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THE ROLE OF IT IN A HEALTHY BUSINESS ECOSYSTEM: AN EXPLORATORY STUDY OF THE KOREAN CAPITAL MARKET FROM A KEYSTONE COMPANY'S PERSPECTIVE

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Abstract

The business environmental structure is constantly being shaped by customer's desires and market dynamics. A large number of loosely interconnected participants make up a business ecosystem, and offers a customized and complete set of products and services. In a business ecosystem, the competitiveness of a company is influenced by its own capability and its interrelated partners' capabilities. Therefore, a company should enhance not only its competitiveness but also related companies' capabilities. To do this, a company has to find its place in the business ecosystem to make a complete business strategy using IT. This paper provides business ecosystem strategies and academic guidelines from the perspective of a single company. Firstly, a business ecosystem perspective is conceptualized, and the importance of a keystone company's role in the ecosystem is examined. Then, using a case study method, focus is put on the keystone's IT capabilities that pave the way for a healthy business ecosystem. This paper explores the Korean Capital Market as an example of a business ecosystem and finds the role of IT, particularly from the perspective of a keystone company. Through this study, it is confirmed that the keystone company's IT capabilities play an important role in the healthy business ecosystem. This paper provides guidelines to practitioners in keystone companies and gives ideas to IT researchers.

Keywords: Business ecosystem, Healthiness, IT role, Keystone, Korean capital market ecosystem.

1 INTRODUCTION

The size and scope of an industry are determined by customer demands (Rothschild 1990). Diverse and specific customer needs bring to a complex business environment a complete set of products and services from a number of interconnected companies. It indicates the importance of business relationships and partnerships (Iansiti 2005, Bleecker 1994) and the limitation of a single corporation's strategy for producing valuable products (Adner 2006). For the better understanding of complicated business environments, presented is a holistic view of a business ecosystem, a concept which is birthed from ecology and "network thinking."

Previous studies (e.g., Moore 1993) emphasized the importance of an ecosystem-based perspective in business. A business ecosystem is defined as an extended business network which includes customers, competitors, suppliers, retailers, and other financiers (Moore 1993, Iansiti & Levien 2004, Vuori 2005, Iansiti & Richards 2006). Each constituent of a business ecosystem doing its business is weightily related to other entities' value in the same business ecosystem. In other words, the values composing a product or service are flowing from one to another in the business ecosystem. It is comparable to the relationship of living things with one another in a natural ecosystem. Therefore, interrelated companies have the common goal of making their business ecosystem healthy, because a collapse of some entities can be critical to other entities (Kim & Lee & Han 2007). Therefore, the overall healthiness of a business ecosystem is crucial in entities' sustainable survival as the competitiveness or capabilities of a single company influences, and is influenced by, other related companies.

Iansiti and Levien (2004) presented the concept that a keystone company is important to a healthy business ecosystem. They said that a keystone company has to effectively manage its business ecosystem to gain advantages from it (Iansiti & Levien 2004, Iansiti & Richards 2006). However, there is no study that provides actionable guidelines on how to make a business ecosystem healthy and what is the role of IT in it. To overcome the problem, this study tries to provide a feasible strategy that addresses this issue, using the concept of healthiness, especially in the aspect of Information Technology (IT).

The questions that this paper attempts to answer are the following: *(1) why do we have a concept of a healthy business ecosystem?*; *(2) how can a keystone company play an important role in a healthy business ecosystem?*; and *(3) how does a keystone company's IT capabilities bring about healthiness in the ecosystem, for itself and for other entities?* More specifically, the purpose of this study is to identify the major dimensions of healthiness in a business ecosystem by doing an in-depth literature review and exploring the role of IT using a case study approach. This paper applies the business ecosystem concept to the Korean Capital Market, because studying the Korean financial industry is necessary for understanding the vital flows among complicatedly related financial companies and their great need for IT. This paper also investigates a number of related documents about financial regulators and related companies composing the Korean Capital Market Ecosystem (KCME). In addition, in-depth personal interviews with high and middle administrators of the Korea Exchange (KRX) as a central company and other entities are provided. The findings of this study serve not only as a groundwork for researchers seeking to understand the issues in business ecosystem, but also to afford practitioners with guidelines on how to make their business ecosystem healthy and eventually improve their performance.

First, a review is presented on the definition and the basic concept of a business ecosystem. In this part, a brief overview about healthiness and the role of a keystone company is discussed. Second, the paper presents a conceptual analysis of the role of IT in a healthy business ecosystem. Then, a case is developed about the KCME in order to explain the importance of healthiness and the IT capabilities of a keystone company in a business ecosystem. Finally, the paper discusses research findings and issues about a business ecosystem's IT, and describes the implications of our work for IS managers and researchers.

