How to Innovate Sellers' Performance in the E-marketplace: Focused on Absorptive Capacity and Information System Use Pattern

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ABSTRACT

Intermediaries are presenting not only transactional information that orchestrates electronic transaction, but also market related information and knowledge useful for sellers' understanding of the market status. However, we do not have strong evidence that the market related information and knowledge is properly utilized by sellers and that it has an actual influence on sellers' performance. According to the research result, absorptive capacity and the pattern of information system utilization is statistically significant to sellers' performance mediated by operational efficiency and market knowledge creation. Especially, explorative utilization of information system and realized absorptive capacity has a stronger influence on sellers' performance mediated by market knowledge creation. With this research result, this study maintains that sellers are required to absorb and utilize market related information and knowledge more actively through explorative utilization of information system to achieve better performance in the e-marketplace. On the other hand, intermediaries are recommended to provide abundant and valuable market related information and knowledge for the sellers to build up better e-marketplaces.

KEYWORDS: absorptive capacity, the pattern of information system use, performance, operational efficiency, market knowledge creation, e-marketplace

1. INTRODUCTION

The e-marketplace is an electronic market where online market makers, sellers and buyers share the IT infrastructure (Bakos 1998, Tisenmann et al. 2000). Today, online shopping malls and web por-

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tals in Korea are competitively creating e-marketplaces in the form of open markets, building on their existing customer bases, and accordingly, e-marketplaces are taking on growing importance in online transactions. With competition among different e-marketplaces getting fiercer, online market makers are doing their utmost to find competent sellers and improve their business performance.

In the e-marketplace, the market maker and the seller communicate mostly through interorganizational system or IOS, which minimizes non-electronic communications (Kumar et al. 1996). As a result, IOS became the most important channel through which sellers get information and knowledge necessary for their operation in the e-marketplace.

The information and knowledge that sellers are able to obtain through IOS in the e-marketplace is either transactional or analytical. Transactional information is used for actual transactions involving posting product images, receiving and processing orders, and accepting payment. Analytical or non-transactional information is not directly related to transactions, but helps sellers learn overall market conditions. Analytical information is also called secondary information or market knowledge. The prices of competitors' goods, popularity ratings for items or sellers at a certain moment are the good examples of analytical information.

Earlier studies gave importance to analytical as well as transactional information. According to Grover et al. (2001), the online market makers supervising the general flow of information in the e-marketplace are in an exclusive position to provide sellers with analytical information or market knowledge as well as transactional information through IOS. Fahey et al.(2001) also emphasized the importance of knowledge management by a focal firm in an e-business environment. As one of the most well-known online marketplaces in North America, eBay offers a wide range of transactional and analytical information to enhance sellers' operation. (e.g., seller reports, http://pages.ebay.com/marketplace_research/index.html) E-market makers in Korea also provide diverse transactional and non-transactional information for sellers.

However, studies about how effectively sellers use the information given through IOS and to what extent the information influences sellers' performance are very few. This study is aimed at investigating sellers' use of information delivered through IOS and the influence of the information on sellers' performance.

To this end, this research is focused on absorptive capacity that is widely used for the studies on interorganizational learning and the utilization of IOS, and the pattern of information system use. Absorptive capacity is, simply put, the ability of an organization to absorb and use the information and knowledge from outside (Cohen et al. 1990). The pattern of information system use is conceptualized by applying exploration and exploitation from the organization learning theory (March 1991) to information system use (Subramani 2004).

The final outcome of this study will be the answers to the three questions. First, how and to what extent does the pattern of information system use influence sellers' performance? Second, how and to what extent does sellers' absorptive capacity influence sellers' performance? Third, does analytical information and market knowledge influence sellers' performance?

In trying to find the answers to these questions, this study is expected to provide sellers with a practical guide for more effective use of IOS and encourage them to achieve better performance by paying attention to the capacity of using information and knowledge. For e-market makers, this study will show necessary conditions for building a competitive e-marketplace by boosting sellers' performance.

This research report consists of 6 chapters. Following the Background and Goals, Chapter 2 introduces theoretical basis, such as absorptive capacity, the purpose of information system use and

dependent variables. Chapter 3 presents the research model and establishes hypotheses. Chapter 4 explains the methodology of the research and the data collection. Chapter 5 examines the hypotheses and discusses the research results. Finally, Chapter 6 argues the implications and limitations of the research.

2. THEORETICAL BACKGROUND

2.1 Theory of Absorptive Capacity

Absorptive capacity is the ability to identify, assimilate, transform and exploit the knowledge resources in order to gain new knowledge and apply it to commercial ends (Cohen et al. 1990, Zahra et al. 2002).

Absorptive capacity is useful in explaining the performance gap among different organizations that have used the same knowledge resources (2002). Even though they are exposed to same knowledge (information) sources, organizations with different levels of absorptive capacity achieve different results in recognizing and using the external knowledge (information), and thereby give different performance. Recently, absorptive capacity is explained in a wider context as the key to dynamic capability in opposition to operational capability (Pavlou et al. 2005). Dynamic capability is the capability of an organization to reconfigure its resources on the basis of new information and knowledge from outside (Pavlou et al. 2005). Absorptive capacity plays the pivotal role in the dynamic reconfiguration of external knowledge by an organization.

