

# Knowledge Trade and Sharing in Knowledge Management System

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**Abstract.** The importance of knowledge management (KM) leads many companies to use a knowledge management system (KMS); however, users frequently do not make good use of KMS. There is a new view that knowledge market can be helpful to promote knowledge transfer by knowledge trade. Knowledge transfer could be activated through the items of knowledge organization, knowledge strategy, KMS, and knowledge reward via knowledge sharing culture and knowledge trade market. We have proposed that the framework be organically related to above factors in the prior research. This article examined various cases to analyse the effect of knowledge trade market and knowledge culture for knowledge transfer. We then considered real case researches of the Korean organizations and global firms in order to discuss each factor on how to activate knowledge transfer. This discussion suggests that organizations harmonize both knowledge culture and knowledge trade market for knowledge transfer.

**Keywords:** Knowledge trade market · Knowledge transfer · Knowledge management (KM) · Knowledge management system (KMS) · Case analysis

## 1 Introduction

Changes in the knowledge-based economy have highlighted the importance of knowledge management (KM) for sustainability and corporate competitiveness (Davenport and Prusak 1998). As more firms recognize the importance of invisible knowledge assets, they have conducted KM. KM is defined as, “a systemic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that other employees may make use of it to be more effective and productive in their work (Alavi and Leidner 1999)”. Firms expect to maximize the utilization and, hence, value creation of knowledge being accumulated in the firm (Nonaka 1994). A Knowledge management system (KMS) is defined as “IT-based systems developed to support and enhance the organizational process of knowledge creation, storage/retrieval, transfer, and application (Alavi and Leidner 2001)”.

In traditional KMS, however, there was a tendency that a little knowledge could be transferred to users. Because users were passive being who accepts knowledge (Parent et al. 2007). A discrepancy between the complexity of accumulated data and the intention of users who want to find the latest knowledge causes poor KMS use. Users want to find the latest knowledge easily. For this reason, users tend to have difficulty finding high quality knowledge within their company.

Recently, there is a new view that knowledge trade takes a good advantage of knowledge transfer (Benbya and Van Alstyn 2011). Knowledge trade market based KMS can be good substitute for traditional KMSs. We think that knowledge trading can help transfer knowledge and grow an organization effectively. Jeong and Ahn empirically proved that knowledge transfer can be activated through knowledge trade in knowledge markets. This study explores how a knowledge transfer mechanism interacts organically in real cases. The framework for knowledge transfer activation is based on: (a) knowledge organization, (b) knowledge strategy, (c) KMS, (d) knowledge rewards, and (e) knowledge sharing culture and knowledge trade market. We want to examine potential gaps between evidence and practice in knowledge transfer framework (Jeong et al. 2013).

In the next section of this paper, we will review traditional KMSs and knowledge-trading KMSs. We then provide an overview of our research methodology and analyse it with qualitative data. Multiple case analyses of various organizations provide implications supporting our systematic framework. Lastly, we outline discussions for readers and future research.

## 2 KMS Review

### 2.1 Supplementations of KMS in Traditional KM

Generally, scholars have regarded KMSs as a key enabler for KM. KMSs support the creation, transfer, and application of knowledge in organizations (Alavi and Leidner 2001). IT is an important enabler for supporting knowledge transfer. KMSs have three common applications: (a) the coding and sharing of best practices, (b) the creation of corporate knowledge directories, and (c) the creation of knowledge networks (Alavi and Leidner 2001).

There has been some criticism of traditional technology-push KM models.

Workers may not know if the available data, information, and decision models are indeed up to speed with the radical discontinuous changes in the business environment. In this model, incomplete and often outdated data, information, and decision models drive the realization of the strategic execution, but with diminishing effectiveness (Wiig, K.M.: New generation knowledge management: What may we expect? Knowledge Research Institute 2002, Malhotra 2005).

