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# Competitive Evolutionary Dynamics of Cloud Service Offerings in Korea: A Path-Dependency Perspective

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# COMPETITIVE EVOLUTIONARY DYNAMICS OF CLOUD SERVICE OFFERINGS IN KOREA: A PATH-DEPENDENCY PERSPECTIVE<sup>1</sup>

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## Abstract

*Cloud service for personal users has become more popular world-wide since Apple Inc. launched iCloud storage service in October, 2011. However, such cloud storage service was not new because many global telecom companies, usually called telcos, as well as many portals had already offered similar Internet-based online storage services at that time. As of now, there can be seen hundreds of diverse cloud storage and computing services for both personal and enterprise users in the global market. During last several years, Korean cloud service market has been led by three major telcos, who have launched more advanced and more diversified services competing with each other. Some questions may arise: What makes that happen and what kind of market dynamics affects on the evolution of cloud service offerings? This paper tries to answer these questions by categorizing and analysing 84 cloud services offered by three major telcos in Korea during last three years. As a research framework, Pessemer's new product classification scheme was employed and precedence relationships among differently positioned service categories were analyzed to figure out the competitive evolutionary dynamics of the market. From the empirical study, path dependency was observed and resource-based view of the market competition was validated. Also, it was found that a player's next move in service offering to a better position in Pessemer's product space is quite closely related with the competitive position as well as the company-owned competitive resources like technology competency and company-wide service scope.*

*Keywords: cloud service, evolutionary dynamics, path dependency, resource-based view*

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# 1 INTRODUCTION

As many smart devices like smart phone and tablet PC proliferate worldwide, cloud service, which provides us with a ubiquitous connection to Internet storage and computing services, is becoming more essential in our daily lives. Following the cloud service initiatives by major global leading companies like Amazon, Microsoft, Google and Salesforce.com, many local service providers in Europe, Asia and other regions have been launching variety of cloud storage and computing services. Among them, telecom companies, usually called telcos, are most active and aggressive in developing new cloud services and offering them in the market. They tend to recognize this market as a blue ocean and regard cloud service as a new growth engine to increase the ARPU (Average Revenues Per User) from their service subscribers. Their service offerings span from simple on-line storage to variety of software applications and personalized computing services. During last three years, over one hundred of diverse cloud services have been offered by major Korean telcos.

Some questions may arise: What makes that happen and what kind of market dynamics affects on the evolution of those cloud service offerings in Korea? Also, what rationales explain those evolution patterns of the market? Are path dependencies working and constraining market players' next strategic move in their cloud service offerings? In what condition, does a new path creating move occur? Are their path dependencies or path creation moves related somehow with the resources they developed and owned? This paper attempts to answer these questions, resorting to the well-known resource-based view on competitive strategy and the innovation theory.

According to Baney (1991), who introduced RBV (Resource-based view) theory on strategy, a company may create a superior competitive position by building up and accumulating his/her own differentiated resources which can not be easily imitated or copied by competitors. Also, by Robertson (1967), evolutionary path of innovation may change depending on the innovation strategy a company takes when offering a new product to the market. Incremental/continuous innovation and radical/discontinuous innovation are most frequently cited evolutionary paths. An innovation is called incremental when a modification or enhancement of the existing product is pursued. New motorbike model and Menthol flavour cigarette are the examples. On the other hand, discontinuous innovation corresponds to a new product which is based on totally new standards, leading to a new pattern of behaviours from the customers. We presume that the evolutionary path of product innovation is anyhow related with the founding factors of strategy or differentiated resources from the RBV theory.

When it comes to the innovation itself, a more detailed categorization of innovation is beneficial for our research purposes. By Garcia and Calantone (2002), innovations can be further categorised as radical innovation, incremental innovation, market breakthrough, technical breakthrough, and finally a really new innovation. The criteria for discriminating one type from other types of innovation can also be classified into macro and micro levels, and marketability is an important factor to discriminate an incremental innovation from a radical innovation. Radical innovation, market breakthrough, technical breakthrough, and the really new innovation can be regarded as a path creation move in strategy terminology. According to Chang (2009), multi-level path creation model developed by Henfridsson (2009) provides us with a new perspective on under what conditions do market and technical breakthroughs destroy the path dependent evolution, leading to a path creation in product strategy.

