

An Exploratory Study on the Cloud Computing Services: Issues and Suggestion for The Success

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There is a growing interest for 'Cloud computing' to cut costs, and help the users focus on their core business instead of being impeded by IT obstacles. As it became IT version 3.0 which represents the era of cloud services and the dominance of a new kind of IT service provider, cloud service providers (CSPs)' role is more critical as a trusted IT advisor to include cloud migration and integration expertise. However, previous literatures related to cloud computing service have mainly analyzed from customers, although it is hard for customers to totally understand the complex and diverse cloud ecosystem. Therefore, it is an urgent task to mitigate the inhibitory factors in providing the cloud services for activating cloud industry. This study, an exploratory research based on interviews, has derived factors of promoting and hindering the activation of cloud computing from the provider's perspective, and has analyzed a sequence of cause and effect for each factor. For this, the casual loop diagram was developed to deduce key issues, and propose an alternative. The results of this study are expected to help activate 'Cloud computing' in Korea by minimizing the potential negative effects of activating 'Cloud computing' industry.

Keywords : Cloud Computing, Service Provider, Causal Loop Diagram, System Dynamics

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I . Introduction

According to a dramatically changing business environment and severe market competition, firms have still prompted to adopt various up-to-date information technologies (IT) to improve their business operations [Pan and Jang, 2008; Sultan, 2010]. Cloud computing has recently spread out through the main areas related to information systems (IS) and technologies, such as operating systems, technological solutions, and application software for firms [Armbrust *et al.*, 2010]. Worldwide spending on public IT cloud services will reach \$47.4 billion in 2013 and is expected to be more than \$107 billion in 2017, according to a new forecast from International Data Corporation (IDC). Over the 2013~2017 forecast period, public IT cloud services will have a compound annual growth rate (CAGR) of 23.5%, five times that of the IT industry as a whole. As it became IT version 3.0 which represents the era of cloud services and the dominance of a new kind of IT service provider, cloud service providers (CSPs)' role is more critical as a trusted IT advisor to include cloud migration and integration expertise [Servicenow, 2013].

While cloud computing has been discussed as a new technology that can provide many advantages, the cloud computing business is not growing as fast as expected [Banerjee, 2009; Buyya *et al.*, 2009; Goscinski and Brock, 2010]. Especially, there are a lot of start-ups in Korea under the "Creative Economy" policy of Korean government. In January 2011, Korean government established a "Government Cloud Computing Demonstration Centre" to promote the cloud computing industry under the supervision of the National Computing and Information Agency

(NCIA), an affiliate of the Ministry of Public Administration and Security (MOPAS) [KT, 2012]. Despite the increasing interest and the industrial policy for the growing cloud industry, the domestic cloud service in Korea is being introduced to few companies, and the revenue of cloud service providers is not insufficient. Therefore, it is an urgent task to reduce the inhibitory factors in the cloud computing industry [Kim *et al.*, 2012].

Cloud computing service has long been performed in the U.S. and European nations. A lot of global firms announced that the introduction of clouding computing brought about an improvement in productivity and a reduction in cost [Paleologo, 2004; Rochwerger *et al.*, 2009; Marston *et al.*, 2011]. Relatively, the domestic clouding computing business is in an early stage so it is necessary to make a lot of studies and efforts to find alternatives to improve cloud computing industry [ACCA, 2014; Kim *et al.*, 2012].

Prior research on cloud computing has mainly addressed issues of promoting the future cloud computing service [Park, 2009; Kim *et al.*, 2009], political and legal issues [Kim *et al.*, 2013], and adoption of cloud service from the user perspective [Lim and Oh, 2012; Kim and Kim, 2012; Moon *et al.*, 2013; Seo, 2013; Jung and Namn, 2014]. Of particular interest in this literature is the study by Lim and Oh [2012], who noted that factors affecting performance expectancy and the intention to use cloud computing service based on innovation diffusion theory. However, although there have been a few researches on the adoption of cloud computing service from the user perspective, there is a lack of understanding about the key issues for the success of cloud computing service from the service provider perspective. This gap in the literature and

the practical problem it represents for service providers serve as motivations for our exploratory study.

Therefore, this study aims to identify the issues that prevent cloud computing from quickly growing and gaining significant market share in cloud computing services market currently dominated by global competitors from the provider's point of view and to provide suggestions for activation of cloud computing in the future. Specifically, our research questions are (1) "What issues are critical?" and (2) How to improve the situation based on the identified issues" in the context of cloud computing service. In order to achieve this goal, we apply the case study and the system thinking method [Sterman, 2000; 2001]. We selected the ABC Company, a leading service supplier in cloud computing industry, as the case study. ABC currently has the most subscribers of all cloud services in Korea [Cho, 2010; KT, 2012]. The system thinking approach identifies main factors of promoting and hindering cloud computing activation in Korea and influential relationships among factors related to the cloud computing business.