Current KMSs represent mainly centralized repositories, organized and structured around pre-defined company functions and workflow (Antonova and Nikolov 2014). Many efforts are necessary for maintenance of the latest knowledge and good quality knowledge in current KMS (Wiig 2002). The balance between rewards and assessment is very important for a user's participation in knowledge transfer,

because users want to obtain recognition and reputation through their contribution to knowledge transfer. Appropriate KM strategies for maintaining KMS require: (a) the balance between competition and collaboration, (b) the balance between social (intrinsic) rewards and economic (extrinsic) rewards (Bock et al. 2005), and (c) knowledge diffusion strategies that meet organizational goals (Yu 2007). If only competition is emphasized uploading knowledge in KMS, individuals may hoard information for personal advantage (Benbya and Van Alstyne 2011). In the early stage KM, there was tendency firms give only economic rewards to individuals. Though economic rewards are helpful to share knowledge, they are not primary motivators within knowledge sharing initiatives (Bock et al. 2005). The KM objectives and strategy need to concur with the company's/business unit's objectives (Greiner et al. 2007). According to Saito et al. (2007), appropriate KM strategies for maintaining KMS require: (a) senior management support with strategy and business requirements, (b) consideration of organizational dynamics and culture, (c) a series of KM initiatives designed to support knowledge process. A culture of trust and collaboration improves knowledge sharing and organizational effectiveness (Sveiby and Simons 2002). We should emphasize knowledge culture, organizations structure, technology, and management as key elements for successful KM (Yu et al. 2007).

## **2.2 Supplementary Mechanism for Traditional KMS: Knowledge Trade Perspective**

Knowledge trade can address the difficulties in managing the hesitation of knowledge transfer in traditional KMSs. Traditional KMSs are repository systems to manage and accumulate knowledge. KMSs established from a knowledge trade perspective, however, support the process to connect people seeking answers with people that have the answer.

The architecture of a traditionally centralized IT system is designed with a top-down approach; that of a knowledge market, by contrast, is designed as a way of connecting peer-to-peer. The peer-to-peer approach can connect directly knowledge producers (possessors) to knowledge consumers (seekers) (Benbya and Van Alstyne 2011). On the other hand, centralized management of a top-down approach cannot manage all the information; it is also difficult to maintain the latest information. As old knowledge is accumulated in the KMS, users tend to ignore it. Figure 1 explains the differences between traditional knowledge management and knowledge trade market.

## **3 Research Method**

The prior research conducted by survey and structured equation model (with partial least squares) empirically proved that knowledge transfer could be activated through knowledge sharing culture and trade in knowledge markets. As prior research has shown, knowledge-sharing culture and knowledge trade markets are supporting

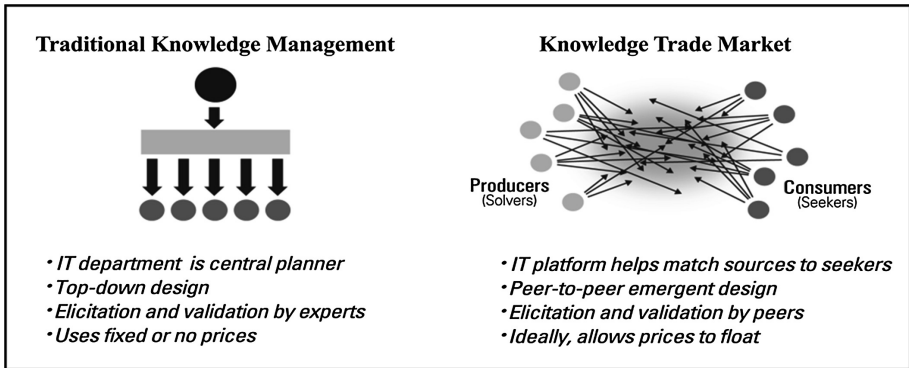


Fig. 1. Differences between traditional knowledge management and knowledge trade market (Source: Benbya and Van Alstyne 2011)

mechanisms for knowledge transfer activation. Knowledge organization and strategy are positive factors for knowledge sharing; KMSs and knowledge rewards are positive factors for knowledge trade markets (Jeong et al. 2013). Figure 2 shows how factors affect the empirically proved knowledge transfer platform (See Fig. 2).

To investigate how knowledge transfer factors are activated in real cases, we did multiple researches on the knowledge-transfer activation factors: knowledge organization, knowledge strategy, KMS, knowledge rewards, knowledge sharing culture, and knowledge trade market. We did collect real-case evidences that substantiate each latent variable to knowledge transfer framework. Especially, we do want to introduce the best practices of the utilization of knowledge trade mechanism in real cases. In the next section, we will introduce how each factor activates knowledge transfer mechanism through real cases.

