IPTV brand), the consumer can

receive on demand services (Meng et al., 2013). In theory, Channel Open is similar to iTunes Radio or TV, and VOD Open is similar to the Podcast feature in iTunes. TV App Store, Open-type CUG, SNS, and Open Commerce are viewed as equivalent to the Apple App Store or the PC-based CUG, SNS, and electronic commerce on a TV platform (Park et al., 2013).
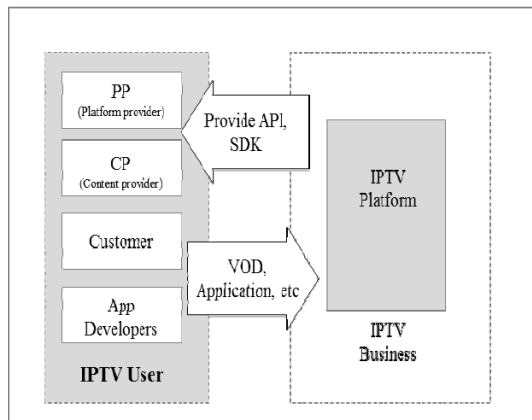

Fig. 1: Open Type IPTV

From the consumer perspective, the entire system will appear similar to iTunes on an Internet-connected PC with a large TV monitor. Given their fundamental similarities, the argument can be made as to whether the system is a PC with a TV monitor or a TV with computer functions. From a service functionality viewpoint, Open-type IPTV can be seen as an attempt to replicate content and the application procurement system in a PC service in the TV service market. Despite the service paradigm similarities to a PC with a TV monitor, Open-type IPTV differs in its operation or service make up, particularly in terms of the user interface, service operation, monitor makeup, content resolution, and content characteristics.

3. Materials and methods

This research will begin with examining various service platform open strategy models starting from basic textbook research of overseas companies' documents and records. We will use case studies of global companies to find open service platform initiation strategies and related components. The deduced factors will be verified by experts in interviews. Through basic textbook research, case studies, and expert interviews, we will deduce the key success factors for sustainable IPTV growth.

4. Result

4.1. Industry characteristics

The value chain is a concept from business management that was first described and popularized by Michael Porter. A value chain is a chain of activities. Products pass through all activities of the chain in order and at each activity. At each stage, the product gains some value. Because

this tool provides us each effect factor, we first use this tool for analysis. In particular, Fig. 2 shows the end-users effect as one effect factor.
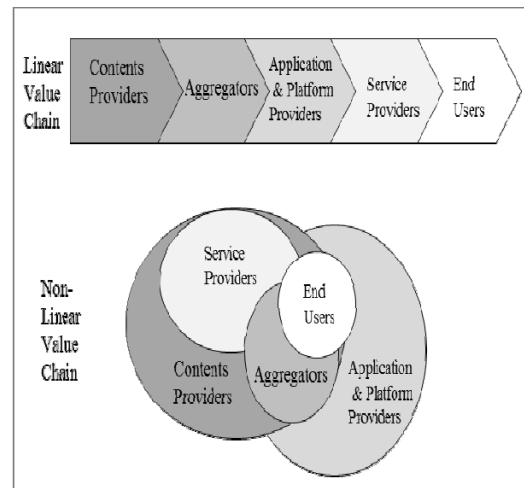

Fig. 2: Value chain of IPTV

Moreover, aggregators smoothly connect each effect factor. In a linear value chain, the players effect moves in order from content providers to end users. However, in a non-linear value chain, everyone expands each other and aggregators provide communication with everyone. In the era of Media 2.0, end users are affected by everyone.

After we analyze the value chain, we need to understand the attractiveness of the industry's structure. Therefore, we used Porter's five competitive forces and specific competitor's analysis. Porter's five forces model is an outside-in business unit strategy tool used to analyze the attractiveness of an industry structure. The competitive forces analysis is done by identifying the five fundamental competitive forces. We see that rivalry and substitutes are very strong factors. Therefore, we need to analyze trend and competitors' graph and their substitutes' subscriber (Table 2).