II . Conceptual Background

2.1 Cloud Ecosystem

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction [Peter and Timothy, 2011]. The cloud computing ecosystem defines the two dimensions that should be considered

when developing a cloud strategy—the delivery model and the type of service or services being delivered [IBM, 2010].

The first dimension to consider when developing a cloud strategy is the delivery model, which can be divided into three delivery models: public, private, and hybrid. A private cloud is one in which both the consumer and the provider if cloud services exist within the same enterprise. A public cloud is one in which the consumer and the provider of cloud services exist in separate enterprise. A hybrid cloud combines multiple elements of public and consumer [Goscinski and Brock, 2010]. Consumer in private clouds are within the same enterprise management boundary as the provider, while the consumers and providers in the public exist in different enterprises.

Private clouds can be divided into three subtypes: Exploratory, Departmental, and Enterprise cloud. A exploratory cloud represents an organization's initial foray into cloud computing to develop consumer and provider competence and create awareness of unique cloud architectural and management system requirement. A departmental cloud means that both IT organization supplying cloud services and the functional department consuming cloud services are within the same organization to expand use of cloud computing to consumers who are not familiar with cloud capabilities and to begin developing operational support systems capabilities. A enterprise cloud is that the IT organization supplying the cloud and the organization of organizations consuming cloud services are within the same enterprise, but exist within different management boundaries to dynamically solve time-critical business problems and to optimise

the organization's investment on IT resource capacity.

Public clouds can be divided into two sub-types: Exclusive and Open cloud. A exclusive cloud is most used to provide access to trusted participants so they can use mission-critical applications. A open cloud is that the consuming and supplying organizations are unknown each other prior to the presentation of a service request, which is typically ordered, fulfilled and paid for over the Internet, in many cases without human intervention unless the consumer initiates an inquiry or customer service transaction [IBM, 2010].

The second dimension is service type. As shown in <Figure 1>, the four service types are layered to represent the increasing level of structure and standard: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a service (BPaaS). IaaS provides on-demand, pay-as-you-use access to infrastructure that the customer configures and controls while PaaS delivers compute capability and a predefined middleware stack which is structured for developers or advanced IT users. SaaS is a predefined such as Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP), which is typically delivered via public cloud provider. Lastly, BPaaS combines application cloud services and the shared services model in which a organization delivers business services, such as procurement or help desk to multiple internal or external consumers [IBM, 2010].

Together, the two primary dimensions—delivery model and service type—are essential to establish a framework for examining cloud implementation requirements, which shows the

responsibilities that each role carries, depending on chosen cloud service type and delivery model. Collectively the consumer and provider are responsible for all issues, but the specific responsibilities of each vary in accordance with service type [Servicenow, 2013].

2.2 Cloud Market

Cloud computing market in the world is expected to grow 27.4% per annum and will be over \$55 billion by 2014 [IDC, 2010]. In particular, the business applications are expected to increase in the annual average of 86% so domestic companies need careful analysis and careful observation point. The current cloud world market is mostly dominated by the U.S. companies. Especially when applied to server virtualization, the top five's market share stand at about 96 percent. U.S. companies, such as Google and IBM, are expanding investment in cloud computing. HP and BMC are strengthening their own capacity through M&A [IDC, 2013].

Cloud computing market in Korea is expected to grow 47.6% per annum and will be over \$460 million by 2014 [IDC, 2010]. However, the current domestic software market is also predominated by competitive global enterprises. Domestic company is non-existent in markets of system, network management software, and storage. Moreover, market share of the top five foreign companies is over 50 percent [IDC, 2013]. In the period since almost 100 domestic companies took the plunge into software business, only 10 percent of them are successfully deployed on a commercial scale and many of them are still in early phase [KT, 2012]. So domestic companies could hardly access to domestic markets because of cutthroat

competition among domestic and against global companies [IDC, 2013].

In recent years, although some companies are securing the competitiveness with specialization, even the domestic market is difficult to enter because of U.S. companies. Therefore, if domestic companies cannot secure competitiveness, the anticipated rapid growth of the domestic cloud computing market is not meant, but will rather lead to strengthening the market power of foreign companies. This issue would directly affect the cloud computing industry in Korea. For this reason, this study analyze cloud computing business and explores factors affecting the activation of cloud computing, especially from the service provider’s perspective.