In understanding the evolutionary dynamics of the cloud service offerings in Korea, strategic position in view of the time to market is another important factor. In other words, whether a market player is a leader or follower greatly affects on the product strategy she pursues. For the followers, a fast catch-up strategy must have a merit because it reduces considerably the risk and uncertainty embedded in a new market development project. However, that is not always the case especially when the market environment changes so fast and also when the competition itself is so fundamental and severe. Lieberman & Montgomery (1998) suggested three typical chase strategies a follower may pursue, which are "a strategy to establish a differentiated position", "a strategy to re-define the competition area" and finally "a strategy to imitate." The followers can imitate the technology of the first mover as

their initial strategic step and may get a superior position by improving the technology. Especially, the follower has an opportunity to catch up a leader position by concentrating all management resources intensively on the next generation technology when the technology is continuously upgraded generation by generation. Leapfrogging is one of the most representative catch-up strategies, which overcomes the constraints from the path dependencies the first mover has, while free-riding the market and technology the first mover developed. Market re-definition suggested by Kim (2010) might be viewed as a kind of leapfrogging.

Despite huge number of researches on cloud services, there are only a handful of researches on the market aspects of the cloud services (Douglas, 2010). More than worse, there is quite limited number of researches on the competitive evolutionary dynamics of the ICT ecosystem (Chang, 2009). Motivated from this, this paper collects 84 cloud services offered by three major Korean telcos during last three years and investigates them to test the presumed research propositions. The remainder of this paper is organized as follows: In the next section, a theoretical framework is introduced, which is based on the market-technology space developed by Pessemier (1977). (We call this Pessemier's product space.) To help understand the framework, a case example of mobile phone is shortly mentioned. Then those 84 services are grouped into 12 categories and each group is positioned in Pessemier's product space. In Section 3, research questions are explicitly proposed, and then tested by analyzing the precedence relationships among those product groups within and across all three telcos. Finally, Section 4 concludes this paper with some further research issues.

## **2 THEORETICAL FRAMEWORK**

### **2.1 Pessemier's New Product Classification Scheme**

In order to figure out the dynamic evolution processes of the cloud services explicitly, we need to resort some solid theoretical framework. For this purpose, Pessemier's new product classification scheme or product space is quite useful. Figure 1 shows how Pessemier's product space is constructed and organized. When designing a new product, the company usually bears some possibility of technological innovation and some marketing targets in mind, given its relationship with the existing product line. Two objectives are apparent in the product space. As you moves from left to right along the product space, difficulty in new product development and in setting up a production system, and the probability of technical failure increase. Likewise, as you move bottom-up, the marketing effort and the chances of marketing failures increase (Pessemier, 1977).

Pessemier's product space is configured to have 3x3 cell structure, where y-axis indicates the market enhancement level while x-axis indicates technological advancement. The newness of the market is categorised as 'no market change', 'strengthened market' and 'new market', while the newness of technology is classified as 'no technological change', 'improved technology' and 'new technology'. By combining the market dimension and the technology dimension into a product space, we could have nine new product strategy options. They are named as reformulation, replacement, remerchandising, improved product, product-line extension, new use, market extension and diversification, depending on their relative positions in the Pessemier's product space.

This framework is useful for explaining evolution type of diversified products or innovativeness of product and is also quite suitable for understanding the evolution aspects of cloud service. The usefulness of this framework can be easily verified by applying it to a case example. For this purpose, let's consider the case of mobile phone development in Korea. Though mobile phone is a physical product as is contrasted to the cloud service, their evolution path shares some common aspects in that both of them pursue multimedia and digital convergence.