Zahra et al. (Zahra et al. 2002) broke down absorptive capacity into four mutually complementary sub-categories (acquisition, assimilation, transformation and exploitation) and classified acquisition and assimilation as potential absorptive capacity, and transformation and exploitation as realized absorptive capacity. According to the definition by Zahra et al. (2002), potential absorptive capacity is the ability to evaluate and obtain external knowledge, but does not guarantee better performance (Cohen et al. 1990), while realized absorptive capacity is the ability to apply the absorbed knowledge to the performance goal. In other words, acquisition of knowledge is one thing and realization of the acquired knowledge is another. TABLE 1 shows more details about the four sub-categories of absorptive capacity and earlier researches on them.

Preceding studies used absorptive capacity for explaining the difference in performance not only in the intraorganizational (Boynton et al. 1994, Cohen et al. 1990, Kim 1999, Pavlou 2005, Szulanski 1996), but also in the interorganizational (Lane et al. 1998, Malhotra et al. 2005) context.

Among these precedents, Malhotra et al. (2005) conducted the research in the interorganizational context similar to that used in this study. According to Malhotra et al. (2005), even when IOS delivers the same knowledge (information) from the focal firm, member firms with different levels of absorptive capacity give different performance. Pavlou et al. (2005) also provided evidence confirming that even when information technology provides the same knowledge (information), the competitiveness of the user companies depends on their absorptive capacity.

Against this backdrop, this study pays attention to the fact that when the IOS funnels the same knowledge and information from the online market maker to multiple sellers (Gray et al. 2004), the absorptive capacity of the sellers might decide the pattern and intensity of information use.

TABLE 1 Classification of Absorptive Capacity and Prior Studies

Classification	Conceptualization	Similar Concepts	Prior Studies
Acquisition Capacity	the firm's capability to identify and acquire external knowledge	-Evaluation -Recognition	Eisenhardt et al. (2000), Kim (1997), Szulanski (2004), Zahra et al. (2002)
Assimilation Capacity	the firm's routines and processes that allow it to analyze, process, interpret, and understand external knowledge	-Understanding	Daghfous (2004),), Kim (1997), Szulanski (2004), Zahra et al. (2002)
Transformation Capacity	the firm's capability to combine existing knowledge and the newly acquired and assimilated knowledge	-Internalization -Conversion	Grover et al. (2001), Kim (1998), Kim (1997), Liao et al. (2003), Zahra et al. (2002)
Exploitation Capacity	the firm's capability to leverage by incorporating acquired and transformed knowledge	-Use -Implementation -Commercialization -Utilization	Van den Bosch et al. (1999), Cohen et al. (1990), Lane et al. (1998), Zahra et al. (2002)

2.2 Explorative IS Use vs. Exploitative IS Use

According to organization learning theory, all activities done within an organization are either exploitation or exploration (March 1991). Exploitation is repetitive use of something confirmed, while exploration is the experimental pursuit of new possibilities (Argyris 1978). Similar concepts are "single loop," and "double loop" (Levinthal 1997) or "local search" and "long jump" (Auh et al. 2005).

A further look into these activities will show that exploitation is defined by efficiency, fulfillment, refinement and implementation, while exploration is characterized by alternatives, search, experiment and risk-taking (He et al. 1999, Schildt et al. 2005). Exploitation pays off in a stable, prompt and predictable manner, but the reward is small. Conversely, exploration is rewarded with uncertain and slow changes or sometimes even with losses, but the results are so innovative and dramatic that competitors can hardly imitate them. Therefore, organizations should make a choice between exploitation and exploration, deciding whether to seek present efficiency or promising future (Levinthal 1997).

In short, in order to survive at present and thrive in the future, organizations should always maintain the balance between exploitation and exploration, because excessive exploration without exploitation will damage the management of an organization or cause losses (Auh et al. 2005), and exploitation without exploration will rule out future growth and competitiveness (Subramani 2004).

In the same context, Subramani (2004) divided the patterns of IS use into IS use for exploration and IS use for exploitation. According to the study of Subramani (2004), different purposes of IS use lead to different results, even though IOS delivers the same information and knowledge. Those who concentrate on exploration will have strong expertise in the area of interest, while those who concentrate on exploitation will improve the efficiency of working process. Studies before Subramani (2004) represent similar ideas. DeSanctis and Poole (DeSanctis et al. 1994) applied the concept of appropriation to IS use, thereby proving that different IS appropriations lead to different consequences in the context of group decision support system. Bensaou (Bensaou et al. 2003) also pointed out the two types of information technology use in interorganizational relations and characterized each as follows (p119):

"(a) IT use for better control and operational monitoring of the flows and processes between the two firms, (b) IT use for better coordination of non-structured tasks in design."

From a similar viewpoint, this research introduces two patterns of IS use, exploitative IS use or ETU and explorative IS use or EPU. This categorization is comparable to Subramani's (2004) men-

tioning of the two fundamental natures of information, i.e., automating and informing. A further look into this will show ETU focuses on automating. ETU is exchange of information appropriate for well-organized, regular and repetitive works such as order processing, accounting and invoicing. ETU contributes to improving efficiency and effectiveness of these processes. Meanwhile, EPU concentrates on exchange of information and knowledge among different parties. EPU is suitable for non-structural and non-repetitive processes such as non-standard decision making, basic data analysis and electronic collaboration.