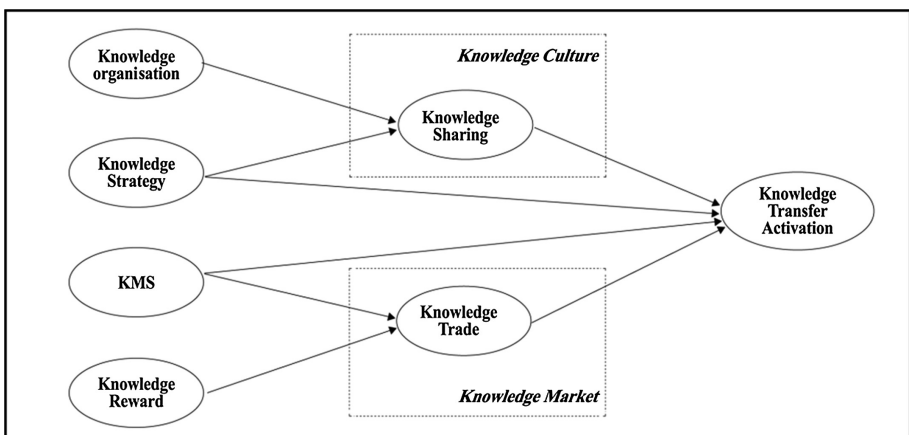


Fig. 2. Knowledge transfer activation mechanism (\*source: Jeong et al. 2013)

## 4 Case Analysis

Case study is commensurate with investigating research question related ‘how’ and ‘why’. The qualitative data are particularly useful for understanding why or why not emergent relationships hold (Eisenhardt 1989). Construction strategy of case study needs analytic generalization method, which compares developed theory and empirical results of case research (Yin 2002). This paper attempts to test how the latent variables of logical model (knowledge transfer framework) are supported in real cases. We researched real cases of KM organizations that successfully organize knowledge transfer from various literatures.

In this section, we analyze how factors including knowledge trade market for knowledge transfer operate in real cases. We investigated the real cases for the combination practice with the framework of the prior research and showed the best practice of each latent variable from literatures. Especially, we interviewed five persons who work for Samsung SDS that knowledge trade market is active for the in-depth analysis in July 2014.

### 4.1 Knowledge Trade in Knowledge Market-Based KMS

Internal knowledge markets are protected environments where users trade their knowledge via price mechanisms. They facilitate reuse of existing information, cause new information to be created when needed, and efficiently regulate use of resources, including people’s time (Benbya and Van Alstynne 2011). Knowledge trade interacts with knowledge sharing culture to raise the value of knowledge assets.

Infosys Technologies, a global India software services company, has received both the Asian and the Global Most Admired Knowledge Enterprise (MAKE) awards. Infosys has launched a central knowledge portal, KShop, in 2000. A knowledge currency units (KCU) incentive scheme was launched to jumpstart contributions to KShop. “Under the scheme, Infosys employees who contributed or reviewed contributions to KShop would be awarded KCUs, which they could accumulate and exchange for monetary rewards or prizes. Additionally, employees’ cumulative KCU scores world is displayed on a scoreboard on KShop, thereby is increased the visibility and standing of prolific contributors (Garud 2005)”.

Samsung SDS is the largest Korean company that provides SI and IT consulting with US\$ 6.4 billion revenue and 10,000 employees in 2014. Samsung SDS is a representative KM enterprise that has held MAKE (most admired knowledge enterprise) in Asia for nine years straight and received MAKE in Global in 2010. More than 60 % of their 10,000 workers possess IT professional certificates. Samsung SDS has operated a knowledge portal named ‘Arisaem’ since 2000. Samsung SDS encourages knowledge trade through an internal knowledge market by paying virtual currency. Colleagues evaluate the quality of knowledge traded and there are three degrees of being satisfied: strong satisfaction, satisfaction, normal. The price level from the evaluation of colleagues is differentially graded by a dedicated team and there are differential rates of virtual currency for knowledge sharing contribution. The following example is a real case in which Samsung SDS used virtual currency. “Some manager in Samsung SDS had a difficulty finding a

solution during the project. He had to change a computer operating system from UNIX to Windows, but he did not know where to start. He immediately threw a question to ‘Arisaem’ and finished his work within two days. That would be four work-weeks if he had to work alone. He, of course, gave ‘Aar’ (virtual currency) to solution finders (Kim 2002)”. The person concerned KM(S) of Samsung SDS evaluates that they could save nearly 50 h on every knowledge trade event.