2 LITERATURE REVIEW: BASIC CONCEPTS OF BUSINESS ECOSYSTEM

In the 1970s, an ecological perspective was introduced to the organizational research (Young 1988, Vouri 2005), and it was adapted by many researchers in the field of business. This effort paved the way for the business ecosystem perspective. After the introduction of the business ecosystem's perspective by James Moore (1993), it aroused the interests of both researchers and practitioners. Although there is no universally accepted definition, a business ecosystem can be understood as a network comprising suppliers, customers, distributors, outsourcing firms, makers, service providers and technology providers (Moore 1993, Iansiti & Levien 2004, Iansiti & Richards 2006).

Many studies emphasized that the business ecosystem concept gives us an understanding of the business environment and helps us create new opportunities (Adner 2006, Kim & Lee & Han 2007). In a business ecosystem, companies are considered as nodes in a network (Rothschild 1990) and their relations are dynamic (Gossain and Kandiah 1998). As time goes by, the boundary is dynamically changed as some nodes are wiped out and new ones crop up (Rothschild 1990). Although drawing the boundaries of an ecosystem is difficult (Iansiti 2005), the business ecosystem perspective is useful as an ecological and holistic lens for viewing all of relationships and flows (Abe et al. 1998, Kim & Lee & Han 2007). In a business ecosystem, an individual company has to consider interrelated companies because the complete set of quality products is made by many other companies. In view of that, business value can be defined by companies' competitiveness and interrelated companies' capabilities. The business ecosystem perspective is a window to the flow of value and the competitiveness among diverse companies.

Iansiti (2005) argued that companies have to build a healthy business ecosystem. Similarly, James Moore (1993) discussed the importance of a rich business ecosystem which is strong enough to grow and be profitable. Healthiness, however, is the capability within interrelated companies to provide comparative advantages to other companies (Kim & Lee & Han 2007). From these definitions, a healthy business ecosystem is where companies can easily reach their business goal through exchanging vital values on a reasonably stable structure and process between companies. Therefore, healthy business ecosystem can be achieved by the entities' and relationships' healthiness.

For building a reliable strategy in a business ecosystem, healthiness should be clearly defined. Moore (1993) said that stable and profitable business ecosystems are the desirable state for each company. Iansiti and Levien (2004) emphasized that a healthy business ecosystem should be robust, responsive, productive, innovative, and predictable. They explained healthiness as the following three dimensions: robustness, productivity, and innovation (Iansiti & Levien 2004, Iansiti 2005, Iansiti & Richards 2006). It was a valuable work but replenishments are needed. They explained that the survival rate of companies, their ROI, and their products' diversity are measured for evaluating healthiness, however this process is limited. Also, the set of companies in a business ecosystem is perceived a population. In organizational population research, companies are regarded as the same species. Same species can be considered as companies in the same industry. However, according to the basic assumptions about business ecosystem, it extends over an industry and a market (Moore 1993), and diverse companies, customers, and non-profit organizations are included in it (Abe et al. 1998). Apparently, a business ecosystem should be understood in the context of individual companies and not that of a population. In this paper, healthiness is defined in the level of the relationships and structures among diverse companies.

We concretize the three dimensions of Iansiti and Levien (2004) by modifying plausible meanings and adding an important dimension in order to provide the complete meaning of healthiness. We redefine the dimensions between companies in the relationship level. First, as Iansiti and Levien (2004) emphasized, companies must keep their sustainability and viability to confront environmental threats (Kim & Lee & Han 2007). To do so, the relationships between companies should be robust enough keep it safe from external dangers and threats. Therefore, '*robustness*' is the first dimension of healthiness. Second, diverse products can provide a greater choice and reliability to the customers (Iansiti & Richard 2006, Kim & Lee & Han 2007). The relationships have to consistently transform

the raw materials to increase the number of valuable new products and services. Therefore, ‘*creativity*’ is considered as the second dimension. Third, companies are able to produce more with the same or less input by having effective and efficient inter-organizational business processes in a business ecosystem. Therefore, the concern of companies should be on how to enhance their ‘*productivity*,’ which is the third dimension of healthiness. Finally, a company should have ‘*interoperability*’ to work with other companies. It is the starting point in building diverse relationships with other companies having higher business capability. Interoperability means the ability to make a new relationship without long term preparatory proceedings. If a company is equipped interoperability, it can make a stable relationship in a business ecosystem (Abe et al. 1998, Rothschild 1990). Overall, if companies create a higher level of robustness, creativity, productivity, and interoperability, they can easily have a healthy business ecosystem.