In late 1990s, B/W flip mobile phone was most popular, thus regarded as a standard model. We consider this model as a benchmark in our product space as shown in Fig. 1. This flip type mobile

phone then evolved to folder type and the B/W phone to colour phone as digital technologies developed. At this point in time, there was a jump in their evolution trajectory. That was the advent of camera phone, which changes drastically the concept of mobile phone from a device for voice communication to an integrated multimedia gadget. It enabled the users not only to communicate, but also to listen to music, to watch broadcasting TV videos and even to play a mobile game. The advent of camera phone can be viewed as a discontinuous innovation in technical point of view because a chip dedicated to camera and multimedia functions was introduced for the first time so that the overall architecture interconnecting baseband chip (an original technology chip for wireless communication), LCD screen and camera phone chip was entirely reconfigured. This means that there was a evolutionary jump to a new technology which surpasses the technical basis of the existing product, and should be a definite example of discontinuous innovation. Further advances along the technology dimension and/or the market dimension include Internet phone, MP3 phone, PDA phone and finally tablet PC.

<b>New market</b>	<b>New Use</b> Extend sale of present products to types of customers not presently served ex) Car Phone	<b>Market extension</b> Extend sales to types of customers not presently served by offering a modified present product ex) PDA phone	<b>Diversification</b> Extend sales to types of customers not present served by offering products of a new technology ex) Tablet PC
	<b>Remerchandising</b> Make present products more attractive to the type of customers presently served ex) Folder type phone	<b>Improved Product</b> Make present product more useful to present customers by improving present technology ex) Internet Phone	<b>Product-line extension</b> Widen the line of products offered to present customers by adopting a new technology ex) mp3 phone, Camcorder Phone, Multimedia Device
<b>No Market change</b>	ex) B/W flip type phone	<b>Reformulation</b> Make minor modifications in product to reduce cost and/or improve quality ex) Infrared Apparatus	<b>Replacement</b> Make major modifications in produce to reduce cost and/or improve quality ex) Color, Camera Phone
	<b>No technological change</b>	<b>Improved technology</b>	<b>New technology</b>

Figure 1. New product categories classified by product objectives

Based on the discussions, we might be able to associate a type of innovation with some evolutionary moves in Pessemier's product space. An incremental innovation can be made without any significant changes in the existing product architecture or in the existing market scope. So, any incremental innovation can be associated with an adjacent move in Pessimier's product space vertically or horizontally. Meanwhile, radical innovations correspond to a jump from a cell position to another not-adjacent upper-right cell position. According to Utterack and Abernathy (1975), chasing by the followers usually follows some evolution path which is opposite to that of the leaders.

## 2.2 Categorization of Cloud Services

In the literature, cloud services are often classified as Infra as a Service (IaaS) which provides IT facilities, Platform as a Service (PaaS) which provides a platform to develop application software and finally Software as a Service (SaaS) which provides applications themselves to the clients. However, this classification scheme does not fit to our research purpose. Instead, we are more interested in finding some cloud service categories to each of which has its own levels of technological newness and marketing newness. In other words, all services belonging to a certain category have common features, and at the same time have almost the same position in Pessimier's product space. Table 1 shows the service categories classified to fit to this academic requirement. The service categories founded in this way include storage, mobile, office, N-Screen, CDN, server, back up, media, virtualization, enterprise, specialized service and management service.

Market and Service		Descriptions	Source
B2C market	Storage	Online storage service over the Internet	Kim et al (2009)
	Back up	Backup storage for large data file and media contents, which is easily extended on demand.	DMTF (2010)
	Mobile	Mobile extension of storage-based backup and media services, and might be called as DaaS (Device as a Service).	Lee (2012)
	Media	Delivery of multimedia contents like music, photo, video and game over the online storage.	KCCA (2011)
	N-Screen	Contents are provided across different screens like mobile phone, computer, and TV, even holding on-line.	Son, et al. (2011)
	Contents delivery network	Delivering contents with a large distributed system of servers deployed in multiple data centers across the Internet.	KCCA (2011)
B2B market	Office	Services to affiliate joint works easily by accessing e-mail, web meeting, documents and business schedules.	Choi (2011)
	Virtualization	Services to provide a virtual (rather than actual) version of computing server, storage, network and application.	Kim (2009)
	Server	Services to provide a remote or an extended computing server capacity across the cloud.	DMTF (2010)
	Enterprise	An integrated enterprise level application service package served over the cloud.	Choi (2011)
	Management	IT business supporting services, which range from IT consulting to monitoring, security and handling disorder through cooperative contract with professional cloud service providers.	DMTF (2010)
	Specialized service	Specialized services span a wide-range of engagements that are customized to the specific needs from different industries.	HP(2011)