Table 3 indicates the subscribers to digital cable TV (DCATV) and IPTV in the two-year span from 2009. The number of DCATV subscribers is higher than the number of IPTV subscribers. However, the number of IPTV subscribers is increasing and is now nearing the number of subscribers to the DCATV subscribers. In the Korean IPTV market, we also see that KT's Qook holds a 56% market share, SK Broadband holds 23%, and myLGTV holds 21%.

4.2. Case Study

4.2.1. France FT: Orange TV

France Telecom (FT) launched the "Orange TV" IPTV in 2007 and the Orange Satellite TV in August 2008 in areas lacking broadband cable. In the initial stages, Orange TV experienced difficulties and FT offered free IPTV services and cable and satellite TV's. The highlight of these difficulties is that ADSL2+ covered all of France. FT successfully differentiated Orange TV from a simple broadcasting service and positioned it as a "3 Screen Strategy"

connecting PCs, TVs and mobile phones. The popularization of the three-screen strategy "content everywhere" was facilitated because Orange TV already had an independently developed premium

channel. At present, Orange TV has developed Orange Cinemax, Orange Cinegeants, Orange Cinechoc, Orange Cinehappy, and Orange Cinenovo as its monopolized channels.

Table 2: Porter's 5 competitive force of IPTV

Classification	Competitiveness	Explanation
Supplier	Getting stronger	Contents Provider (KBS, MBC, etc.) is getting stronger. Because Contents become more important
Entry	Low	Relatively high entry barrier in the market law regulation- Large Enterprise Network infra is needed
Rivalry	Very Strong	KT, SK Broadband, LG Powercom are major enterprise in Korean, especially Telecommunication Chicken game
Substitute	Strong	Digital Cable TV has many subscribers they are looked in contract

Table 3: Subscribers of digital cable & IPTV

Date	IPTV	Digital Cable	SK Broad & TV	KT QOOK TV	myLGTV
2009.1	1,567,719	1,970,062	775,446	712,131	80,142
2009.2	1,552,308	2,048,805	766,711	691,009	94,588
2009.3	1,560,767	2,109,644	756,092	694,315	110,960
2009.4	1,587,436	2,172,012	746,663	709,778	130,995
2009.5	1,616,090	2,245,304	747,151	712,245	156,695
2009.6	1,687,230	2,318,121	774,980	723,961	188,289
2010.9	2,476,000	3,330,000	601,000	1,346,000	529,000
2011.1	3,179,564	3,400,000	734,656	1,805,781	639,127
			(23%)	(56%)	(21%)

The two premium TV channels, Orange Cinema Series and Orange Sport have on-demand services incorporated as part of Orange TV's the core strategy of "Contents Everywhere". Subscribers for the two premium TV channels can watch live broadcasts on PCs and mobile phones. They can select VOD and watch a show at any time and can browse through the content catalogue. The core of Orange—Orange Cinema and Orange Sport—contributes to the increasing the number of users of Orange TV. Orange TV is pursuing a second "new contents everywhere" strategy aimed at the expanding a diverse range of content and services as the web enters the TV. Orange announced that it plans to open a TV App Store and is aiming to develop a platform that allows the use and sharing of not just those involved in the three-screen strategy but of all its content. To