Since market flow could control prices, the floating exchange rate (currency) is helpful to control effectively a knowledge trade market (Benbya and Van Alstynne 2011). Samsung SDS applies the floating exchange rate to control an internal knowledge trade market. According to a quarterly KM budget, the more knowledge being shared, the more the exchange rates fall and vice versa. This corresponds to the characteristics of demand-supply curves in markets. The utilization of virtual currency could be the opportunity to use rewards for knowledge sharing and measure indirectly the value of knowledge being shared.

## 4.2 KMS

Accenture is one of the leading global management-consulting firms. It is the largest of the pure consultancies with 246,000 consultants in 120 countries. Accenture has been a pioneer in KM (Paik and Choi 2005). The KMS of Accenture is an essential asset for maintaining virtual teams and various projects in many countries. Formerly known as Anderson Consulting, Accenture proposed the strategies for prevention of degradation using KMS as follows: (a) efficient categorization of information, (b) continual supply of valuable knowledge, (c) maintenance of repository cleanness by professionals. The Anderson Consulting KMS maintained continuously valuable knowledge and managed by more than 400 professionals (Jarrar and Zairi 2010). It is very difficult to maintain knowledge effectively.

We need developing platforms by users’ participation rather than managing knowledge. Fjeldstad et al. (2012) proposed that we need actor-oriented organizational structures and architecture for collaboration. Actor-oriented architecture is composed of three main elements: (a) actors who have the capability and values to self-organize; (b) commons where actors can accumulate and share resources; and (c) protocols, processes, and infrastructures that enable multi-actor collaboration. Knowledge trade could be self-organizing system that maintain the latest knowledge and establish relationships (collaboration) by users’ participation (Benbya and Van Alstynne 2011).

## 4.3 Knowledge Rewards

Rewards systems offer people fairness in relation to their contribution and the value they add to the organization (Armstrong 2006). Social, i.e. intrinsic rewards are viewed as more effective than economic, i.e. extrinsic rewards (Brock et al. 2005; Huff 2006). Recognition is the representative variable of social rewards and encourages people to promote individual and organizational knowledge sharing rather than individual knowing (Riege 2007).

IDEO has been ranked in the top 25 most innovative companies. IDEO shares their employees' profiles containing capability and outcomes. The profile is classified with tags; the number of tags with profiles acknowledges who is the professional in the concerned project. The company easily finds out the professionals who lead new projects. Profiles work on raising employees' reputation in the company and are helpful to spread knowledge sharing to all members. Employees gain recognition and reputation from colleagues and grow as professionals. Profile sharing lets the company dig out hidden talents and motivate employees to share their knowledge (Brown 2008). Balancing between company's recognition and personal reputation as proper knowledge rewards, IDEO kills two birds with one stone: training professionals, and sharing knowledge. The right social recognition program leverages an organization's people and their knowledge to share the corporate culture.

Kelly Services is a Fortune 500 company offering services that include temporary staffing, outsourcing, and vendor on-site and full-time placement. Kelly has been recognized for its quality processes, management practices, supplier diversity, and community involvement (Jenero and Mark 1995). Kelly operates a reward program named Kudos for increasing an individual's productivity and encouraging participation. Whenever employees get recognition from customers or managers, the company present 10 ~ 100 Kudos points with the level of contributions. Each Kudos point is equal to US\$ 1. Employees' contributions are classified into three categories. First, "individual records" (when employees receive recognition from managers or customers): manager recognition, customer recognition, building their learning record, record breaker, improving their record, and submitting an idea for productivity. Second, "making someone better" (when employees refer their colleagues or participate in an activity): referral bonus, making a difference, peer recognition. Third, "bang your dream" (when employees write articles): newsletter recognition. Employees who contribute to the company are also in the spotlight in their newsletter. Kelly's Kudos program is a good example that balances between individual effort to obtain social and economic rewards and the recommendation of colleagues. It is possible to enhance the divergence of knowledge through the balance between social rewards and economic rewards.

#### 4.4 Knowledge Sharing Culture

Culture acts as a social control mechanism that manages community members and sanctions those who deviate from norms (Lee and Cole 2003). Organizational culture can be defined as the shared, basic assumptions that an organization learned while coping with the environment and solving problems of external adaptation and internal integration that are taught to new members as the correct way to solve those problems (Park et al. 2004). Al-Alawi et al. (2007) classified the relationships between organization culture and knowledge sharing as follows: trust, communication between staffs, information systems, reward system, and organization structure.