III. Research Methodology

3.1 Case Study Method

We adopted the exploratory case study methodology that was considered appropriate for this study for several reasons. First, a case study is ideally suited to complex phenomenon [Yu, 2013]. Because cloud computing business in-

volves multiple competitors and diverse users for each kind of service with three delivery models and four service types we mentioned above, it is intertwined with the environment where the business take place. Second, as the existing knowledge is not sufficient to test or confirm causal questions, an exploratory case study is more valid method than a confirmatory or explanatory case study research [Yin, 2003].

For case study, we selected company ABC, a cloud computing service provider leading the domestic supply market in cloud computing industry. Since its introduction of cloud computing in 2009, the company has taken the lead in helping users raise their awareness of cloud computing services and activating the domestic cloud computing market as a service provider. Data collection for case study was performed in two steps. In the first step, the company’s product data on its website, its PR materials, including seminar documents, and literatures related to the case study of the company were collected as the first data. In the second step, based on the first data, the interviews in the cloud computing service supplier of the company were used as the second data.

<Table 1> Characteristics of the Interviewees

	Category	No. of interviewees (persons)	Rate
Gender	Male	25	86%
	Female	4	14%
Job	Management planning/support	5	17%
	Business planning/support	4	14%
	Software Development	9	31%
	System R&D	8	28%
	Others	3	10%
Years of experience of IT related jobs	Less than 1 year	0	0%
	Between 1 and 2 years	0	0%
	More than 2 years	29	100%

The interview mainly focused on the question as to 'what are the influential factors on activation of cloud computing service?' To investigate the influential factors on activation, the interview was aimed at analysing as to what factors are promoting and hindering cloud computing supply, what processes were unfolded, and consequently, how the current state of cloud computing supply chain in Korea is. Of the 29 interviewees selected by ABC, 25(86%) were men, and 4(14%) women see <Table 1>.

3.2 System Dynamics with Causal Loop Diagram (CLD)

System dynamics (SD) is a methodology and mathematical modelling technique for framing, understanding, and discussing complex issues and problems [Forrester, 1961, 1969; Sterman, 2000]. Originally developed in the 1950s to help corporate managers improve their understanding of industrial processes, system dynamics is currently being used throughout the public and private sector for policy analysis and design [Michael and Robert 2008]. What makes using system dynamics different from other approaches to studying complex systems is the use of feedback loops and flows. It is used to look into a complex system wholly and structurally and thereby analyse the influence of a variety of relevant factors and solve problems. In the system dynamics methodology, it is possible to simulate diverse policies and strategies and assume non-linear changes [Yu *et al.*, 2013]. For the reason, the methodology is used as a frame of reference for the phenomena occurring in complicated causal relations [John, 2000].

Previous research used CLD (Causal Loop

Diagram) for case analysis in different contexts, such as change management in inter-organizational systems for the public [Sutarno *et al.*, 2008-9], a case study of interactions between critical factors [Akkermans and Helden, 2002], and an information systems project [Kim and Pan, 2006]). For the development of CLD in the context of cloud computing, this study tried to analyse and define the current state of cloud computing in the system dynamics methodology; extract the inhibiting and promoting factors of activation from an interview-based case study; analyze the causal relations of the extracted factors; and make suggestions for cloud computing activation [Kim *et al.*, 2011; Son *et al.*, 2013]. CLD, a key to the system dynamics approach, is used to diagrammatize the interactions of potential causes and make feedback loops [John, 2001].

The diagram is made up of three elements. First, an arrow represents the causal relation of variables. The starting point of an arrow means a cause variable, and its end point means an effect variable. A sign represents a direction of the causal relation (+/-), '+' sign means that two factors change in the same direction, and '-' sign means that two factors change in a different direction. The '=' sign means Time Delay [Kim *et al.*, 2011]. When such causal links create one close loop, it is called a feedback loop, which is defined as a reinforcing loop and a balancing loop. In a reinforcing loop, when a variable changes, the effect returns to the variable so that the variation is reinforced. In a balancing loop, when a variable changes, the effect returns to the variable in an opposite direction so that each balance is in balance. When a feedback loop has the causal links, all of which are denoted with '+', or have an even number of the causal links

denoted with ‘-’, the loop is a reinforcing loop. When a feedback loop has an uneven number of the causal links denoted with ‘-’, the loop is a balancing loop [Kim *et al.*, 2011]. As a qualitative model, the causal loop diagram is used to analyze the interaction and effect of various phenomena through system analysis and qualitative simulation.