achieve such a platform, FT announced in 2009 a TV App Store for IPTV and added that third-party developers can supply various content by developing software and opening APIs. In the spring of 2009, FT announced at its Partner Camp its official stance on the development of the TV App Store and the "TV Application shop for Open Set-top Box" and implored for support from related companies. Fig. 3 represents Orange TV's open-type model in the near future that Atlas Research put into a diagram (IPTV-News, 2008.12.08). "Content Creation" and "Contents Aggregation" are similar to opening software and APIs for supply-side users and "Devices" is classified as an open-type model for platform providers. The plan is to support Internet-based terminals such as eBook and tablet PCs and ultimately induce the evolution of "N-screen".
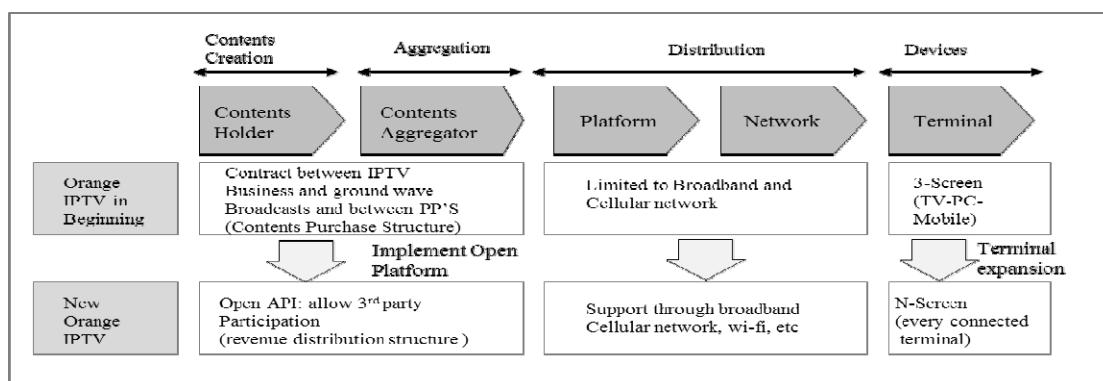
Fig. 3: France telecom's orange TV open model

4.2.2. America: Verizon

Since 2005, Verizon has been providing to its FiOS TV and broadband subscribers video content such as Starz Play, ESPN360, Disney Connection, YES Network, and NFL Game Extra. In addition, Verizon

Wireless' mobile video service VCAST provides more than 100 TV series through ground wave broadcasts and cable program providers on mobile phones. The problem that Verizon faces is the massive cost to supply and procure content; therefore, it provides

primarily old content, meaning that it cannot respond effectively to the competition.

Verizon's FIOS TV has 2.9 million subscribers. To date, U.S. IPTV businesses provide multi-room DVR functions to differentiate themselves from cable and satellite TV and have made significant effort in providing region-specific information on topics such as weather, sports, and traffic information through full-duplex widgets. U.S. IPTV businesses provide extra services such as remote energy control, video conferencing between TVs and PCs, and others but do not view them as marketing tools. The businesses' major strategy still focuses on voice, data, and video service packages. Unlike the FT's Orange TV, U.S. IPTV businesses, and their leaders Verizon and AT&T in particular do not have their own content and must merely provide content instead of setting up their own independent video websites. In the United States, OTT (Over-The Top) videos are overflowing.

The problem is that OTT broadband content is being indirectly supplied through Internet Protocol (IP) networks. In the past few years, companies such as Apple, Blockbuster, Netflix, Verizon, and Vudu have launched OTT Set-top boxes (STB) that provide a variety of Internet content. Rationally, OTT videos represent latent competing services of IPTV VOD service's; therefore, cooperating with OTT STB companies is not an attractive strategy for communications businesses. However, although cooperation with STB companies may be unattractive, including OTT videos in packages to keep subscribers may be advantageous. Cooperation with OTT companies providing innovative TV services through OTT STB, such as Netflix and Blockbuster, will allow communications companies to obtain an upper hand in competition with cable and satellite TV companies. Of course, fundamental issues exist with OTT videos such as network quality of service (QoS), control over the user experience, and potential problems with quality control when P2P OTT services are provided. However, TV users are already using PCs and smartphone to search the web and watch video content that cannot be found on paid TV and consumers are becoming increasingly aware of numerous OTT companies. For these reasons, Verizon chose to implement a rather offensive strategy of adopting OTT companies. In other words, Verizon has opened some channels to OTT companies (in a managed open-type fashion), providing OTT videos like YouTube, Veoh Networks, blip.tv, and Break.com to its subscribers.