Although each company in a business ecosystem has its own role and responsibility, a few central companies are more important than others in terms of healthiness (Iansiti & Levien 2004, 2006). They are named as “keystones,” which serve as a platform obtaining the greatest advantage from the ecosystem members. It is able to pick a keystone company using the centrality that reveals how many diverse companies’ transactions are related with the company’s core business. The role of a keystone is generally to provide basic information/knowledge through an IT platform to the ecosystem members. The ecosystem members can create more values using advantages acquired from the platform. Therefore, the platform of a keystone is the foundation of symbiotic relationships in a healthy business ecosystem. Through the literature review, some significant concepts such as business ecosystem, healthy business ecosystem, healthiness, keystone and related issues are summarized in the Table 1.

Concepts (Key terms)	Conceptualization	
	Assumptions	Issues (Questions)
Business ecosystem	A business ecosystem is a loose business network comprised of diverse companies. The boundary is changeable, and it is difficult to find out.	What is a real feature of a business ecosystem?
Healthy business ecosystem	A healthy business ecosystem is where companies can easily reach their business goal through exchanging vital values between companies in a same business ecosystem.	How can a company define a healthy business ecosystem in the real business world?
Healthiness	Healthiness is an indicator that reveals the condition of a business ecosystem. Interoperability, robustness, creativity, and productivity are important to enhance healthiness.	How can a company improve the healthiness of their business ecosystem?
Keystone	Keystone company is a platform obtaining the greatest advantage from ecosystem companies, and provides common resources to the companies.	What is an important factor of a keystone in the ecosystem’s healthiness?

Table 1. *The summary of key concepts and issues*

3 ANALYZING THE ROLE OF IT FOR HEALTHINESS FROM A KEYSTONE’S PERSPECTIVE

In creating value, the role of IT is a traditional issue (Piccoli & Ives 2005). Under the concept of business ecosystem, IT can play an important role for individual companies and the overall business ecosystem by enhancing their healthiness. To provide basic guidelines to individual companies, the role of IT in a business ecosystem should be clearly defined. Most of all, IT is not only a platform of the business ecosystem but also a primary platform of a keystone company. It means that IT can provide comparative advantages to the keystone company as it promotes the overall healthiness of the ecosystem. Therefore, the role of IT in a keystone company should be defined and evaluated from the keystone’s internal and external viewpoints.

First of all, keystone’s IT should regulate responses to internal and external stimuli. IT should manage information flows for robustness with other entities (Kim & Lee & Han 2007) and provide communication tools between entities for a stable ecosystem. Furthermore, IT has to provide a degree

of predictability to each entity and enhance the productivity of the ecosystem for it to be rich and healthy. Table 2 reveals how keystone's IT can support the business ecosystem's healthiness. In the following case study, this paper investigates how IT actually enhances the healthiness of a business ecosystem in terms of four major dimensions identified in this study.

Healthiness		The role of IT in a keystone company
Four healthiness dimensions	Interoperability	Keystone's IT should permit stable and regular communication with other entities.
	Robustness	Keystone's IT should offer a fast response time between entities and should guarantee the healthy flows of information and knowledge.
	Creativity	Keystone's IT should stimulate other entities' innovation and should be an analyzing tool to obtain valuable information and knowledge.
	Productivity	Keystone's IT should be able to support each entity's productivity. It should be able to bring entities into action.
Overall healthiness		Keystone's IT should regulate responses to internal and external stimuli and sense external changes of the business ecosystem.

Table 2. *The role of IT for healthiness dimensions*

4 RESEARCH METHODOLOGY

The theoretical and empirical research foundations of a business ecosystem are significantly insufficient. So, we need more useful and detailed knowledge about the business ecosystem phenomenon. To do this, ecosystem related studies are reviewed for having a better understanding of the management dilemma in the aspect of IT. In this study, the Korean capital market was selected as a business ecosystem, because numerous financial companies are striving for their survival and enhancement in the capital market ecosystem and they are closely interdependent with other financial companies and regulators. Also, the Korea Exchange (KRX) was considered as a keystone of the business ecosystem because it provide information and regulation platforms for intermediating the exchanges of stocks, futures and options.

This study was designed based on an exploratory study using an in-depth case analysis. The data were collected from Feb. 2006 to Jan. 2008 from diverse sources. First, the data were gathered from internal sources of the KRX, such as semi-structured interviews, direct observations, and indirect questionnaires in the company. Data was also gathered using a questionnaire from the partner companies of the KRX. Second, private documents such as management, financial, operational, and consulting documents of the company were used to complement the results of the interviews and observations. Public data such as annual reports, research reports, newspapers, and magazines were also reviewed. Third, each author investigates the role of IT and its impacts on the KRX's performance and other companies in the business ecosystem.