Table 1. Classified cloud service categories

## 2.3 New Product Positioning of Cloud Service Categories

Once the classified cloud service categories are given, the next step is to position each category appropriately in the Pessimier's product space by comparing their respective technology and market newness with each other. Figure 2 depicts the resulting positions of those 12 cloud service categories. In view of the telcos, most of which have been providing personal communications services, B2C cloud services are not new because they can be easily built upon the existing subscriber base, while

B2B cloud services are in some cases new especially for the telcos who has no B2B customer bases. For this reason, B2C cloud services are usually positioned within lower-left four cells, while most of the B2B cloud services are positioned at the other cells located toward the upper and/or the right corners. Figure 2 gives us a valuable insight on how the cloud service innovations have been developed and followed a systematic evolution path. However, this does not necessarily indicate that three major telcos have followed a same evolutionary path in their cloud service offerings. They may differ from each other in their strategic incentives to enter the segmented markets depending on their competitive market positions, which will surely lead to quite different schedules for service offerings.

	<b>New Use</b>	<b>Market Extension</b>	<b>Diversification</b>
<b>New Market</b>	Virtualization Server	Enterprise Office Management	Specialized Service
<b>Strengthened Market</b>	<b>Remerchandising</b> Backup	<b>Improved Product</b> Mobile	<b>Product Line</b> N-Screen
<b>No Market Change</b>	Storage	<b>Reformulation</b> Media	<b>Replacement</b> CDN
	No Technological change	Improved technology	New technology

Figure 2. Positioning of Cloud Service Categories

### 3 RESEARCH PROPOSITION AND EMPIRICAL ANALYSIS

#### 3.1 Research Proposition

The innovation pattern, observed as a moving path in Pessimier’s product space, can be interpreted somehow in relation with the resource-based view (RBV) of strategy as path dependent move or path creation move. Path dependent move is usually resource-based, while path creation move, which we call “leapfrogging” is not. The RBV theory regards the firm as a specific bundle of resources, and the way that those resources are acquired and combined makes it unique and different from the other firms. In our perspective, it is quite natural to expect that the firm with different set of competitive resources will behave quite differently from the other firms in its new product service offerings to the market.

While it might be somewhat obvious, the telcos of our interest will also show different evolutionary patterns because they have accumulated different set of business resources with different growth

history. In reality, Nelson and Winter (1997) explained the reason why technological changes show great regularities and develop within certain boundaries using the concept of resource-based path dependency. The concept of path dependency suggests that technological change is widely pre-structured among firms because the resources they already possessed restricts somehow their future strategic move (Dosi, 1982).

On the other hand, path creation or leapfrogging assumes that new paths are hardly linked with the existing techno-organization system, based on a fundamentally new scientific knowledge base. Leapfrogging is a discontinuous technological move across different technologies, and usually targeted to catch up or even to move forward as a new leader position. To activate a leapfrogging move, the firms usually adopt a new independent innovation by collaborating with technological leaders in other areas, or by concentrating R&D resources for a new technological breakthrough. For this reason, path creation move or leapfrogging often omits one or two steps in its evolution path.

The research questions of this research is focused on: What different evolutionary moves are observed from the Korean cloud service markets, and what kind of market dynamics affected on the evolution of those cloud service offerings in Korea? Are path dependencies working and constraining market players' next move in their cloud service offerings? In what condition, does a new path creating move occur? Are their path dependencies or path creation moves related somehow with the resources they developed and owned? We try to answer this question in this section by testing the following Proposition 1, based on the RBV discussions on the evolutionary path of the cloud service offerings shown in Figure 2.

**Proposition 1:** The player who has relatively more internal competitive resources will have a strong incentive to take adjacent moves in her product strategy in order to utilize those resources, while the player who has relatively little relevant resources will have a strong incentive to take a leapfrogging in her product strategy.