IV. Case Study: ABC Case

4.1 Introduction of Cloud Computing Services

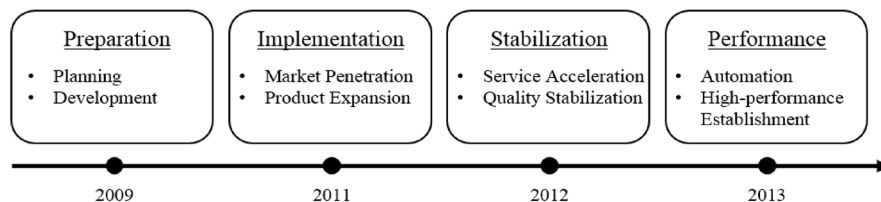
The company ABC’s cloud computing business are presented to aim at immediately responding to the changes of the management environment caused by the rapidly changing ICT ecosystem. In the backgrounds, as shown in <Figure 1>, the company ABC prepared for introducing cloud computing in 2009, performed planning and development to release personal cloud computing products in 2010, and advanced in the cloud computing market on a full scale by launching ‘Cloud Server’ service in the early 2011. ABC have continuously launched diverse cloud service products including IaaS, PaaS, and SaaS since 2011. In the beginning, the company had yet to make a big success because of some issues, including information leakage and concern about the system stability. However, the

company exerted its most efforts to advance the quality of cloud computing services and ended up stabilizing cloud computing by acquiring various certificates in 2012 [KT, 2012]. Thanks to such efforts, ABC is recently equipped with the business environment of the cloud computing service with high performance as service provider.

4.2 Efforts and Achievements

The company ABC reached up its level to Amazon’s, the world’s best cloud computing service provider, in terms of system performance, network quality, SLA level, security and price. In November 2011, the company was approved by Cloud Harmony specializing in the test of cloud computing performance [KT, 2012].

In addition, to enhance the quality of cloud computing service, the company implemented center & system replication designs in Cheonan, Mok-dong, and Gimhae CDCs, and established cloud operating governance system with its experience of the establishment and operation of its private cloud system. In July 2012, the company received ‘the 1st cloud service provider’ certificate from Korea Communications Commission. To meet clients’ needs, the company expanded and advanced products. Now it is equipped with the Korea’s largest product line-up. Compared to domestic and foreign competitors, the company has the best competitiveness in terms of



<Figure 1> Company ABC’s Cloud Computing Business Progress

product price.

By making such ceaseless efforts, the company ABC provides cloud services for many different industries, such as entertainment, press media, and finance. As a result, many domestic firms are using the company ABC's cloud products to achieve cost saving and work efficiency.

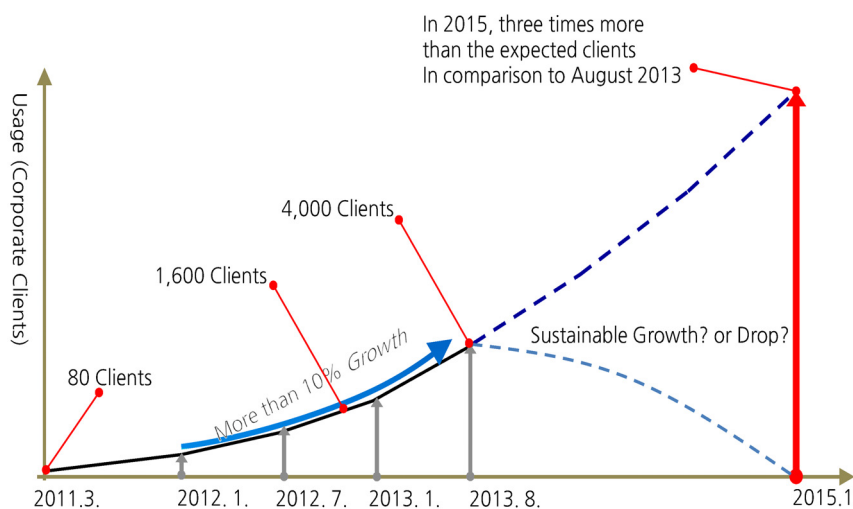
V. Analysis Results

In this study, as shown in <Figure 2>, 'Used amount of cloud computing services for enterprise' was regarded as a reference model, based on 'The present and future of cloud computing and market strategy' in light of the study mentioning that the growth conditions of cloud computing is the spread of corporate demand [KIPA, 2008]. And the inhibiting and promoting factors of the activation of the domestic cloud computing market were extracted with the exploratory study of expert interview and actual case study of the company ABC that is leading the domestic cloud computing market. Causalities of the extracted

factors were analyzed with system dynamics research methodology to derive main issues, and then present several key issues and propose alternatives for activating cloud computing market.