Finally, the collected data were analyzed systematically with the concept of healthiness, business ecosystem, keystone, and IT. Most of all, the role of IT in a keystone company was investigated through a series of interviews and questionnaires. The questionnaire was answered by IT managers and IT users of the company and partner companies. The results were then matched with other sources. The structure of IT and the development processes of new information systems were closely observed inside the company. The observations were interpreted according to the authors' conceptual foundations about business ecosystem.

5 HOW TO MAKE THE KOREAN CAPITAL MARKET HEALTHY USING IT

5.1 The Korean Capital Market Ecosystem

The capital market is one example of a business ecosystem. This study classified the Korean Capital Market as a business ecosystem and used the term ‘Korean Capital Market’ as a narrow definition of the ‘Korean Stock Market,’ since the ‘Loan Market’ was excluded. The Korean Capital Market Ecosystem (KCME) is made up of social capitals, finance companies, listed enterprises, and investors. They are independent entities such as the financial supervisory service, the Korea securities depository, the bank of Korea, the Korea securities finance corporation, the Korea Exchange, and many entities in business domains such as insurances, banks, securities, and so on (See Table 3).

Constituents of the Korean Capital Market Ecosystem (Companies and Social Overhead Capitals)				
Single Entity	Domain (Group of Entities) *Index: Feb., 3, 2008			
	Domain Name	Quantity	Sub-domain Name	Quantity
Korea Exchange (KRX)	Listed Company	1778 (1951 listings)	KOSPI	751
			KOSDAQ	1027
Korea Securities Finance (KFSC)	Securities company	77	Domestic securities	39
			Foreign securities	14
Financial Supervisory Service (FSS)			Domestic bank	16
			Foreign bank	8
Korea Securities Depository (KSD)	Futures company	56	Domestic futures	12
			Foreign futures	0
Bank of Korea (BOK)			Domestic securities	35
			Foreign securities	9
Government	Bond issuer	922	Won-denominated	869
			Foreign currency	63

Table 3. Constituents of the Korean Capital Market Ecosystem

Because drawing the definite boundaries of a business ecosystem is not an easy take (Iansiti 2005), it is helpful to subdivide a complex ecosystem into diverse related groups of companies or business domains (Iansiti & Levien 2004). Following this comment, we defined the KCME and classified it into several groups. After defining the main mechanism about ‘Stock Exchange’, related organizations such as Social Overhead Capitals (SOC), government regulators, individual finance companies were identified. Then, entities doing a similar business were formed as a group. Finally, interactions or flowing of values were linked between entities in the ecosystem. Figure 1 showed the simplified structure of the business web of the KCME.

In this business web, diverse phenomena were observed. First, numerous companies who have diverse goals work closely with related other companies. Second, activities in a company such as developing finance products and services and providing financial regulations influence the decision making of the other companies. Finally, their dynamic reactions are similar to that of a living thing in a natural ecosystem. Internal competitions in each domain and numerous acts of cooperation between domains are observed as well. Therefore, we can say that balance is important in this complex web.

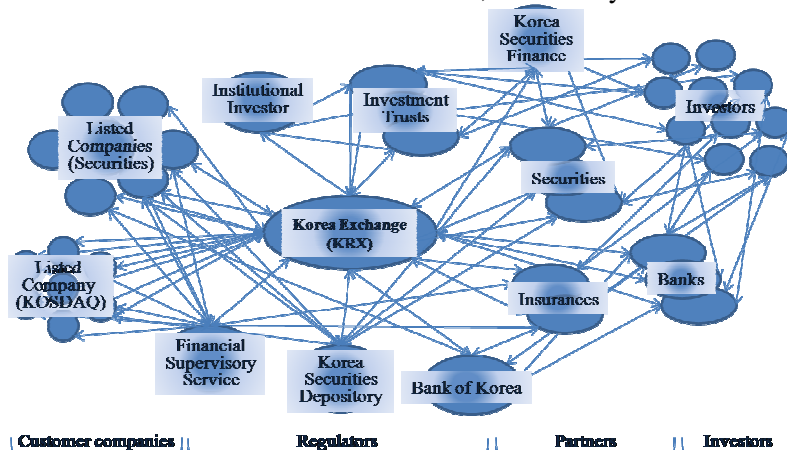


Figure 1. The Korean Capital Market Ecosystem

5.2 Healthiness of the Korean Capital Market Ecosystem

The Korean Capital Market Ecosystem (KCME) is evaluated as a minor capital market in the world. The KCME is affected by the rise and fall of the indexes in major capital markets (Bin & Kang 2007). Besides, the fluctuations of exchange rates influence the behaviours of foreign investors in the KCME. Moreover, the moving of foreign investors affects the purchasing rate of the Korean individual investors (Oh & Han 2007). It means that the KCME has a weak foundation compared to other major global markets such as that of New York or the London capital market.