2.3 Examples of ETU and EPU

It is the routine processes of sellers that involve specific examples of exploitative use of IS. The best example is "the system for sellers" or "seller management system" provided by e-marketplaces for sellers. This system carries out necessary functions for sellers such as registration of goods, order processing, payment confirmation, delivery order, and payment request. Meanwhile, explorative IS use is not directly related to sellers' routine processes, but helps sellers in learning and finding new information. Item ratings, buyers' traffic at different moments and dates, copyright, intellectual property right and trademark issues, and possible solutions to transaction incidents mostly lying outside the scope of sales management system fall into the area of EPU. Notices, bulletin boards and FAQ for sellers are also good examples of EPU. The examples mentioned here are all taken from the system and functions of G Company that most of this study is based on.

2.4 Performance Variables on the Absorptive Capacity and Purpose of IS Use

IOS-based steady interorganizational relationship brings two benefits. One is higher efficiency of business operation and the other is the creation of knowledge (Sobrero et al. 2001). However, regarding these benefits (efficiency and knowledge), Sobrero et al. (2001) and Malhotra et al. (2005) have different ideas.

Sobrero et al. (2001) considered efficiency enhancement and knowledge creation to be mutually exclusive and there was a trade-off between the two, while Malhotra et al. (2005) insisted they were attainable at one time. In particular, Malhotra et al. (2005) demonstrated the absorptive capacity of a member firm to proceed with information and knowledge coming from outside through information system can achieve higher efficiency and create knowledge. According to Subramani (2004) IS use in interorganizational relationship builds up business process specificity and domain knowledge specificity, and thereby influences the business performance of an organization.

Based on these earlier researches, this study chose market knowledge creation and enhanced operational efficiency as the primary dependent variables, and seller performance as the secondary dependent variable.

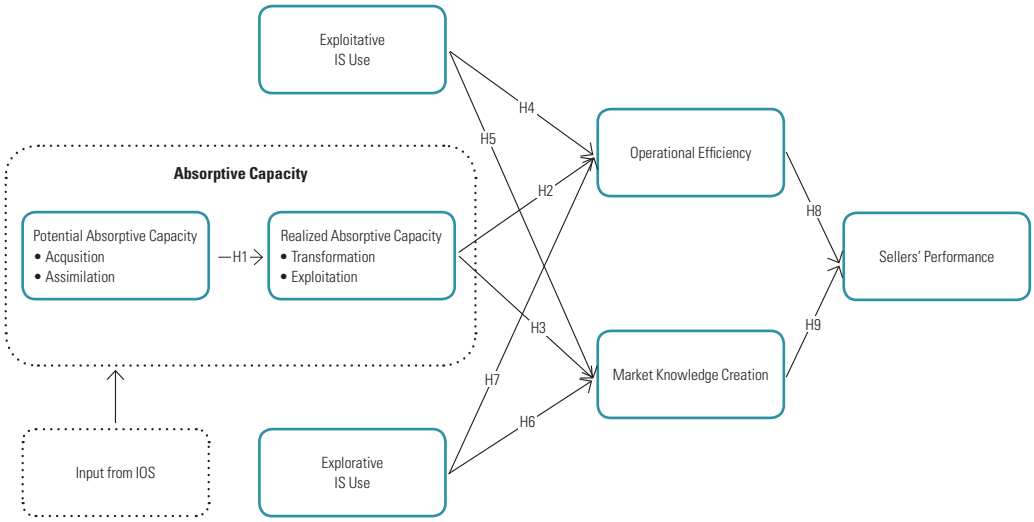
3. RESEARCH MODEL AND HYPOTHESES

Figure 1 shows the research model and hypotheses of this study. Let us first look at the research model and then move to hypotheses.

3.1 Absorptive Capacity

As already mentioned, Zahra et al. (2002) classified the four sub-categories of absorptive capacity into potential absorptive capacity (acquisition, assimilation) and realized absorptive capacity (transformation, exploitation). This means, not all information acquired from outside and then assimilated is exploited (Alavi 2001).

FIGURE 1 Research Model



From this viewpoint, the potential absorptive capacity is the ability to adapt the information and knowledge from outside for the use of the organization, while the realized absorptive capacity is the ability to utilize the adapted information and knowledge. Therefore, potential absorptive capacity increases the chance for realized absorptive capacity. To use knowledge, you should obtain the knowledge, but it does not necessarily mean that obtained knowledge is always used to the full capacity. Therefore it is the realized absorptive capacity rather than potential absorptive capacity that decides the performance of an organization. In the e-marketplace where all sellers share a common information system, and thus are exposed to the same knowledge and information, not one seller will have an opportunity to access better information than others. Therefore, the difference between potential capacity and realized absorptive capacity makes sense. Even though some studies did not assume that the four categories of absorptive capacity come in chronological order (Pavlou 2005), this study differentiates the potential absorptive capacity from realized absorptive capacity and builds the first hypothesis here.

Hypothesis1: The potential absorptive capacity of online market sellers has a positive influence on their realized absorptive capacity.

IOS helps organizations improve accuracy and efficiency of information flow among themselves and ultimately enhance the efficiency of operation, (Kumar et al. 1996) which is the very purpose of

IOS use. However, the extent to which the efficiency of an organization improves depends on each organization's ability to absorb and utilize the information from IOS.