5.1 Reference Model

Company ABC's had 80 corporate clients of cloud computing products in March 2011 when 'Ucloud CS' products launched, 1600 companies at the end of 2012, and more than 4000 companies in August 2013 [KT, 2012]. However, according to expert interview results, the current ABC company's corporate client (used amount) remained still insufficient level by comparison with the cloud computing business investment (CAPEX) and operational expenses (OPEX). There has been also rarely large-scale corporate client with many obstacles such as system failure and information disclosure concerns in the domestic cloud computing market [Subashini and Kavitha, 2011; Paquette and Wilson, 2010; Pearson, 2009]. Therefore, the situation scarcely warrants that company



<Figure 2> Company ABC's Reference Model

ABC made their cloud computing business successfully settled in the market.

Company ABC now wishes a continuous growth in the number of corporate clients and activating cloud computing business enables by securing large-scale corporate client. Ultimately, what they want is to reach the break-even point through the activation of the market. However, the company is concerned with the market failing to overcome the various obstacles mentioned above. Most of domestic companies promoting cloud computing business lie in the similar situations like company ABC. Moreover, in recent years the global leaders in cloud computing, such as Microsoft and Amazon, are beginning to threaten the domestic market.

This study extracts the factors to activate the domestic cloud computing market through a case analysis, analyze cases through interviews with experts at a cloud computing provider, and look into relevant issues through the analysis of the collected data by system thinking approach. Also, it tries to diagrammatize the analyzed results with the use of Causal Loop Diagram (CLD); to use the causalities of the extracted factors to derive the main issues arising in activating the cloud computing market; and finally to propose high-levelled alternatives for booming cloud computing market.

5.2 Analysis Framework of Causal Loop Diagrams

The influential factors of cloud computing are defined as the promoting factors and the inhibiting factors. The promoting factors mean the positive effect generated by a sense of fear for survival in the changing ICT environment and by the

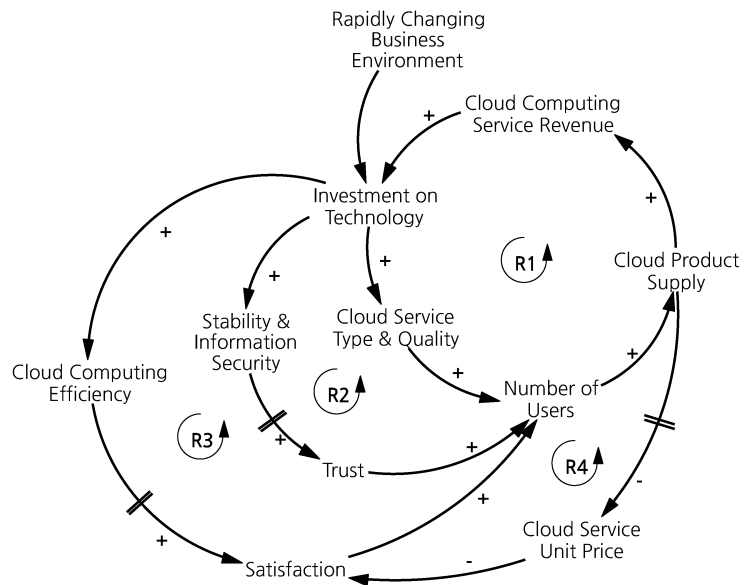
profits gained by cloud computing business. The inhibiting factors are a firms' fear and resistance in the circumstance of cloud computing introduction and activation, the cloud business department's lowering morale and productivity, and obstacles to cloud computing introduction. The effect of inhibiting factors causes the management and employees to preferring conventional work processes, leading into a reduction in a cloud computing use rate.

The analysis result consists of four promoting loops and five inhibiting loops. Based on the result, the main issues were extracted and the final alternative causal loop diagram (CLD) was proposed. Regarding the CLD analyzed by the systems thinking approach, the result from the analysis of promoting and inhibiting loops from a provider's point of view was applied to extract main issues and propose alternatives and the final CLD.

5.3 Causal Loop Diagram of the Promoting Factors of Activation

In regard to cloud computing, an expert at the company ABC mentioned "The development of cloud computing technology leads into a rapid change in the ICT environment. As a result, relevant firms quickly respond to the changing management environment and make an investment to defeat other competitors. Such an investment results in an improvement in the quality of cloud computing service and a rise in a supply of service products which increases sales."