This case defines the Korean capital market as a good example of a business ecosystem. In the capital market, many companies, investors and listed companies are working with others. In other words, each business is complicatedly interrelated. In the age of keen competition, the KCME has to maintain its ecosystem's healthiness. Therefore, companies' and investors' satisfaction make a healthy and rich capital market ecosystem. For example, when a securities company produces value to an investor, he tends to invest more in the capital market. At that time, intermediary fee of a new investment can be a return to the securities company. On the other hand, the investment can be a valuable capital of a listed company. The plentiful capital attracts a latent company to list in the Korea Exchange (KRX). The cycle leads to a healthy KCME.

5.3 The Korea Exchange as a Keystone

Keystone companies share resources, make balances and provide new technology platforms (Iansiti & Levien 2004). Furthermore, a keystone company obtains the greatest advantages from the business ecosystem members (Iansiti & Levien 2004). When a company wants to list its stocks or futures, the company goes through a listing process which is provided by the Korea Exchange (KRX). When a securities company exchanges a stock, the company connects to the KRX trading system. When an investor tries to invest, he makes use of the information and statistic system of the KRX. Therefore, the central mechanisms of the Korean Capital Market Ecosystem (KCME) are accomplished in the platform of the KRX, which is one of the keystone companies in the KCME. It is a stock issue company and an intermediary company, which provides information platforms and stock market platforms such as 'exchanging and listing regulations' and 'trading systems' to KCME companies. And other financial companies and listed companies depend on the KRX. Therefore, the KRX can be comprehended as a keystone company. From these reasons, the role of KRX is critical to all the members of the KCME.

For doing an important role, KRX have used information technology (IT) since 1974. In the early stage, it used IT to do simple calculations. However, after the introduction of an electronic trading system in 1988, all transactions were handled by the electronic trading systems in 1997 (KRX-a 2006). The IT of KRX helps reduce 41 thousand dollars in the internal operating expenses in 2005 (KRX-a 2006). Moreover, the trading system of KRX provides an efficient working process to the partner companies in the KCME (KRX-c 2006).

5.4 The Role of IT for a Healthy Korean Capital Market Ecosystem

The competitiveness of the KCME can be evaluated by the market trust (Cho & Han 2007), and the amount of capital. A healthy capital market ecosystem means a market place where there are plentiful capital and an active trading of stocks, futures, and indexes. Moreover, numerous companies desire to list their stocks on the capital market, and investors intend to invest more. A healthy KCME is made through the vitality of all entities involved. Vitality is created though the trust that is obtained due to the capabilities and competitiveness of the intermediary companies. Furthermore, such competitiveness is supported by keystone's IT. The mechanism about healthiness and keystone's IT is shown in the Figure 2.

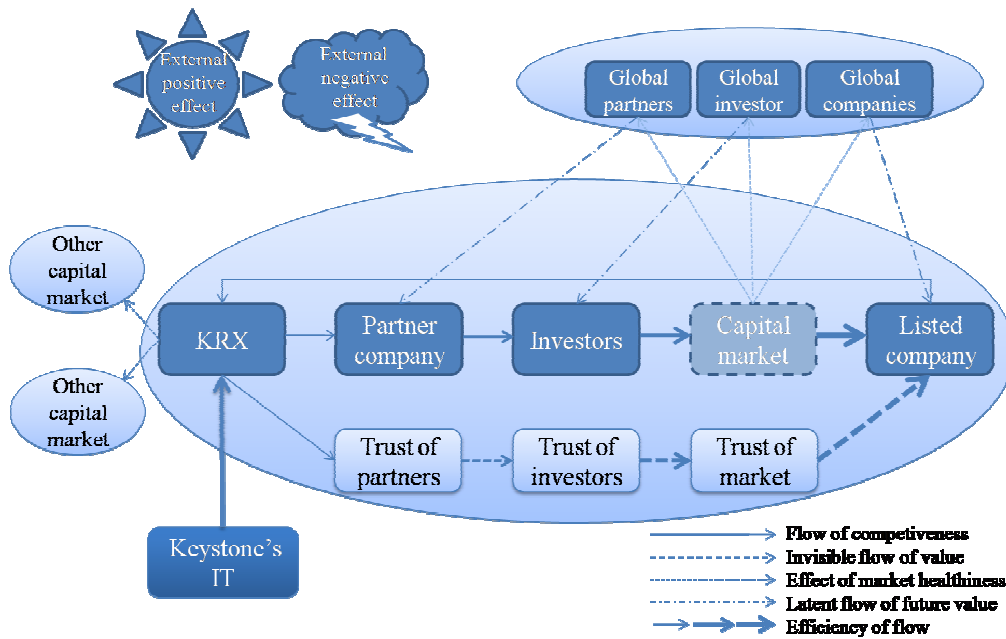


Figure 2. Keystone's IT and healthiness mechanism of the Korean Capital Market Ecosystem