LEGO Mindstorms NXT is now being developed with consumers every year. It is a programmable robotics kit developed by LEGO and MIT. The LEGO

Mindstorm series of kits contain software and hardware to create small, customizable, and programmable robots. Currently, there are a number of YouTube video clips about creative and customizable robots. The early version of Mindstorms had been hacked. LEGO considered litigation; however, they accepted this situation as a reflection of the customer's point of view. There is a strong community of professionals and hobbyists of all ages involved in the sharing of designs, programming techniques, creating third-party software and hardware, and contributing of other ideas associated with LEGO Mindstorms (Vallance et al. 2009). Its system/website is organized much like a wiki, harnessing the creative potential and collaborative efforts of participants. LEGO also encourages sharing and peering by making software code available for downloading and by holding various contests and events. In addition, LEGO invite outside specialists who give directions besides inside experts from strong communities. Though LEGO currently has a culture that respects its customers, LEGO previously had a vertical closed structure. If LEGO had not been able to adapt its culture with customers' communications, then there would be no LEGO.

#### 4.5 Knowledge Organization

Information is a flow of messages, while knowledge is created and is organized by the very flow of information (Nonaka 1994). Knowledge creation is the wide-scoped process of cooperative relationships among members within organization. A horizontal organization structure is suitable for knowledge transfer by making cooperative relationships. That is why horizontal organization activates teamwork-based communications among members (Goh 2002). A horizontal organizational structure not only implies enhanced communication but also the decentralization of the decision-making process (Claver-Cortés et al. 2007).

Recently, organizations use actively social network services (SNS) to ensure horizontal in-company communications. There are two types of companies using SNS: companies that use commercial SNS and companies that use self-developed SNS. LG electronics and Daumkakao use commercial SNS. LG Electronics is a Korean multinational electronics company with sales of US\$ 54 billion and 91,000 employees in 2014. Daumkakao is an internet services company in Korea, which has sales of US\$ 0.6 billion and 1,600 employees in 2014. The HRD team of LG uses social media 'Yammer' to collect ideas and to discuss opinions. Daumkakao uses Yammer more specifically; it is composed of a community for company-wide communications and 48 in-house communities. Communities are composed of teams, services, concerns, and clubs. People talk and discuss opinions in their communities. Daumkakao evaluates Yammer use as a movement to initiate in-house horizontal communication.

Though SNS promote an organization for supporting horizontal communication, companies block outside SNS messages because of security issues. Shinsegae and Lotte Data Communication Company (LDCC) use closed-end and self-developed SNS. Shinsegae is a Korean department store franchise with sales of US\$ 4.5 billion and 16,000 employees in 2014. LDCC is a Korean IT-service company with



sales of US\$ 5.4 billion and 1,200 employees in 2014. Shinsegae has developed intra-social system named ‘Blossom’ to strengthen communications between people. In Blossom, people can check all posting messages from all members in real time and use most of the features as SNS. All messages from outside flow into LDCC SNS, but messages from inside to outside are blocked. Key features are as follows: micro blog (Twitter) operation, searchable personal profiles with personal career goals and projects, proposed ideas evaluated with comments and surveys, and places for storing content.

#### 4.6 Knowledge Strategy

KM should be tightly related to objectives and business strategies of the organization or sub-unit. The strategic direction of the organization should determine the direction of the KM activity (Greiner et al. 2007). Based on the strategy, KM will determine the processes for managing knowledge. KM processes define methods for managing knowledge at a macro (organizational) and micro (individual and group) level (Sherif, 2006). According to Lettieri et al. (2004), “A KM strategy must be coherent and integrated with a comprehensive strategy whose goal is to pursue excellence”.

Samsung Life Insurance is the largest Korean insurance company with US\$ 22 billion in revenue and 6,500 employees and is a Fortune global 500 company. The company makes the best use of a two-track strategy for knowledge transfer. Insurance companies need both actuaries and life insurance planners. Professional knowledge is actively shared in the forum in their KMS. People share and adopt their ‘Learning and Growth’ knowledge in the ‘Infor YOU’ team room. Knowledge sharing site in Infor YOU is composed of field CoP and an essential certificate-learning club. Knowledge capable of being shared and transferred includes business operation materials, learning materials, club activities, and headquarters materials. In addition, Samsung Life Insurance efficiently transfers its knowledge assets (lessons learned and information from field, best practices) to life insurance planners through a satellite broadcast. Knowledge strategies have to be appropriately adapted to organizational structures and business strategies like Samsung Life Insurance.