As shown in <Figure 3>, such a process creates a basic loop for activating the cloud computing market, in which the increasing sales trigger an



<Figure 3> CLD for Reinforcing the Use of Cloud Computing Service

investment again into the development of cloud computing technology and end up improving the quality [R1]. According to the interview result, a cloud computing provider should first reinforce a virtuous circular loop in which the provider makes an investment into improvements of system stability and information security to gain client' trust and thus increase the number of users and a supply [R2]; secondly the provider should create a loop of promoting the activation of the virtuous circle, in which the provider continues to develop the extensibility and accessibility of IT resources to improve the efficiency of cloud computing and thereby achieve client satisfaction to increase a supply [R3]; and thirdly, when the above virtuous circular loop works well, it is possible to create a virtuous circulation based reinforcing loop of activating the cloud computing market, in which a large increase in a supply causes a fall in cloud service use price and thereby helps increase fur-

ther user satisfaction, the number of users and a supply and finally achieve economies of scale [R4].

5.4 Causal Loop Diagram of the Inhibiting Factors of Activation

An expert interviewee said, "A rise in users of cloud computing brings about 'Cannibalization' which affects the sales of existing IT products, and therefore it is hard to actively promote cloud computing products in TV and media press." [B1] Also, he mentioned "Thanks to the resistance of the organization related to conventional business in the cloud computing provider, it is possible to delay the launch of cloud computing products." [B2] Such a process creates a basic loop of balancing activation, in which a rise in a supply fails.

An expert referred to the failure case of DuPonts and said, "As global competitors with

better technology enter into the domestic market, clients' preference to global firms' products rise, and the value of domestic firms' products falls. For the reason, to keep up with the global competitors' quality service, domestic firms excessively try to introduce the cloud computing service far apart from their core competence and end up facing failure." Such a process creates a vicious circular loop of inhibiting activation of cloud computing [B3].

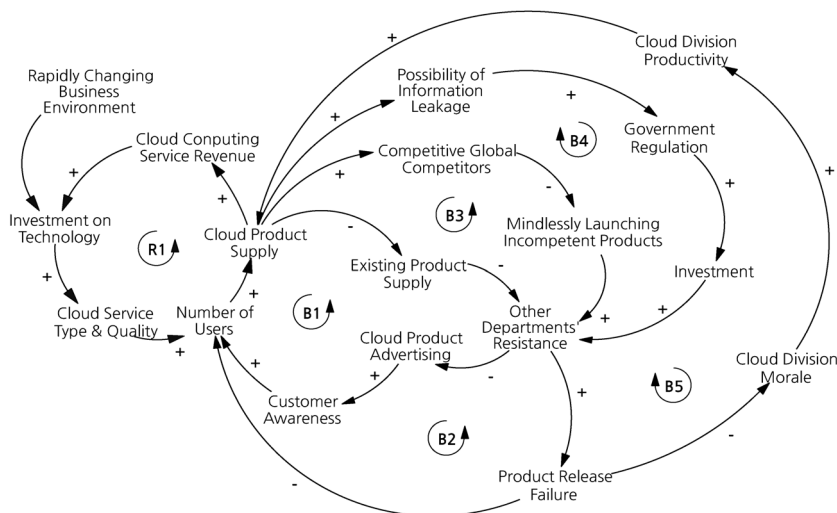
According to cloud quality enhancement regulations of the government organization, a cloud computing provider increases its investment to multiply systems and comply with standards, and consequently meets resistance of other groups than cloud computing related departments and delay the launch of cloud computing products. That is a reinforcing loop of inhibiting activation of cloud computing [B4]. In addition, as an investment in cloud computing facilities and the operation cost continue to remain high, the resistance of conventional groups causes a fall in the morale of cloud related departments,

which results in lowering productivity and ends up inhibiting a rise in a supply. As shown in <Figure 4>, that is a vicious circle loop of inhibiting activation of cloud computing [B5].

5.5 Summary of Analysis Results

Based on the interviews with experts at the cloud computing provider ABC, a case study was conducted to activate the domestic cloud computing market. The interview data were examined by literature review and the case study of the company ABC. After that, a causal loop diagram was used to analyze issues and alternatives for the promoting and inhibiting factors to activate the cloud computing market.

To sum up, the issues arising in activating the cloud computing market are a sense of crisis over the management environment being rapidly changed by the development of the ICT industry, the stability and efficiency of cloud computing services, and an increase in clients. To address the issues, it is necessary to enhance the efficiency