The pooled IOS (Kumar et al. 1996)[1] of an e-marketplace provides sellers with equal opportunities. In other words, it offers the same quality of information through the same delivery channel so that everybody is equally exposed to the information and knowledge from IOS. Therefore, it is the ability of each seller to understand and utilize the information that makes difference.

Sellers with strong absorptive capacity (realized absorptive capacity) are highly likely to make the most of information delivered by IOS and, building on their own resources and capabilities (Pavlou et al. 2005), improve operational efficiency. But, those with little absorptive capacity (realized absorptive capacity) can hardly capture the implications of the information in the context of operational efficiency. Here, the second hypothesis is formulated.

Hypothesis 2: Realized absorptive capacity of online market sellers has a positive influence on their operational efficiency.

As one of the attainable benefits from IOS-based interorganizational relationship, knowledge creation is comparable to operational efficiency. According to Sobrero et al. (2001), the two main advantages of IOS-based interorganizational relationship are efficiency and knowledge creation (p.494):

"(a) …to increase the overall efficiency of the process, or (b) to tap into external resources, otherwise inaccessible, to augment the internal assets base."

There are detailed studies on the relations between absorptive capacity and knowledge creation. Zahra et al. (2002) said realized absorptive capacity is the process of creating new knowledge by integrating external knowledge with internal knowledge. Malhotra et al. (Malhotra et al. 2005) also said the absorptive capacity of member firms using IOS is related to the creation of market-specialized knowledge in partnership with the focal firm. Pavlou et al. (2005) introduced dynamic capability to show that absorptive capacity can improve the efficiency in information processing and knowledge management. In various contexts, absorptive capacity is said to accumulate mutually beneficial knowledge in the long run through interactive learning, as well as to simply improve operational efficiency. (Daghfous 2004, Lane et al. 1998, Van den Bosch et al. 2003). Based on the arguments of these earlier studies, the third hypothesis is established.

Hypothesis3: Realized absorptive capacity of online-market sellers has a positive influence on their market knowledge creation.

3.2 Exploitative IS Use

In the e-marketplace, exploitative use of IOS by sellers is inevitable in the routine operational processes, because the e-marketplace itself is based on IOS (Bakos 1998), and it is mostly through IOS that sellers carry out standardized and repetitive processes (Subramani 2004). For example, the whole process of selling goods, ranging from registration of an item, order reception, and data input delivery to payment confirmation, goes through IOS. Earlier studies proved that these examples of ex-

[1] Kumar et al. (1996) divided IOS into pooled IOS, sequential IOS and Reciprocal IOS according to interdependence, defining e-marketplaces as a pooled IOS where participants share common database, network and application.

ploitative IOS use have direct consequences to operational efficiency (Bensaou 1997, Bensaou et al. 1996, Premkumar et al. 1995). That is, information systems might guarantee accuracy and timeliness of standardized and repetitive process, and thereby enhance operational efficiency. In this context, this research comes up with the fourth hypothesis.

Hypothesis 4: Sellers' exploitative IS use in the e-marketplace has a positive influence on their operational efficiency.

Exploitative IS use by sellers might be considered in relation to knowledge creation as well. As Subramani (2004) shows, through continuous and repetitive use of IS, from an exploitative viewpoint, sellers will obtain better acquaintance with the market. For example, they will be able to capture competitor- and customer intelligence and seize market opportunities more easily. They will also acquire sales know-how.

In summary, even exploitative IS use gives sellers high exposure to market information and knowledge, and the repeated exposure might enrich the sellers' knowledge about the market.

Hypothesis 5: In the e-marketplace, exploitative IS use by online sellers has a positive influence on market knowledge creation.

3.3 Explorative IS Use

Explorative IS use is sellers' intentional use of information system to get more information and knowledge, and thereby to make a step beyond simply boosting operational efficiency through exploitative IS use.

The IOS in e-marketplaces delivers information and knowledge about the market itself as well as transactional data. The market information easily attainable through IOS includes popularity ratings of goods, prices of competitors, customers' requests and complaints, and FAQ. Sellers can get these resources for further processing at any time they want if they are willing to.

However, these resources are not necessary for sellers' running daily business, so sellers should have strong intention of explorative IS use to create market knowledge out of this useful information.

Hypothesis 6: Explorative IS use by sellers in the e-marketplace has a positive influence on their market knowledge creation.

Explorative IS use can be related to operational efficiency as well as market knowledge creation. According to Subramani (2004) explorative IS use has a positive influence on business process specificity. While sellers focusing on exploitative use of IOS are expected to improve operational efficiency with market knowledge creation being only an incidental outcome, sellers using IOS for learning and exploration of the market are expected to create knowledge and improve efficiency at the same time (Schildt et al. 2005).

Explorative IS use involves more aggressive utilization of information system than exploitative IS use. With operational efficiency having reached a satisfactory level through IOS, sellers will be able to use IOS more intensely to analyze customers' needs, complaints, expectations and patterns so that they can respond to the market more promptly and efficiently, and ultimately, might enhance their operational efficiency.

Hypothesis 7: Explorative IS use by online sellers in the e-marketplace has a positive influence on their operational efficiency.