The company including in the KCME are impacted by the behaviour or performance of other companies, because their business goals and capabilities are related with each other. In Figure 2, the KCME seems like a natural ecosystem where all entities' energy is continuously flowing. In the KCME, the relationships are understood as the flow of value. The abundant flow of value will increase the entities' competitiveness, leading to a healthy KCME. If you follow the flow of competition, you can see the phenomenon that shows the efficiency of flow in higher stages. In each stage, the efficiency of value rises like the 'energy efficiency' in a natural ecosystem. It indicates that the competitiveness increases in stages in the capital market ecosystem. If the complete cycle of vital flow is continuously repeated, the healthiness will be higher than before. IT of the KRX supports this cycle, because the flow of competitiveness and value started with the KRX.

IT in the KRX has done a good job to support their main business and operation. Today, the market system of the KRX is divided into four market systems including securities market systems, KOSDAQ market systems, index futures options market systems, and product futures option market systems. Each of these systems produces reasonable performance in each market because each system is fully optimized in the market (Han & Lee & Kim 2008). Each was developed by using a different system server and different application of diverse programming languages (KRX-b 2006). The four divided market systems mean that four link systems, four exchange systems, four information systems, four accounting systems, four supervision systems and more than four database systems are in the KRX (Han & Lee & Kim 2008). In other words, the divided and duplicated information systems across different markets are a major hole of IT cost. Especially, overlapping of the market data is unavoidable under the divided database system of the KRX.

6 RESEARCH FINDINGS

6.1 Keystone: Ecosystem leadership using IT

Korea Exchange (KRX) will open the next-generation information systems (The 4th Generation IS) in January 2009. It is composed of IT infrastructures and IS applications for all business and operation of the KRX. Furthermore, this new information system will play an important role in the Korean Capital Market Ecosystem (KCME) as an IT platform of a keystone. Firstly, the KRX will do all

business using the new system and will provide the integrated market trading system including the securities, options and futures, and KOSDAQ market (KRX-b 2006). In this system, trading application programs will decrease from 14456 to 9936. Thirteen Hardware and 11 Operating Systems will be reduced to 3 or 4, and 8 Database will decrease to 3. It means the KRX uses an integrated customer data on the integrated Database and Data Warehouse. It will reduce the cost on data storage and the disorder from overlapped data. Furthermore, it is able to make a generalized IT control for easy maintenance and recovery. Secondly, the system will give operational effectiveness to the business process and the IT department. This new IT platform will reduce 30% of IT investing and operating expenses in the KRX (Han & Lee & Kim 2008). Besides, the IT provides a new product development platform to the KRX. It means an easy and fast product and index development environment. As stated above, the IT of the KRX supports internal effectiveness and efficiency, and is forerunner of healthiness in a business ecosystem. The following Figure 3 exposes the role of IT in the healthiness of the KCME.