Doosan E&C is global infra-solutions company that provides civil works, architecture and plants with US\$ 1.9 billion revenue and 1,700 employees. Doosan E&C has successfully modified their knowledge strategy to suit the construction industry. Though in general KM tries to transfer best practices, conversely Doosan E&C shares failures. In the construction industry, delays raise costs. The company allows voluntary posting of failures to spread lessons, and eventually influence production growth. Doosan E&C have changed their knowledge strategy to optimize organization structures within industry category.

Table 1 describes briefly the characteristics of the above cases. Characteristics of constructs from case organizations present main points for knowledge transfer activation.

**Table 1.** Characteristics of case organizations

Construct	Case Organizations	Characteristics
<i>Knowledge Trade (in Knowledge Market)</i>	Infosys Technologies,	Virtual currency based knowledge trade market affected external mechanism for knowledge transfer
	Samsung SDS	Knowledge trade by price led to autonomous dispersal of knowledge
<i>KMS</i>	Accenture	Traditional KMS needed a lot of effort for maintenance Autonomous development of knowledge market in KMS by knowledge trade
<i>Knowledge Reward</i>	IDEO, Kelly Services	Knowledge rewards balanced between economic reward and social reward (recognition, reputation)
<i>Knowledge Sharing (in Knowledge Culture)</i>	LEGO	Trust based knowledge culture affected internal mechanism for knowledge transfer Knowledge culture derived a sharing environment from user participation
<i>Knowledge Organization</i>	LG electronics, Daumkakao, LDCC	Horizontal and flexible organization structure Animated communication in knowledge organization
<i>Knowledge Strategy</i>	Samsung Life Insurance, Doosan E&C	Aligned knowledge strategy with organization target Knowledge strategy modified within environment around organization (industrial category)

## 5 Discussion

Our study explains how knowledge transfer mechanisms could be activated through knowledge trade markets by the multiple case researches. There are many enterprises that operate KM. There are, however, a few enterprises that increase productivity with KM. KM is a real, complex ecosystem organized by a number of factors; knowledge organization, knowledge strategy, KMS, knowledge rewards, knowledge sharing culture, and knowledge trade in markets. Why is knowledge market a useful mechanism for knowledge transfer activation? Market mechanisms can control the cycle of knowledge creation and extinction in the knowledge market. Knowledge trade in markets can be controlled autonomously by flexible prices. Currency liquidity can vitalize the knowledge market. Though some companies utilize virtual currency policy, the exchange of real goods can manage the market appropriately as with Samsung SDS.

Companies and organizations have to develop KMSs that users can promote autonomously by active adoption of trade in knowledge market mechanism. We need to adjust market mechanisms on KMSs via flexible prices and balance economic rewards and social rewards rather than favoring only economic rewards.

Firms or organizations should consider various aspects for the placement of a knowledge market within the organization. First, KMSs should provide a way to

improve and sustain the relations among communities. Second, firms need to change their organizational structure to be flexible. Flexible organizational structure can improve the social relations of the members. Decentralization and social interaction are particularly important on encouraging knowledge flows among organizational units that compete with each other in the marketplace (Tsai 2002). Third, we should harmonize the economic and social rewards for the balance between competition and cooperation. Though economic rewards can be helpful for the quantitative growth of knowledge creation, it is important to improve the quality of knowledge by reputation and social rewards. Fourth, compensation should be accompanied by a fair assessment. Evaluation methods need to leave a uniform measurement and they should be promoted and managed so employees feel judgments of their knowledge transfer are fair.

We hope that our results can give a stage as theoretical and empirical framework for future research on the knowledge trade KMS (in knowledge market), which enhance KM initiative with the other accelerator: knowledge organization, knowledge strategy, and knowledge sharing culture.

In particular, a consideration of limitation in the current study suggests that further studies be made by in-depth case studies for knowledge trade market. Though we investigated multiple cases across different conditions for knowledge transfer, we do not explain deeply how each factor harmonize organically with the knowledge transfer of knowledge market in real case. We could also obtain more generalized research results if we do study deeply one or two cases through a traditional case-study methodology (Yin 2002).

For future work, we suggest that a knowledge market analysis based on SNS be added by setting the framework of a knowledge market and knowledge sharing culture for knowledge transfer activation.

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