As already mentioned, the secondary dependent variable in this research is the sellers' performance. The central focus of sellers in the e-marketplace is on the tangible outcomes such as revenues and profits. They are willing to raise operational efficiency and gain market knowledge, because they want the tangible outcomes to grow. In other words, if they actually improve operational efficiency and create market knowledge, they can gain the upper hand in the market and their revenues and profits will soar. While operational efficiency is related to sellers' performance in view of operational benefit, market knowledge creation is related to sellers' performance in view of strategic benefit (Subramani 2004).

Hypotheses 8 and 9 are aimed at verifying the influence of sellers' operational efficiency and market knowledge creation on their performance.

Hypothesis8: In the e-marketplace, sellers' operational efficiency has a positive influence on their performance.

Hypotheis9: In the e-marketplace, sellers' market knowledge creation has a positive influence on their performance.

4. METHODOLOGY

4.1 Definitions of Research Variables

Research variables deployed in this research are mostly from earlier studies. The questions used in the survey are also borrowed from prior studies, although some of them went through minimum changes for the conformity to the purpose of this research. TABLE 2 presents the definitions of research variables and the source of questions.

TABLE 2 Operational Definition of Research Constructs

Constructs	Operational Definition	Items	Source
Potential Absorptive Capacity	the seller's capability to value and acquire external knowledge	4	Zahra et al. (2002)
Realized Absorptive Capacity	the seller's capacity to leverage the knowledge that has been absorbed	4	Zahra et al. (2002)
Operational Efficiency (OEF)	the extent to which seller responds to day-to-day transactions in an efficient manner.	4	Malhotra et al. (2005)
Market Knowledge Creation (MKC)	the extent to which seller develop a better understanding of and response to the market and competitive environment.	4	Malhotra et al. (2005)
Sellers' Performance (PFM)	the extent to which seller improved in terms of market share, profitability, growth rate, innovativeness, successfulness.	5	Lee et al. (2003)
Explorative is Use (ETU)	the extent to which sellers use the information systems to support their routine operations and to perform structured, repetitive tasks, for example, order processing and invoicing and settling accounts	3	Boynton et al. (1994)
Exploitative is Use (EPU)	the extent to which sellers use the information systems to understand market trends and opportunities, such as customer preferences, and competitors, for decision making and strategic action (e.g., pricing, production selection, timing of product introduction, etc.)	3	Boynton et al. (1994), Subramani (2004)

4.2 Data Collection

The research data were collected through survey asking sellers of A Company, one of the largest e-marketplaces in Korea having about 6 million online members and dealing with 20,000 transactions on an average day. Sellers of G Company are all registered business taxpayers.

The survey was conducted in two phases. In the preliminary survey conducted for one week, the draft version of the questionnaire was distributed among 200 sellers to find whether the questions were appropriate to the purpose of the study and specific enough for the respondents to answer. G Company sent the e-mail list of all 3,182 sellers. The sellers were then listed up in order of revenues so that 200 participants were picked out at regular intervals. The draft questionnaire proved to be satisfactory, but some questions were slightly modified for the sake of clarity of meaning.

The main survey based on the modified questionnaire was carried out for another one week. The participants were 994 sellers, one out of every three selected from 2,982 sellers who had not answered the draft questionnaire. The selected sellers received an email encouraging them to participate in the online survey. The sellers in the email list were those who directly contact the G Company and the questionnaires were delivered to those who were in the most appropriate positions to answer the questions. To find out the non-respondent bias, Chi-square goodness of fit analysis was run for comparing respondents and non-respondents on revenues and no deviation between respondents and non-respondents was found (p=0.239).

The response rate was 24.7 percent, with 246 out of 994 sellers returned the questionnaire. Except 5 invalid ones, 241 questionnaires were analyzed for the study; therefore the actual response rate was 24.2%. The questionnaire is attached at the end of the research report. Each question uses 7-point Likert Scale. To improve the reliability of answers, a certain number of reverse coded items were included and the questions were arranged in random order.

4.3 Sample Characteristics

TABLE 3 shows statistical characteristics of respondents. Companies earning revenues of less than 1 million won on an average month represent 19%, with those earning 30 million won or over accounting for 23%. Companies staffed by 3 employees or below account for 37%, while those staffed by 30 or over accounting for 4%. Majority of the respondents sell goods in other e-marketplaces at the same time.

TABLE 3 Profiles of Responding Sellers

		Frequency	Percentage
Product Categories*	Computers and Peripherals	57	12%
	Portable Electronics (digital camera, MP3 player, cellular phone, etc.)	52	11%
	Home Electronics	45	10%
	Cosmetics and Beauty Care Products	23	5%
	Clothes and Other Fashion Items (handbag, wallet, belt, etc.)	30	6%
	Jewelry	39	8%
	Home Interiors (furniture, bedding items, etc.)	16	3%
	Homecare and Kitchenware	30	6%
	Healthcare Products	34	7%
	Baby Care and Maternity Products	46	10%
	Food	29	6%
	Sports and Leisure Products	23	5%