4.3. Google's Smart TV

Smart TV can be defined as an OS-based TV that provides videos, applications and other content through a platform based on the web and app store. Microsoft's WebTV has evolved into Apple TV, which has evolved further into Google's Smart TV. The trend is the smartphone business model that has spread in the mobile terminal market, using the OS and app store platform as its basis. The TV will be a potential market such as mobile phones and tablets using the same OS platform to achieve inter-terminal content synchronization and applications. The same web content will be continuously accessible through an Internet connection.

TVs are becoming smart because they are the most popular device medium and are superior to the PCs or the mobile phones in terms of use and market size. Google TV's core is in creating an open-type Android-based ecosystem, thereby providing UX optimized for information searching.

Google has divided the responsibility with cooperating companies in terms of software platform development, hardware development, sales and distribution, and broadcast content distribution. Adobe builds Flash player 10.1 onto the Chrome browser for Google smart TV and Sony, Intel and Logitech provide hardware platforms such as TV, Blue-ray player, CPU and input devices. Dish Networks, Netflix, and Amazon work as a broadcast content channel. In addition, Best buy is selling Google TV in the North American region as a sales and distribution player (Table 4).

Smart TV will not have a significant effect on the Korean paid-broadcasts in the short term because the country already has a paid-broadcast distribution rate of 95%. However, the distribution paradigm of TV content is expected to change into apps and web content. Businesses are expected to change their business model from a closed one to an open one in the long run.

5. Key success factors for IPTV sustainable growth

The core components responsible for success in the IPTV industry have been deduced from textbook research on conventional service platforms and an analysis on IPTV services and foreign case studies. First, we deduced the major characteristics of IPTV, analyzed open-type services and extracted the core "success component" and ruled out any components that overlapped or were contradictory. The major characteristics of the Open-type IPTV services are shown in Fig. 4.

As Fig. 4 indicates, the Open-type IPTV service is an open market service comparable to Apple's App Store and can be viewed as a part of the paid-IPTV service which provides multimedia services through the IP network.

In addition, Open-type IPTV can be viewed as a service platform that could act as an interface encompassing hardware and software and enabling the production and distribution of multimedia content (Yoo, 2008). Receiving new ideas from outside and performing "Open Innovation" on infrastructure and processing are necessary. Table 5 presents the succinct results of an analysis of the case studies for the components of success after sorting through the redundancies and contradicting components.

For the Open-type IPTV service to succeed, it must acquire diverse and useful content such as that noted in Table 5, and must create technology and infrastructure to allow ease of use and closer

interaction. For example, the remote controller's user interface must be further improved and set-top box performance needs to improve to enhance resolution and overall quality. In addition, for Open-type IPTV to be successful, establishing an open-type ecosystem is necessary.

Table 4: Google TV's partner companies

Classification	Role of Partners
Software Platform	-Google: provided Android, Chrome Browser and search engine -Adobe : equip Chrome with Flash 10.1
Hardware Platform	-Sony : Develop TV and Blue-ray player -Intel: Provide low-power, hig performance CPU - Logitech : Develop input device and STB
Broadcast Content Distribution	-Dish Network: Provide real time broadcast channel through its own STB -OTT business(Netflix, Amazon, etc): Internet broadcast and video
Sales and Distribution	-Best buy: Sell google TV in the North America Region
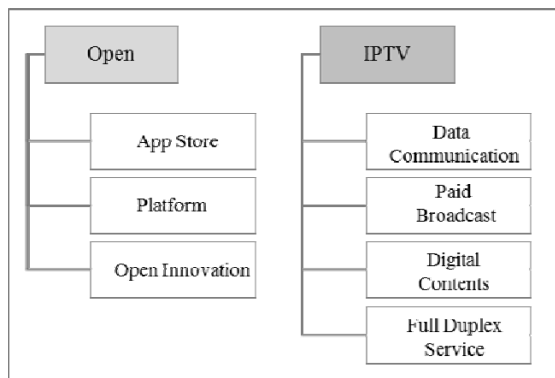
Fig. 4: Major characteristics of open-type IPTV service