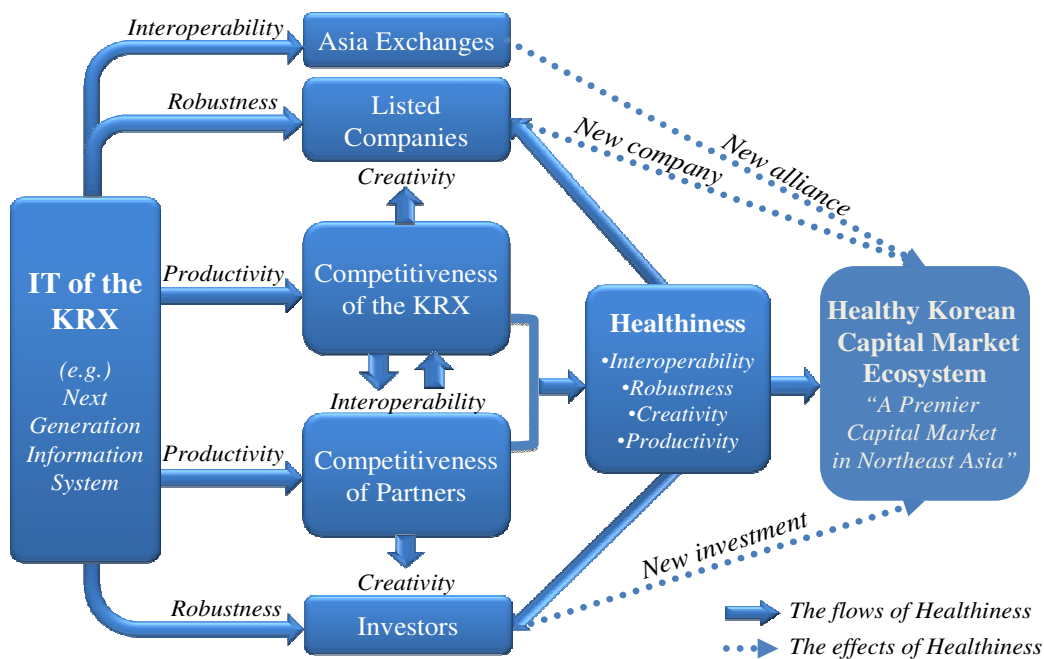


Figure 3. The role of IT for healthy Korean Capital Market Ecosystem

As in Figure 3, IT can play an important role for the members of the KCME. Firstly, the integrated IT can make a unique connection to the interrelated partner companies in the KCME. It will explain the reduction by 30% of the circuit cost for large-sized securities companies and banks. IT uses not only the company connection 'KRX API (Application Programming Interface)' but also the international standard protocol 'FIX (Financial Information eXchange)'. It will provide an easy entry to latent customers and companies in the international market. Each effect leads to the enhancement of healthiness. Most importantly, the new IT can be a new profit source by receiving orders of market system development from other Asian exchanges. Thus, it will be a great opportunity to have new alliances with other exchanges. Actually, KRX have the potential to be the finest capital market in northeast Asia.

6.2 Two aspects of IT roles for healthiness

As stated in above, IT of the keystone company plays a role in both *inside and outside* of the KRX. Through this holistic analysis, we know that IT does a work in not only a keystone company inside but also related entities including the KCME. Furthermore, IT does a work in not only each *entity* but also each *relationship* between the keystone company and other entities. These aspects are explained as the

internal and external boundary aspects of IT roles and the entity and relationship focus aspects of IT roles (see the Table 4).

Focus	Boundary	The IT roles
Entity	Internal	Keystone's IT does works in the keystone company itself.
	External	Keystone's IT does works in the other KCME companies.
Relationship	Internal	Keystone's IT does works on the relationships between of the KRX and the KC ME entities.
	External	Keystone's IT does works on the relationships between the KRX and the latent entities in the outside of the KCME.

Table 4. The two aspects of IT in a business ecosystem

The role of IT can be defined by the four healthiness dimensions. Diverse IT roles can be categorized in the above two aspects. According to these two aspects, detailed explanations about the healthiness of entities and relationships between KRX and KCME entities are described in the Table 5.

Healthiness dimensions		The role of IT for creating healthiness			Expected outcome for healthiness		
		Driver	Effector	Explanation			
Entity focused healthiness	Internal	Productivity	KRX operating business system	KRX	IT gives effectiveness and efficiency to the internal operation of the KRX. IT gives ease of use and a flexible environment for doing business. The transaction time is reduced from 2 seconds to 0.08 seconds. It is a source of internal competitiveness.	- IS and IT cost efficiency - Maintaining and controlling with ease - Higher number of transaction	
			External	KRX market system	Partner company	Integrated market system gives a chance to reduce the storage of overlapped customer data and fast response time to and from partner company.	- 30% reduced circuit cost - Fast response time result of transaction
	Internal		Creativity	KRX integrate infrastructure	KRX	IT reduces the development time of new products such as indexes and options. Easy opening of the new market is available using IT platform.	- Fast development time - Possibility of new market opening
	External			KRX information system	Partner company	IT produces information about new market or new listed company. It can be an opportunity to develop new product of the partner company.	- Creative financial product factory - Diverse customer service
Relationship focused healthiness	Internal	Robustness	KRX clearing system	KRX and listed company	Clearing system guarantees a fast return rate of capital. It produces trust of the listed company.	- Fast capital supply time - Market trust	
			KRX announce system	KRX and investor	IT analyses huge market information to provide more reliable information in order to attract more investments. Reliable information to enhance investors' loyalty	- Reliable information - Attracting more investments	
	External	Interoperability	KRX connection infra	KRX and partner company	IT creates a convenient communication passage between the KRX and a new partner	- Ease of access - Communication platform	
			KRX listing system	KRX and listed company	IT qualifies information and announce to the listed company.	- New easy connection	
			KRX IT solution	KRX and Asian exchange	IT of the KRX can be a profit point through receiving orders of market systems. IT provides an opportunity to make a new alliance and collaboration	- Receiving an IT development order - Collaboration opportunity	