### 3.2 Data

The target companies to survey in this study are KT, LGU+ and SKT, three major Korean telecommunication companies. The data were collected over 84 services that these companies have launched to the market during the period from May 2010 to September 2012. Based on this collected data, Korean telcos began to launch some storage-based service early in the middle of 2010, and then they had expanded their cloud service offerings to mobile. As the technology progressed, their service offerings became more and more cloud-based, so that multi-media services over smart TV and n-Screen began to attract consumers' attention. Table 2 shows what specific cloud services were offered by each telcos during the study period within each service category.

Service type	KT	LG U	SKT
Storage	U CLOUD	U Box+	T Bag Plus
Media	Snap picture printing service, Face recognition service, SNS support, Olleh media player, Gini cloud music service	Digital frame service, U+ Shoot & Play High Definition (HD) encoding, C-Games	T cloud, T CLOUD ( Meta Data & SNS)
CDN	U CLOUD CDN Streaming, U CLOUD CDN	U+ BOX Net Drive, Enterprise cloud CDN	Cloud CDN
Back up/ Database	U CLOUD SS, U CLOUD Backup, U CLOUD DB		Easy Storage



Mobile	U CLOUD MacOS Client, U CLOUD iPhone App, U CLOUD Android App, Take, Take2, Cloud App	U+ BOX iPhone U+ BOX Android LTE HD contents, LTE HD premium pack	Hoppin,
N-Screen	Olleh TV, Olleh TV NOW pack	U+TV SMART 7, Smart home Contents service	N-Screen Service expansion
Server	U CLOUD CS, U CLOUD CS Public, U CLOUD server premium, U CLOUD server snap shot, U CLOUD Server plus, U CLOUD static Web Service, Multi –account support service, U CLOUD server machine image service, Integrated server management service		Cloud server Vaccine service
Virtualization	U CLOUD VDI, Virtual Private Cloud		VM firewall service
Office	Olleh 365	U+ Box web Office, Small business mobile office	
Enterprise	U CLOUD Pro	U+ Smart SME, SimFile + UBOX, Cloud N	T bizpoint, Cloud App, Tbiz Groupware, Cloud CRM
Management	Integrated management service	Cloud N	Cloud SAP B1
Specialized Service	Financial security solution	Smart Grid, Moms view, Smart seller, mGuard, smart clean, cloud CCTV	Place of origin management system, Cloud security service

Table 2. Cloud Service Offerings launched by three major Korean telcos

### 3.3 Analyzing the Evolutionary Dynamics of the Cloud Service Market in Korea

This section addresses the evolutionary dynamics of the cloud service offerings for each company. We deal with the cases of KT, LGU+ and SKT one by one. Figure 3 shows the evolutionary dynamics of KT's cloud service offerings. First of all, KT looks most aggressive in launching various cloud services ahead of other competitors, while keeping a good path-dependent, or resource-based schedule of consecutive service launches. It can be easily seen in Figure 3 that KT prefers incremental innovations in the forms of service modification and enhancement of the incumbent services, to a radical innovation by creating a new product. We might call KT's strategic move "step-by-step" innovation. However, this does not necessarily mean that KT's market position is a follower position. As compared to the other players, KT had accumulated plenty of internal resources relating with the cloud service even for B2B services, which made KT take path-dependent incremental innovations for all over the positions in Pessimier's new product space.

Referring to a specific cloud service, KT showed a trend to extend the innovation continuously starting from the U-Cloud Biz Service. A kind of IaaS service like cloud server/storage/DB was first launched in Korean market by KT and then many business applications like IT, game, shopping, media and broadcasting outsourced KT's infrastructure services more frequently and more widely, pursuing a cost saving of the hosted companies. In addition to this, KT reinforced the service provisioning options by diversifying the server operating systems and introduced the snap shot service in order for the users to install his/her own system at the same environment as the one used in-house. A similar service policy was applied further for the other customized value added services.