		Frequency	Percentage
	Sports and Leisure Products	23	5%
	CDs and DVDs	44	10%
	Others	4	1%
	Total	**472**	**100%**
Number of Participating Online Marketplaces	One	20	8%
	Two	33	14%
	Three	66	27%
	More than Four	122	51%
	Total	**241**	**100%**
Number of Employees	1~3	89	37%
	3~10	113	47%
	10~30	29	12%
	More than 30	10	4%
	Total	**241**	**100%**
Monthly Sales Revenues	Less than 1 million in Korean won (< $1,060 in USD)	45	19%
	1 million ~ 2 million in Korean won ($1,060 ~ $2,120 in USD)	17	7%
	2 million ~ 5 million in Korean won ($2,120 ~ $5,300 in USD)	36	15%
	5 million ~ 10 million in Korean won ($5,300 ~ $10,600 in USD)	29	12%
	10 million ~ 15 million in Korean won ($10,600 ~ $15,900 in USD)	19	8%
	15 million ~ 20 million in Korean won ($15,900 ~ $21,200 in USD)	15	6%
	20 million ~ 30 million in Korean won ($21,200 ~ $31,800 in USD)	24	10%
	More than 30 million in Korean won (> $31,800 in USD)	56	23%
	Total	**241**	**100%**

** Multiple answers were allowed.*

5. DATA ANALYSIS

For data analysis, this research used Structural Equation Modeling (SEM) that allows researchers to see measurement errors and correlations among latent variables (Rigdon 1998). At the same time, Two-Step Approach recommended by Anderson et al. (Anderson et al. 1988) was also used to examine the measurement model for validity and reliability of measurement variables, and research model fit on the first stage, and to carry out path analysis for clarifying correlations among latent variables in the structural model on the second stage. The analysis tool was AMOS program (Ver. 5.0).

5.1 Measurement Tools Testing

The measurement model restricts each measurement item, but correlates latent variables so as to judge the validity of the model by comparing measured values against reference values. The measurement model testing shows, all measured values meet the reference values, but for GFI (0.85). However, the GFI of this research model is close to the critical value and the GFI standard is strict (0.90). In addition, the measurement value satisfies AGFI, which means the measurement model is fairly acceptable. The second and fourth columns of TABLE 4 show the measurement values and the reference values for each item, respectively.

TABLE 4 Goodness-of-Fit Indices of Structural and Measurement Models

Fit Indices	Measurement Model	Structural Model	Recommended Thresholds
x2	555.0	587.6	N/A
Df	278.0	287.0	N/A
x2/df	1.99	2.04	<3.0 (Gray et al. 2004)
CFI	0.95	0.95	>.90 (Bassellier et al. 2003)
GFI	0.85	0.85	>.90 (Gefen et al. 2000)
AGFI	0.81	0.81	>.80 (Gefen et al. 2000)
NFI	0.91	0.91	>.90 (Gefen et al. 2000)
TLI	0.95	0.94	>.90 (Gefen et al. 2000)
RMSEA	0.064	0.066	<.08 (Byrne 1998)
SRMR	0.038	0.062	<.08 (Hu et al. 1999)

Notes:
• SRMR = Standardized Root Mean Square Residual; • RMSEA = Root Mean Square Error of Approximation; • NFI = Normed Fit Index; • CFI = Comparative Fit Index; • GFI = Goodness-of-fit Index; • AGFI = Adjusted Goodness-of-fit Index; • TLI = Tucker-Lewis Index .

To judge the validity of the measurement models and the measurement tools, convergent validity, discriminant validity and scale reliability were examined. Convergent validity was examined by loading each measurement item. The loading of 0.60 or over was to be judged valid (Chin et al. 1997). The convergent validity test shows the third item for the measurement of exploitative IS use was 0.31 in loading value, and thus excluded from the analysis (See Appendix A). Except for the third item, the loading values of all measurement items were 0.75 or over, satisfying the convergent validity requirements. Discriminant validity was examined through comparison between AVE (Average Variance Extracted) and correlation coefficient. As TABLE 5 suggests, if AVE is larger than any value in the table, then the measurement tool is considered to have discriminant validity. Scale reliability was examined through measuring composite reliabilities (CR) of latent variables. As TABLE 5 shows, if CR was 0.70 or over, the scale reliability was considered to be acquired (Gefen et al. 2000).

TABLE 5 Composite Reliability, AVE, Construct Correlation

	Mean	CR	AVE	PASC	RASC	OEF	MKC	ETU	EPU	PFM
1. PASC	4.92	0.93	0.76	0.87						
2. RASC	4.82	0.95	0.83	0.85	0.91					
3. OEF	4.50	0.90	0.68	0.48	0.48	0.83				
4. MKC	4.32	0.92	0.73	0.56	0.51	0.55	0.86			
5. ETU	5.26	0.90	0.81	0.39	0.40	0.68	0.31	0.90		
6. EPU	4.11	0.86	0.67	0.52	0.49	0.77	0.68	0.44	0.82	
7. PFM	4.37	0.95	0.74	0.59	0.53	0.45	0.65	0.27	0.45	0.86