To do so, content owners must be allowed to participate in the market solely on the basis of marketability; thus a decent number of users must be obtained by providing free content and by proposing a practical business model that allots revenue to content owners. Lastly, the organization fully responsible for the Open-type IPTV service had experience and an understanding of intellectual property related laws. Initially operating the organization at a small scale is important. Expansion can occur only when adequate experience has been obtained with consideration for the organizational culture of the entire ecosystem.

Table 5: Key success factors per characteristic

Success factors	Service attribute	Related research
Price quality	Data Communication Paid Broadcasting	(Kwon and Kim, 2008)
Diverse content	Digital content	(Kim, 2006)
Quality Content	Full-duplex service	Korea Game Industry Agency, 2008
Technology & Infrastructure	Digital content	(Kim, 2006)
Open-type Ecosystem	Full-duplex service, App store, Platform	(Yoo, 2008)
Organizational culture	Open Innovation	(Chesbrough, 2003)

6. Discussion and conclusion

This research stemmed from the question of what platform strategy must be implemented for a company to continuously grow in a rapidly changing, converging environment. This research also put forth a direction for the materialization of an open platform strategy in the IPTV service industry through open platform strategic case studies. To suggest a direction, a service platform strategy was formulated by determine the main success factors of the Open-type IPTV service. These main success factors were found through preliminary research related to foreign case studies, IPTV services, and open platforms. The open platform research and IPTV service research revealed the important factors that are necessary for the realization of the Open-type IPTV strategy.

Analyzing global companies and strategies in greater detail will enable problems to be addressed related to price and acquiring content and strategies for cooperative arrangements with global companies such as Google or Apple.

Because a platform consists of a common base technology and structure, it has a standardized character. Providing standardized interfaces through platforms creates the flexibility needed for various applications to coexist. A platform business connects various stakeholders in the value chain, thereby taking on the role of mediator in its own ecosystem. In addition, platform businesses can benefit from the numerous innovations inherent in supplementary products and from competition on a systematic scale (Kim, 2006). The list of success factors for sustainable IPTV growth includes: price, quality of service, quality and diversity of content, technology and infrastructure with a common structure used to

provide new services to subscribers, the role of the central component of the ecosystem through the symbiotic relationship between partners, and an organizational culture with an open perspective.

Acknowledgement

References

Abdollahpouri A and Wolfinger BE (2012). Wired and wireless IPTV access networks: A comparison study. In Ultra-Modern Telecommunications and Control Systems and Workshops (ICUMT), 2012 4th International Congress on: 308-316. IEEE.

Angotra P, Kuwadekar A and Al-Begain K (2010). Media Share-An IPTV Service Development, Deployment and Delivery Platform. In Next Generation Mobile Applications, Services and Technologies (NGMAST), 2010 Fourth International Conference on: 30-33). IEEE.

Azgin A, AlRegib G and Altunbasak Y (2012). Cooperative on-demand delivery for IPTV networks. In Global Communications Conference (GLOBECOM), 2012 IEEE: 1853-1858. IEEE.

Baltoglou G, Karapistoli E and Chatzimisios P (2012). IPTV QoS and QoE measurements in wired and wireless networks. In Global Communications Conference (GLOBECOM), 2012 IEEE: 1757-1762). IEEE.

Björkqvist J and Virtanen S (2006). Convergence of hardware and software in platforms for radio technologies. Communications Magazine, IEEE, 44(11): 52-57.

Chang HY (2013). LC-CloudTV: A Low-Cost Cloud-Based IPTV Platform with SVC Technology. Journal of Internet Technology, 14(7): 1105-1112.

Chesbrough HW (2006). The era of open innovation. Managing innovation and change, 127(3): 34-41.