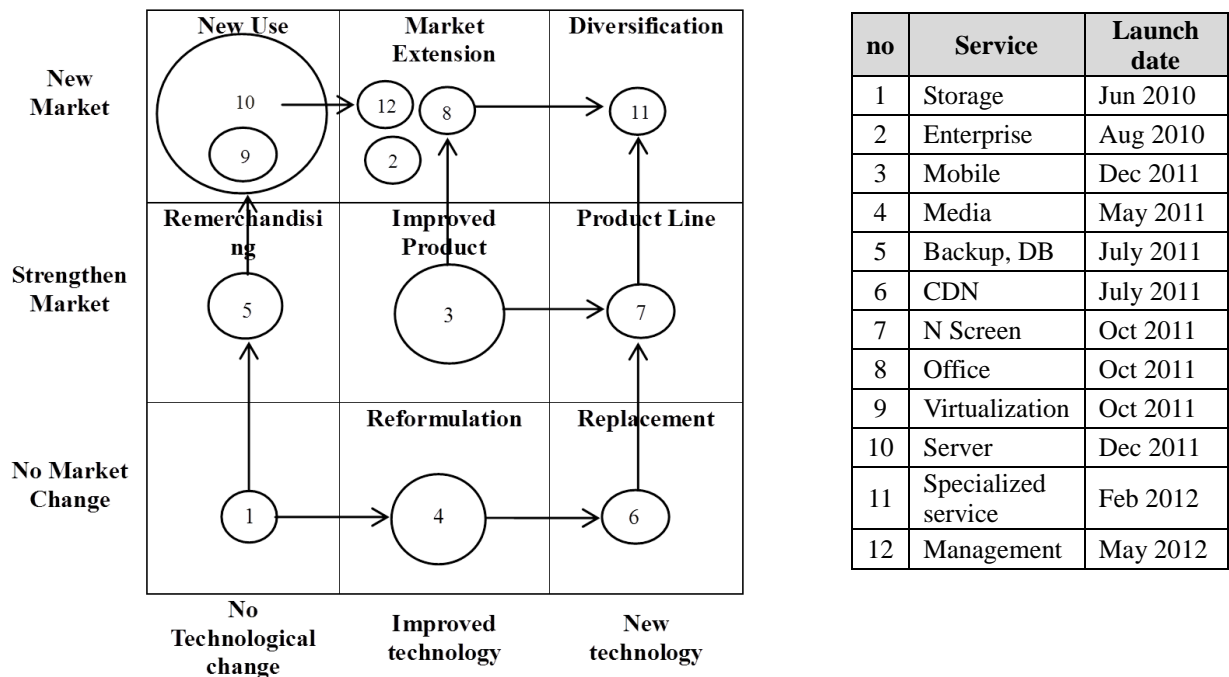
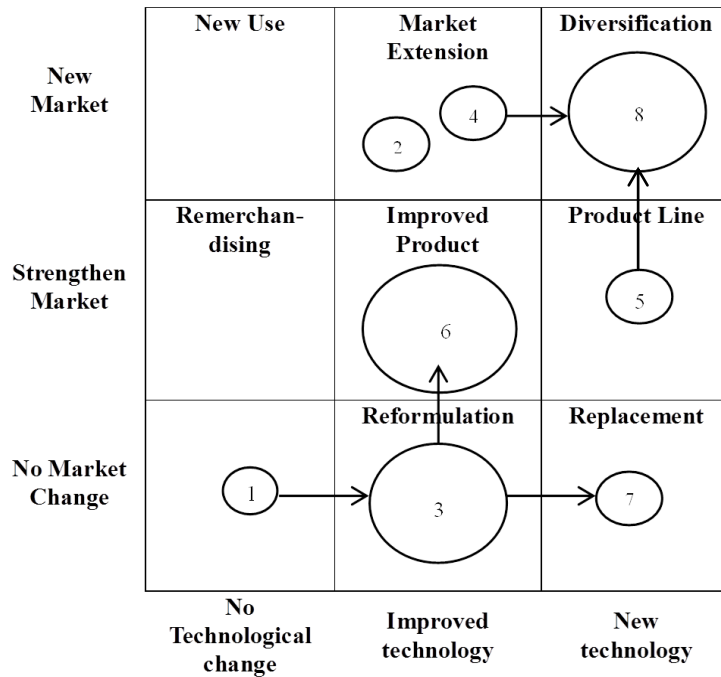


Figure 3. KT's cloud innovation pattern aspects

Meanwhile, LGU+'s move looks quite different from that of KT's. It can be easily observed in Figure 4 that more than half of their cloud service offerings are a path creation move, rather than resource-based, path-dependent move. LGU+'s strategic focus was on the catch-up strategy, which made LGU+ take leapfrogging move in Pessimier's new product space. By doing that, LGU+ expected that she can set up a differentiated position firmly in a new, unexplored market, ahead of the other cloud service providers. Leapfrogging strategy is usually employed by those who lag behind but are eager to catch up and become a market leader at the next round of market competition.