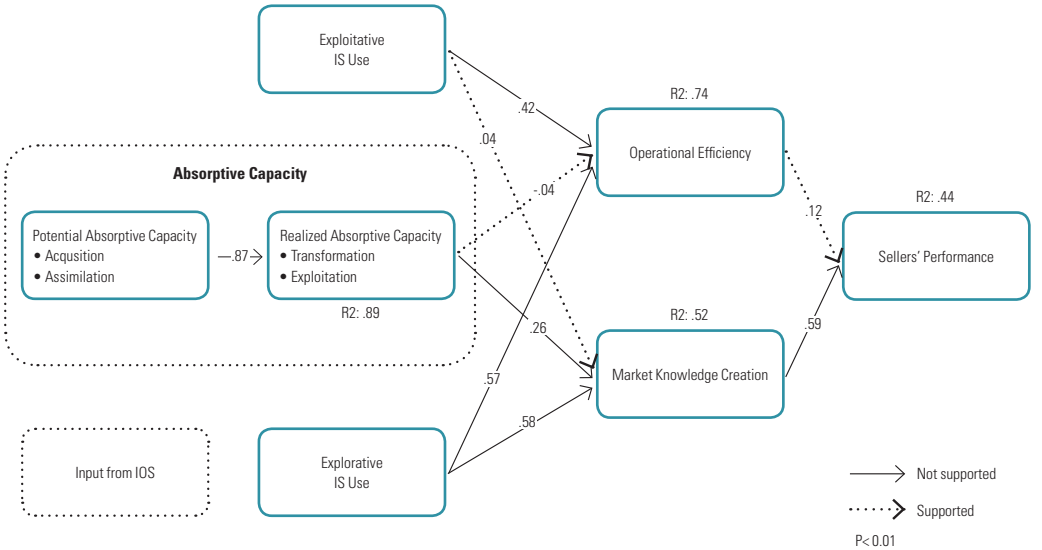
Notes:
• PASC = Potential Absorptive Capacity; • RASC = Realized Absorptive Capacity; • OEF = Operational Efficiency; • MKC = Market Knowledge Creation; ETU = Exploitative IS Use; • EPU = Explorative IS Use; • PFM = Sellers' Performance.

• Diagonal elements display the square root of average variance extracted (AVE).

5.2 Structural Model Evaluation

To clarify the relations among latent variables, the structural model established the path among latent variables and proved the significance of t-value using path coefficient. The third column of TABLE 4 shows the fitness of structural model. As the TABLE 4 suggests the structural model established by this study has a good fit, which proves the validity of the structural model.

FIGURE 2 Results of the Model Testing



5.3 Notes on Hypothesis Testing Result

The result of hypothesis testing is presented in Figure 2 and TABLE 6.

According to the testing result, with 0.01 significance level, (H2), (H5), (H8) were rejected, while the remaining others were accepted. The testing result of (H5) shows exploitative IS use is not related to market knowledge creation, affecting only operational efficiency. In other words, sellers who use IOS just for the exploitative purpose are not able to fully use the market knowledge provided by the market maker. This is exactly consistent with the research result of Subramani (2004). However, explorative IS use affects both market knowledge creation (H6) and operational efficiency enhancement (H7). According to the testing result of (H2), sellers' absorptive capacity has nothing to do with operational efficiency enhanced through IS us, but has an association with market knowledge creation. This is an interesting result contradicting the study of Malhotra et al (2005) who proved suppliers' absorptive capacity influences both market knowledge creation and operational efficiency in the context of supply chain management. However, this study result shows in the e-marketplace, absorptive capacity of sellers affects only market knowledge creation, not operational efficiency. This is explained by the fact that in the e-marketplace, the operation between the market maker and the seller is firmly standardized through information system use (Bakos 1998, Grover et al. 2001), which minimizes the impact of sellers' absorptive capacity on operational or business efficiency. However,

the rejection of (H2) is well consistent with Zahra et al. (2002) who defined absorptive capacity in view of knowledge creation and utilization. The rejection of (H8) implies that the performance of sellers is more related to the use of market knowledge than operational efficiency. Under the strictly standardized operational environment such as the e-marketplace, sellers carry out business through the same process, using the same method (Bakos 1998, Eisenmann et al. 2000, Yoo et al. 2002), therefore operational efficiency hardly makes any difference in sellers' performance. Meanwhile, market knowledge creation is closely related to the performance (H9), which highlights the importance of market knowledge to the performance of sellers in e-marketplaces

TABLE 6 Results of Hypotheses Testing

Hypotheses	Path Coefficient	t-value	p-value	Results
H1	0.87	14.284	P<0.01	Supported
H2	-0.04	-0.712	P=0.48	Not Supported
H3	0.26	4.233	P<0.01	Supported
H4	0.42	7.578	P<0.01	Supported
H5	0.04	0.713	P=0.48	Not Supported
H6	0.58	7.837	P<0.01	Supported
H7	0.57	8.637	P<0.01	Supported
H8	0.12	1.842	P=0.07	Not Supported
H9	0.59	8.385	P<0.01	Supported

6. IMPLICATIONS AND LIMITATIONS OF THE STUDY

6.1 Implications of the Study Result

The result of this study draws our attention to some very interesting points.

First, the impact of explorative IS on use. The study result shows exploitative IS use affects only operational efficiency (H4), not market knowledge creation (H5). Meanwhile, explorative IS use affects both operational efficiency (H6) and market knowledge creation (H7). In other words, exploitative IS use is just a part of the daily routine of all sellers, and thus can not be a distinctive factor. However, explorative IS use can help sellers create market knowledge and improve operational efficiency as well. Therefore, it is worth recognizing the value of explorative IS use by the sellers in the e-marketplace.