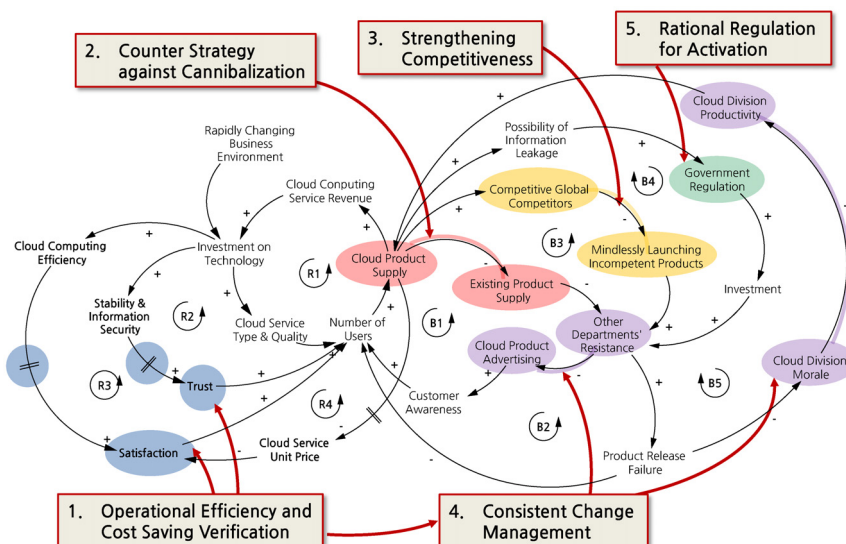
<Figure 4> CLD for Balancing the Use of Cloud Computing Service

of IT operation which is created by the switch to cloud computing and to alleviate relevant firms' concerns about the quality of the service. In fact, it takes much time until service providers earn client' trust and satisfaction. Therefore, the providers need to make efforts to shorten the time. An alternative to that is to make a successful case like successful joining of large-size corporate client (e.g., public organizations) in cloud computing services and thereby to promote the service.

The issues arising in inhibiting the cloud computing market can be summarized as the cannibalization effect according to which the sales of conventional IT products fall with the increasing use of cloud computing service; domestic firms' premature launch of cloud computing products regardless of their core competence in the circumstance where global competitors with better technology enter into the domestic cloud computing market; the government organization's regulations to minimize system failure or information leakage; resistance of other groups than cloud

computing related departments in providers; failure of launching products because of obstacles for cloud computing service; and lowering morale of the executives and staff in cloud business division and falling productivity.

As an alternative to address the issues, it is necessary to specify the cloud computing market, position strategic products, and make customized target advertisements to respond to the cannibalization effect. In addition, it is urgent to develop and launch cloud computing products which reflect a provider's distinct value on the basis of its core competence. Also, it is necessary for the government to come up with reasonable regulations and support policy in the participation of the firms demanding and providing the service. To stir up the morale of the executives and employees in cloud computing departments and mitigate resistance of other groups than cloud computing related departments, it is necessary to operate a cloud computing promotion center and constantly manage the changes of



<Figure 5> Overall CLD with Suggestions

the cloud computing environment.

As shown in <Figure 5>, a causal loop diagram of integrating the promoting loops and inhibiting loops extracted above is proposed. The alternatives for the issues drawn are displayed in the boxes.

VI. Discussion and Implications

6.1 Discussion and Suggestions

In reinforcing circular structure of the activation of the cloud computing market, enhancing cloud operation efficiency and activating the cloud computing based application industry, including smart work and big data contribute to achieving client satisfaction which increases a use rate of cloud computing. In the balancing circular structure, the negative factors-relevant firms' insistence on conventional IT application methods on account of their concern about quality, cannibalization effect, the government regulations, the launch of products irrelevant to core competence, and entailing resistance of other groups than cloud computing related departments, and lowering morale and productivity of cloud computing departments-cause a fall in a use rate of cloud computing.

Suggestions for activating the cloud computing market can consist of two types: reinforcing the positive circular structure of the above CLD and weakening the negative circular structure. In the positive circular structure, as a plan for shortening the time of improving client's trust and satisfaction, it is necessary for cloud computing providers to make operational efficiencies and cost savings verification. For this issue, it

is necessary to make their efforts to find success cases for securement of large-scale corporate client or for others. It also needs to try to vitalize cloud-based appliance industry such as smart work and big data through government's institutional support and related research activity. They also need to enhance cloud computing efficiency through improving data processing performance in cloud system and access quality for accessibility of IT resource.

It is also necessary to come up with a plan for addressing such issues in the negative circular structure. First, cloud computing providers need to establish the strategies of responding to cannibalization. It can be useful to develop strategic product positioning through cloud market segmentation and targeted advertising aimed to client segmentation. Secondly, they need to develop the differentiated cloud product based own core competence. It is an applicable way to create a synergy effect with the core capabilities of another company for the issue. Finally, they need to make constant efforts to manage organizational changes and develop consensus at an organizational level.

Additionally, the government organizations need to prepare reasonable regulatory measures and institutional support programs. It is possible ways to establish a special law for the activation of the cloud services and practical support through participation of cloud user and supply company for regulatory policy.

