An Exploration of Knowledge Integration: A Comprehensive View of Media Characteristics and Integration Capability

Daocheng Hong, Shanghai Key Lab of Intelligent Information Processing, School of Computer Science, Fudan University, Shanghai, China, hongdc@fudan.edu.cn; Centre for Applied Informatics, Victoria University, Melbourne, Australia, Daocheng.Hong@vu.edu.au

Yanchun Zhang, School of Computer Science, Fudan University, Shanghai, China; Centre for Applied Informatics, Victoria University, Melbourne, Australia, Yanchun.Zhang@vu.edu.au

Abstract

With the increasing tendency of information technology (IT) applications, knowledge integration in organization has emerged as an important research topic for both practitioners and researchers, reflecting the magnitude and impact of knowledge resource in distributed environments. Practically, data, information, and knowledge are transmitted via various media, and integration capability is the antecedent of knowledge integration in organizations. However, few literatures research knowledge integration from the comprehensive perspective of transmission media and integration capability. As a complement to previous research, this study proposes a comprehensive theoretical model of knowledge integration (KIM) by incorporating valuable perspectives of media characteristics and organizational capability. This research model provides a new lens for knowledge integration based on transmission media in organizations by integrating relevant research streams. Furthermore, this robust and new model, which has been applied to a knowledge integration practice of e-commerce platform, can be used to explain the most knowledge integration phenomenon in contemporary society.

Keywords: Knowledge Management; Knowledge Integration; Integration Capability; Media Characteristics.
INTRODUCTION

With an overwhelming amount of data based on web, sensor and mobile terminals being generated (The Economist 2010), new discovery and insights can be obtained from the highly detailed, contextualized and rich information which is relevant to business knowledge and events in organizations. More recently, data and information booming provides not only the challenge but also the chance for organizational knowledge management. Knowledge management has been paid more attention by researchers particularly from different theoretical perspectives. Some researchers have gone as far as to propose clearly defined organizational models for knowledge creation and management (Hedlund 1994; Nonaka and Takeuchi 1995). Some studies have focused on other topics, such as the role of project teams. Those areas are concerned with product research and development, learning with knowledge creation, and even organizational structures formed with teams (Bogenrieder and Nooteboom 2004; Newell et al. 2004). Furthermore, some investigations have been conducted to characterize the nature of work linked to knowledge and organization (Grant 1996a; Grant 1996b). Especially, Grant’s theory of knowledge integration, which is an example of an attempt to synthesize relevant streams of research, regards the knowledge integration as the primary role of the firm and the essence of organizational capability. Additionally, knowledge embedded in various media sources and transmitted via media channels from text to multimedia even human mind diffuses between entities with different capabilities and efficiencies. It is necessary to study knowledge integration in organizations considering the socio-technical factors. Therefore, we explore keys from socio-technical views under the context of big-data and information moving forward at an ever-quickening pace: What media factors and capability factors influence knowledge integration in organizations? How do these factors affect knowledge integration?

In relevant research area, the information and knowledge management has received a great deal of attention from researchers, particularly with different theoretical perspectives. However, there are very few literatures on knowledge integration from the comprehensive perspective of media characteristics and capability theory by integrating information science and social science. Therefore, it is necessary to conduct a deeper study and explore a new theory for knowledge integration from the integrated perspectives. Data, information, and knowledge are transmitted through various media that affects the efficiency of knowledge dissemination. And knowledge integration in organizations is conducted by entities with different capabilities and efficiencies. Hence, this research focuses on knowledge management activities and proposes a robust and reliable model of knowledge integration (KIM) based on the media characteristic perspective and capability theory. In other words, this study explores media factors and capability factors influencing knowledge integration and develops the KIM theory drawn on media characteristics (Klein 2003; Steuer 1992), organizational capability (Henderson 1994; Mitchel 2006) and the theory construction methodology (Eisenhardt 1989; Wand and Weber 2002).

In this study, the main contributions to information and knowledge management are described as follows. First, we propose a novel model of knowledge integration by focusing on the fundamental media characteristics and organizational capability which as a comprehensive perspective have been ignored by most researchers in knowledge management. Second, we delineate these media characteristics and organizational capability in knowledge integration model, and in particular analyze the reasons and mechanism of social-technical factors on knowledge integration which provide a novel and integrated perspective for both academia and industry practice. Third, within the KIM framework, we conduct a case study on the knowledge management practice (ABC Wine Exchange Center) in the mainland of China which illustrates that KIM can explain organizational knowledge integration and can be extended to other similar phenomenon in organizations.