In addition to this, LGU+ product portfolio seemed to be somewhat narrowed and focused as compared to the other competitors. The product categories for which LGU+ launched at least one service were more or less skewed toward enhanced and new technologies. This implies that leapfrogging is initiated by a technological innovation, rather than a market innovation. The reason why LGU+ takes this path creation move is clear. Their smaller customer base, and relatively shorter business experiences in B2B service markets urged LGU+ to take a new, surprising strategic action to position in an unexplored, but potentially promising cloud service market.

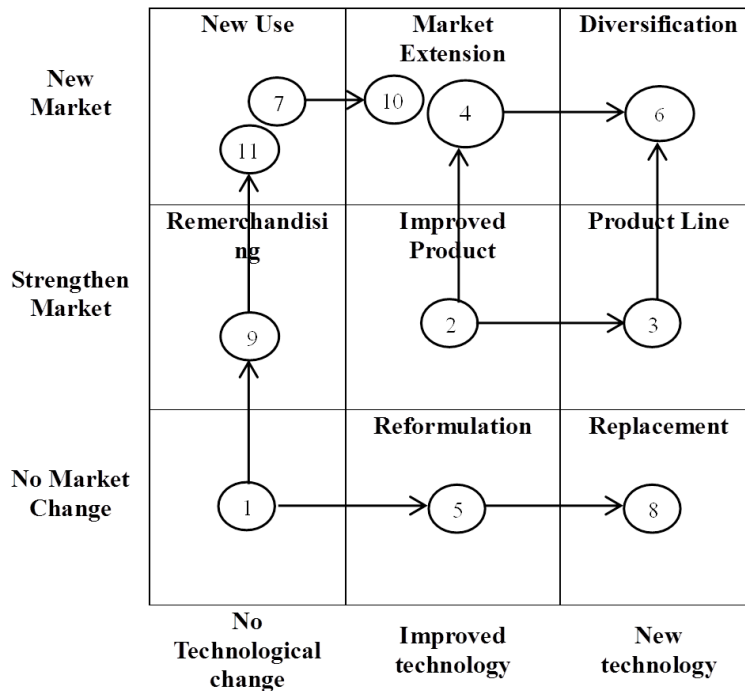
LGU+, unlike KT which focused on a kind of IaaS, showed a different stand to focus on multimedia home services. Internet telephony, IP-TV, and smart TV are typical home appliances that LGU+ has enormous interests. This might be viewed as a differentiation strategy in view of Porter's generic strategies. However, it should be noted that LGU+ has established a strong Internet-based home service market base during last several years, offering some innovative smart home appliances, which can be utilized as a strategic asset upon which new cloud based media services like n-Screen and OTT (Over-the-Top) is promoted. This is also the point indicated by the RBV theory. Recently, LGU+ is seemingly most aggressive to diversify her service offerings across all areas including telecommunication, broadcasting, home appliances, construction, contents and robots.



no	Service	Launch date
1	Storage	Aug 2010
2	Enterprise	Feb 2011
3	Media	Mar 2011
4	Office	Apr 2011
5	N Screen	May 2011
6	Mobile	July 2011
7	CDN	Jan 2012
8	Specialized Service	Feb 2012

Figure 4. LG U+'s cloud innovation pattern aspects

SKT's strategic position is strongest in mobile market. In smart phone-centered n-screen services, SKT must be the market leader. Despite that SKT has enjoyed her dominant position in mobile service market during last decade or so, its strategic response to the other cloud service providers' strategic thrusts was slow. Now, SKT's position in cloud service market is a follower position, pursuing a catch-up strategy for some profitable cloud service markets.