The second point is the relationship between sellers' absorptive capacity and performance. Absorptive capacity does not affect operational efficiency (H2), but does market knowledge creation (H3). This is also caused by the high level of operational standardization in the e-marketplace. However, strong absorptive capacity, as explorative IS use does, leads to a high-level of market knowledge creation and strong performance.

Third, there is the usefulness and availability of analytic information and market knowledge in the e-marketplace. The study shows market knowledge creation is more significant than operational efficiency to sellers' performance. In the e-marketplace where quality information and knowledge floods in through information system, sellers who aggressively absorb and learn analytical information and market knowledge will have more opportunities to make better performance than sellers who do not.

In conclusion, sellers' intentional IS use and absorptive capacity mediated by market knowledge creation is the main factor enhancing their competitiveness and making a difference in their performance in the e-marketplace.

6.2 Suggestions for E-market Sellers

On the basis of hypothesis testing result, I would like to put forward some suggestions for e-market sellers from the business perspective. According to the testing result, exploitative IS use can hardly improve sellers' performance. Instead, we need more explorative IS use, i.e. the focus must be shifted from transactional information to analytic information which sellers should intensely learn and analyze. It is also recommended that sellers experimentally and creatively apply their learning to the e-marketplace and continue explorative pursuits. At the same time, sellers have to establish an organizational culture that nurtures absorptive capacity and encourages learning so that the employees of the sellers can always keep an eye on the market and aggressively absorb the knowledge from outside.

Unlike other marketplaces, the e-marketplace offers an environment facilitating accumulation and processing of information. By applying the newly learned knowledge to important decision makings on new items, pricing and timing, sellers will be able to improve market orientation, make themselves different from others and thereby gain competitive advantages. However, in today's e-market circumstances, price is the only thing that matters. When a new item flourishes, soon the market will be bulging with similar items sold at much lower prices. Copying and imitating will lead to nowhere in the long run.

In summary, rather than let a single factor such as price rule the entire market, sellers are required to improve absorptive capacity and continuously gain analytical information to make fundamental changes.

6.3 Limitations of the Study

This study has some limitations in the realistic aspect.

First, data were collected from a single e-marketplace, and thus, might not be accurate enough to reflect the reality in general. Nevertheless, the relatively high response rate (24.2%). a large number of data (241) collected from the corporate level organizations, sellers from a wide range of categories and the virtue of B2B research will offset the limitation.

Second, the performance of sellers was measured at a single point of time. To associate the primary dependent variables such as operational efficiency and market knowledge creation with the second dependent variable, sellers' performance, measurements with an interval of a certain length of time would have made the result more meaningful. In addition, sellers' self-report (Lee et al. 2003) on their performance reduces the objectivity of the result.

Third, there is a risk of common method bias that often appears in surveys. However, the questions were arranged in random order and the questionnaire included some reverse questions to minimize common method bias. And, the questions were validated by earlier studies.

Fourth, the number of questions to measure exploitative IS use was too small (See Appendix A, Questionnaire). The draft questionnaire had three questions about each exploitative and explorative IS use, but the loading value of the last question about exploitative IS use was too low and only two questions remained for analysis. It might arouse doubt about whether two questions are enough to measure the concept of the variables. However, the measurement methods were developed and vali-

dated throughout earlier studies, and the reason for the low loading value of the last question is fully understandable in the research context. Accordingly, two questions are enough to reflect the meaning of the variables.

Fifth, there might be concern about whether the information system of G Company offers both explorative and exploitative use properly. The interview with G Company officials and the log analysis of sellers's IS use show the G Company's system offers exploitative functions that is necessary for daily business and more diverse explorative functions than other e-marketplaces.

Last, for this study AMOS, a type of Structural Equation Modeling was run, but there are several questions possibly considered to be formative indicators, so PLS (Partial Least Square) that is applicable to formative indicators might have been a better tool than AMOS. However, even with PLS, the hypothesis testing result would be the same as with AMOS. Besides, AMOS allows researchers to check the model fit and has stricter standard than PLS. Considering that it is not easy to exactly differentiate reflective indicator from formative indicator, AMOS has its own merits reasons.

7. CONCLUSION

In the e-marketplace, sellers seem to compete under very similar conditions. Compared to traditional marketplaces, the e-marketplace offers standardized environment and uniform rules, and there is no difference in place or time of transactions. (Eisenmann et al. 2000). For example, the size of the shop, accessibility, business hour and transaction fees are all same everywhere and there is no restriction on the items to be sold. As there is no difference caused by face-to-face experience, sellers should find something new that make them different from others.

The result of this study shows market knowledge creation can make a seller distinctive in the standardized e-market circumstances. It also became clear that for sellers to create market knowledge, they need to focus on explorative IS use and absorptive capacity. For better performance and stronger competitive advantages, exploitative use of information system is not enough. Sellers should be determined to intensely use the information and knowledge provided by the information system, as an explorative IS user, and gain absorptive capacity.

At the same time, e-market makers should spare no effort to help sellers achieve better results and create market knowledge. After all, sellers are the customers to the market maker. The more sellers a market maker has, the more the buyers will get from the market and the more buyers will be attracted by the market (Yoo et al. 2002). The profit of market makers comes from the sales commission that sellers pay. To help sellers give better performance and sustain the e-marketplace competitive, market-makers should offer valuable market information and encourage sellers' explorative use of information system and aggressive absorption of market knowledge.

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