Table 5. The Role of IT to make a healthy KCME

6.3 Harmonious Assistancess for a Healthy Korean Capital Market Ecosystem

Although this study emphasized that IT plays an important role for the capital market especially from a keystone's perspective, further consideration is needed for the Korea Exchange (KRX) and all members of the Korean Capital Market Ecosystem (KCME), because healthiness is achieved through the harmonious assistance of all members. In other words, healthiness of business ecosystem cannot be attained without the involvement of all members. Therefore, each member should maintain its competitiveness, and remember that IT is an important resource. Most of all, entities should remember that sensitivity to the changes in environmental conditions is critical to their overall healthiness. Using a keystone's IT, each entity easily sustains its competitiveness. The summarized concept of this study is revealed in Figure 4.

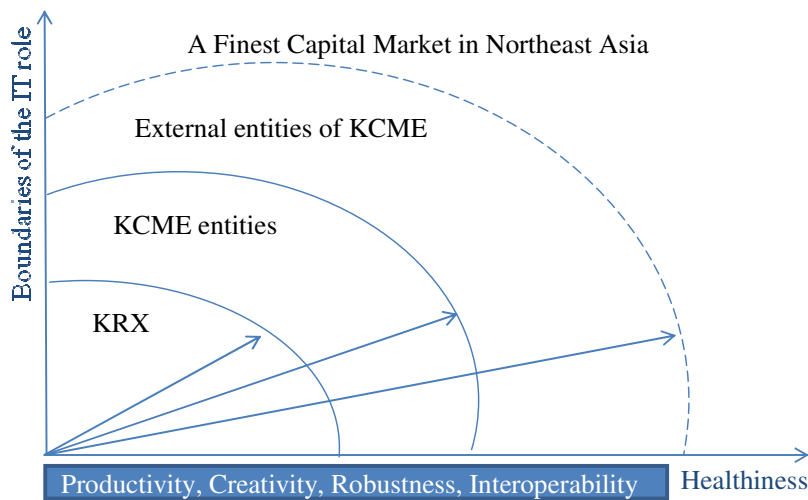


Figure 4. *Conceptualization between IT and healthiness in the Korean Capital Market Ecosystem*

7 DISCUSSION AND CONCLUSION

This paper reconstructed the important concepts about the business ecosystem from a keystone's perspective, which were vague and unclear in previous research. Defining a business ecosystem is difficult because the boundaries of a business ecosystem can be changeable and unlimitedly extendable. The reason is that we had no predefined drawing rules. In this study, the business ecosystem was defined as an ego-centric network from a keystone company, the KRX, which has centrality of the business ecosystem. The KRX and related companies make a Korean capital market. The case about the Korean Capital Market Ecosystem (KCME) is a valuable example that provides insights on what is a business ecosystem in the real business environment, and how we can use keystone's IT for a healthy business ecosystem using the example of the KRX. The related data about the IT of the KRX and its effects to other companies are investigated through diverse methods. Furthermore, this study conceptualized the capital market ecosystem using healthiness and keystone concepts. Through the case study, we found out the two aspects of IT role for business ecosystem's healthiness in the both sides of entities and relationships. Most of all, it highlights that keystone's IT plays a significant role in making a business ecosystem healthy through enhancing healthiness of the entities and relationships.

This paper gives some implications and guidelines to both managers and IT practitioners. Managers should know how to understand and analyze their business environment using a business ecosystem perspective, and then consider how to make a healthy business ecosystem. IT practitioners should

develop adaptable information systems and IT infrastructures for an optimized IT in the business ecosystem. Research regarding business ecosystems is still in the initial stage. Therefore, researchers have to study more about this concept. Especially, IS strategy researchers should study how to relate their specific research in this area.

The single case study is a limitation on the part of this paper. Future studies need to consider the other types of ecosystems and develop specific measures to bring about healthiness. More advanced multiple case studies about retail and manufacturing or other finance sectors are needed for an extended and more valid result. Moreover, the roles of IT in a business ecosystem should be examined by specific empirical data. In spite of limitations, this paper presents ideas for researchers and practitioners in understanding healthy business ecosystems and how they can manage their ecosystems using IT. Using the concept of healthiness in a business ecosystem is one way to conduct a systemic and comprehensive rethinking of evolutionary guides.

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