no	Service	Launch date
1	Storage	May 2010
2	Mobile	Oct 2010
3	N Screen	Jan 2011
4	Enterprise	Sep 2011
5	Media	Oct 2011
6	Specialized Service	Jan 2012
7	Server	Jan 2012
8	CDN	Mar 2012
9	Backup, DB	Apr 2012
10	Management	May 2012
11	Virtualization	June 2012

Figure 5. SKT cloud innovation pattern aspects

From Figure 5, we can read that SKT's overall new product strategy is more or less path-dependent since the sequence of service offerings looks well matched with the right and upper direction in Pessimier's product space. However, this is the case only for the cloud services more or less related with SKT's incumbent mobile customer base and technological and marketing competencies accumulated within the organization.

It is interesting to see that SKT recently launched T-Cloud Biz, targeting B2B IaaS market and SKT uses a kind of catch up strategy to promote this new service offering. Though the competition in IaaS market is becoming quite severe, SKT started 'T-Biz Cloud Partner' program to utilize his relatively strong marketing competency and the relational assets with many mobile application business partners. It is somewhat interesting to observe that there are some resource-based aspects even with this apparent path creation move.

### 3.4 Validating the Resource-based Evolutionary Dynamics Proposition

In order to validate the proposition suggested in Section 3, some concrete measures were developed and tested in view of the rationale of the resource-based view of strategy. As can be discussed in previous section, KT's strategic assets or resources are most diverse, and well-balanced across B2C and B2B markets. SKT's strategic asset is more or less concentrated on B2C mobile market, but still having the largest mobile customer base. Meanwhile, LG U+'s strategic market position is relatively weak, but probably most innovative in new ICT service offerings. However, LG U+ has constructed a wide home customer based connected by wired and wireless Internet, which might have some potential to be served as a stepping stone for the future cloud-based home services.

Based on this evaluation on the resource bases of three players, it is predicted that a well-defined path dependency measure will have a highest value for KT, and the lowest value for LG U+ if the proposition suggested in this paper holds. In order to check whether the prediction is right or now, we developed a measure which compares every pair of individual services across every adjacent pair of cells in Figure 2. Table 3 summarizes the results obtained for each service category for each company. As predicted, the resource-based path dependency measure showed 49.2% for KT, 42.3% for SKT, and 31.9% for LG U+, validating that Proposition 1 strongly holds

Service type	KT	LG U+	SKT
Storage	0 %	0 %	0 %
Media	60 %	57.14 %	50 %
CDN	58.33 %	87.50 %	50 %
backup	66.67 %	0 %	100 %
mobile	35.90 %	63.39 %	0 %
nscreen	33.33 %	36.36 %	50 %
server	58.12 %	0 %	0 %
virtualization	50 %	0 %	75 %
office	52.63 %	45.83 %	0 %
enterprise	10.53 %	27.78 %	46.43 %
management	84.21 %	0 %	71.43 %
specialized service	80 %	64.84 %	64.29 %
Average	49.17 %	31.90 %	42.26 %

Table 3. Degree of path dependency

## 4 CONCLUSION

During last several years, Korean cloud service market has been led by three major telcos, who have launched more advanced and more diversified services competing with each other. The motivation of this paper comes from the observation that different company take apparently different service offerings in emerging cloud service markets. A total of 84 cloud services were collected and analyzed in view of Pessimier's framework of product strategy. A resource-based view was derived to explain the evolutionary dynamics of the comprehensive cloud service market and specified as a research proposition. To validate the proposition, a quantitative measure for assessing the path dependency was developed and calculated for each of three major companies. It turned out that the calculated measure supports empirically the proposed path-dependency hypothesis.

The topic dealt with in this paper is not entirely new, but interesting enough in that resource-based view is applied to predict the competitive behaviour of the companies in a highly competitive cloud service market. There are some areas to be explored further in the future. We need to develop an enhanced model which explains the catching-up behaviours as well. Also, it will give us some fruitful results if we can apply the same logic with other new product space having more strategic dimensions than Pessimier's framework.

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