De Pauw T, Volckaert B. De Turck F and Ongenae V (2011). On the design of a flexible software platform for in-building OTT service provisioning. In Integrated Network Management (IM), 2011 IFIP/IEEE International Symposium on: 1089-1094). IEEE.

Kang SU, Park S, and Lee S (2014). Factors Influencing New Media Subscription Based on Multigroup Analysis of IPTV and DCTV. ETRI Journal, 36(6): 1041-1050.

Ketmaneechairat H (2012). A survey and comparison of some popular IPTV applications. In Computing Technology and Information Management (ICCM), 2012 8th International Conference on 1: 58-63). IEEE.

Kim J and Lee KH (2013). Towards a theoretical framework of motivations and interactivity for using IPTV. Journal of Business Research, 66(2): 260-264.

Kim JY (2008). A Study on Service Platform Strategy of Mobile Internet Service: S Company Case. M.Sc. Thesis, Korea Advanced Institute of Science and Technology, Republic of Korea: 68.

Kim TH (2006). Value chain change of Digital contents industry and operator status. Information and Communication Policy.

Kwon HY and Kim YS (2008). Change of Pay Broadcast market in accordance with emergence of IPTV.

Lemola T (2002). Convergence of national science and technology policies: the case of Finland. Research policy, 31(8): 1481-1490.

Margaritis D, Färe R and Grosskopf S (2007). Productivity, convergence and policy: a study of OECD countries and industries. Journal of Productivity Analysis, 28(1-2): 87-105.

Meng S, Liu L and Yin J (2013). A collaborative and scalable platform for on-demand IPTV services. Services Computing, IEEE Transactions on, 6(3): 358-372.

Meyer MH and Mugge PC (2001). Make platform innovation drive enterprise growth. Research Technology Management, 44(1): 25.

Park S, Ryu C, Cho K and Ryu W (2013). Social information based TV services on IPTV platforms. In 2013 International Conference on ICT Convergence (ICTC).

Rothwell R and Dodgson M (1992). European technology policy evolution: convergence towards SMEs and regional technology transfer. Tec novation, 12(4): 223-238.

Santana et al. (2010). Towards a Web-based platform for the IPTV content delivery and creation. CISCI 2010 - Novena Conferencia Iberoamericana en Sistemas, Cibernetica e Informatica, 7th Simposium Iberoamericano en Educacion, Cibernetica e Informatica, SIECI 2010 - Memorias.

Sawhney MS (1998). Leveraged high-variety strategies: from portfolio thinking to platform thinking. Journal of the Academy of Marketing Science, 26(1): 54-61.

Simmhan Y, Aman S, Kumbhare A, Liu R, Stevens S, Zhou Q and Prasanna V. (2013). Cloud-based software platform for big data analytics in smart

grids. Computing in Science and Engineering, 15(4): 38-47.

Smolnik S (2007). Convergence of Classical Search and Semantic Technologies–Evidences from a Practical Case in the Chemical Industry. In Scaling Topic Maps: 14-24. Springer Berlin Heidelberg.

Song S, Moustafa H and Afifi H (2012). IPTV services personalization using context-awareness. Informatics, 36(1).

Windrum P and García-Goñi M (2008). A neo-Schumpeterian model of health services innovation. Research Policy, 37(4): 649-672.

Xin HM, Li SW and Fu MZ (2014). Software Platform of Home-Based Community Care for the Old Based on jQuery Mobile. In Advanced Materials Research, 989: 4501-4505.

Yim J and Lee G (2013). Design and Implementation of Web Portal for'Open IPTV System'. International Information Institute (Tokyo). Information, 16(12): 8563.

Yoo JE (2008). A study of platform strategy in the convergence era, Korea Creative Contents Agency.

Yu HF, Ding JW, Ho PH and Tapolcai J (2012). IPTV: Technology, Practice, and Service. Int. J. Digital Multimedia Broadcasting, 2012, 734769-1.