6.2 Limitations and the Future Research Direction

Although it has been four years since the full-scale introduction of cloud computing in

<Table 2> Summary of Issues and Suggetions

Issues	Suggestions
Excessive time consuming for improving customer loyalty and satisfaction	Operational efficiencies and cost savings verification such as finding and promoting big succession cases
Supplier's internal cannibalization by overlapped characteristics with existing cloud service products	Counter strategy against cannibalization such as market segmentation, customer segmentation, strategic product development, or strategic targeted advertisement
Developing copied service products due to decreased domestic product value as strong global competitors entered domestic market	Strengthening competitiveness by developing product with core competencies
Resistance of other departments to cannibalization and overspending investment by cloud department	Consistent change management on internal organization such as operating cloud computing information center
Decreasing productivity and morale of cloud department	
Government regulation to strengthen cloud service quality	Establishing rational regulation policy through participation of supply company and customer

Korea, the domestic public cloud computing market has yet to be activated. Therefore, this exploratory study was conducted. But, it has limitations as follows:

First, although this study analysed the promoting factors to activate the cloud computing market by investigating the case of the company ABC, it didn't verify and prove the actual effectiveness of the introduction of cloud computing because of the poor activation of the domestic cloud computing market. Secondly, to secure the representative nature of a case, this study chose a company leading the domestic cloud computing market. However, by focusing on a specific company, it didn't look into various influential factors appearing in other firms or other industrial areas. Thirdly, this study chose an exploratory study model based on interviews, so that it had a limited number of samples and might reflect this researcher's subjective opinion in interpreting the interviews with experts. Fourthly, after having interviews with experts,

this researcher developed causal loop diagrams and examined them together with some interviewees. In other words, this study failed to perform and update constant examinations together with all interviewees. Therefore, there is somewhat a lack of completeness.

In the future study, it will be necessary to investigate the quantitative effect of cloud computing since the introduction of public cloud computing in Korea and investment in the service, and to analyse various cases. Additionally, it is required to develop the causal loop diagram proposed in this study, to make a more detailed and elaborate model, and perform other empirical studies.

6.3 Implications for Research and Practice

The study contributes by explaining the critical issues for the development of domestic cloud industry from the cloud service provider per-

spective. Although previous research has examined several aspects of the cloud computing service—e.g., the development direction for the future cloud computing service [Park, 2009; Kim *et al.*, 2009], the political and legal direction [Kim *et al.*, 2013], the factors affecting the performance expectancy and the intention to use cloud computing service [Lim and Oh, 2012], the organizational characteristics, environmental characteristics and moderating effect of organizational supports as factors influencing the diffusion of cloud computing [Kim and Kim, 2012], and the factors of IaaS adoption intension [Seo, 2013]. In contrast, our study focuses on cloud computing industry and the business from the service provider perspective. Our study thus contributes to the literature by exploring and explaining what issues are critical and how to improve the situation based on the identified issues from the cloud computing service provider perspective. Especially, as cloud service provider's role is getting more important as an IT advisor, the issues and suggestions extracted from service providers can be meaningful progress for future research.

Further, this study adds to the literature by demonstrating how systems thinking approach with CLD can be applied in the context of cloud industry. Especially, our study shows how systems thinking approach with CLD can complement an interpretivist approach in case research, whereas most case studies, especially with the interpretivist approach, are lack of supporting

tools in interpreting target case [Kim *et al.*, 2009; Park, 2009]. The systems dynamics with CLD has also implication in transforming tacit to explicit knowledge. Especially, use of CLD with graphical representation of factors and relationships among them helps facilitates externalization and combination of knowledge that resides in mental models of interviewees [Kim, 2011].

From a pragmatic perspective, this study has implications for cloud business. Whereas the previous studies mainly focused on the customers of the complex cloud ecosystem including providers as well as consumers [Seo, 2013; Jung and Namn, 2014], this study looked into the difficulties and obstacles that service providers have in running the service. Therefore, this study is expected to provide new perspectives of cloud computing that Korean IT companies, who have tried to find a new growth engine, should understand at first. Furthermore, this study analysed the causal relationship between the promoting and inhibiting factors which are extracted from an actually leading cloud computing provider in Korea. Therefore, this study is expected to serve the realistic and effective guidelines for the companies which will perform a cloud computing business and the government organizations which are able to establish and draw up relevant policies. Ultimately, the results of this study are expected to help activate cloud business in Korea by minimizing the potential negative effects of activating cloud computing services.

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Submitted : March 31, 2014

1st revision : July 17, 2014

2nd revision : October 15, 2014

Accepted : October 27, 2014