The organization of this study is as follows. After the introduction, section 2 presents the theoretical concepts such as definitions of the theoretical terms and relevant research. Section 3 focuses on the KIM framework from the media characteristics perspective and organizational capability, and describes the constructs and relationships within the KIM framework. Section 4 illustrates KIM by applying it to a case study on the knowledge integration of ABC Company in China. Section 5 presents the main differences between this study and the previous works. The implications and future research directions of knowledge integration are also probed. Finally, conclusions are drawn for both academia and industry practice.
2 THEORETICAL FUNDAMENTALS

Knowledge Integration. The dearth of knowledge in reality requires more effective mining, discovery and integration of knowledge from the raw data and information. The growing of variety and number of information sources presents not only a huge challenge but also a chance for knowledge management. Knowledge has been classified as two catalogues which are component knowledge and architectural knowledge in organization (Michiel et al. 1999). The former is existing knowledge, and the latter is created by combining or integrating different types of component knowledge into new configuration knowledge. As a much more widespread phenomenon, knowledge integration has been studied both in research and industry. For the purpose of clarity, this paper refines prior definition and contents of knowledge integration (Henderson 1994; Huang and Newell 2003; Michiel et al. 1999; Mitchel 2006). Knowledge integration in organizations is an ongoing collective process of constructing, articulating, redefining and combining different types of component knowledge from the raw data and information by means of various media into architectural knowledge, which includes importation and synthesis of knowledge. Knowledge integration depends on the degree to which organization possesses managerial integration capability including importation and synthesis factors. Different knowledge integration practices have different efficiencies with different capabilities.

Organizational Capability. The theory of organizational capability proposes that the essence of organizational capability is the integration of various specialized knowledge which can be called integration capability. Integration capability of organization that refers to the ability to integrate knowledge is a capacity to access and import knowledge from various channels, and to synthesize this existing knowledge (Henderson 1994; Huang and Newell 2003; Mitchel 2006). Integration capability has a series of processes including effectively acquire, assemble, combine, and deploy valued information resources. According to prior literatures, research on dynamic capabilities and combative capabilities presents insight into the relationship between integration capability and knowledge integration efficiency. Dynamic capability refers to an ability to integrate, build, and reconfigure internal and external knowledge to respond to environmental change (Zollo and Winter 2002). Linking to innovation success, managerial ability (its dynamic capability) to reconfigure division charters (an architectural innovation) was a critical factor (Galunic and Eisenhardt 2001). The combative or integrative capability represents the synthesis and application of new and existing knowledge culminating in organization success (Kogut and Zander 1992). Organizational integration capability leading to knowledge integration, which embodied into importation capability and synthesis capability, is determined by the characteristics of transmission media.

Media Characteristics. Knowledge that evolves from data and information is transmitted by a variety of media from verbal to IT-enabled types in contemporary society. With different media, there will be different efficiencies for knowledge management when knowledge diffuses between entities. Media vividness and media interactivity that have been studied, for example in e-learning, are the two major characteristics (Jiang et al. 2002; Lombard & Ditton 1997; Wand and Weber 2002). The first dimension, media vividness referring to the ability of a medium to produce a sensorially rich mediated environment is also perceived as media richness by researchers. Media richness comes primarily from the literature on computer-mediated communications (CMC) and is most often associated with business communication (Trevino et al. 1987). In this paper, media richness is used to analyze media choice of information and knowledge transmission and to help reduce ambiguity and equivocality for efficient knowledge diffusion.

The other one media interactivity refers to the extent to which entities can participate in modifying the form and content of a mediated environment in real time, and is a hot research topic. Prior research proposed that media interactivity should have five critical components: the number of inputs acceptable; the number and type of characteristics that are modifiable; the range of response possible; the speed of response; and the degree of correspondence between input and response (Lombard & Snyder-Duch 2001). Steuer (1992)construed media interactivity as having three components: speed, range, and mapping. These correspond to the above-mentioned five components, as the first three of the five can be subsumed under “range”. Media interactivity describes the participants mutual
information exchange and process either in real time (e.g., QQ, WeChat, teleconferencing) or in a store-and-forward basis (e.g., email), or to seek and gain access to objects an on-demand basis. Increasing network bandwidth, higher mobility, and more immersive designs promise to offer a better sense (much more richness and interactivity) of access to objects or entities for necessary information and knowledge. Therefore, the research focuses specifically on the characteristics of media channels (media interactivity and media richness) based on prior theories which can be used to enhance the integration capability. With the focusing on media richness and media interactivity, the study is essentially exploring the main components of media features for integration capability and knowledge integration.

3 RESEARCH FRAMEWORK

As discussed in the above sections, data, information and knowledge are transmitted through various media, which are integrated by entities with different efficiencies. Media characteristics and integration capability play a vital role in knowledge integration practice of organizations. This section will focus on knowledge management and will propose a robust and reliable model of knowledge integration based on media characteristic perspective and organizational capability theory.

In this KIM theoretical framework, the dependent variable is knowledge integration and the main constructs are media richness, media interactivity and integration capability. Media richness and media interactivity are posited to have a positive effect on integration capability, then on the dependent variable (knowledge integration). In other words, as each of the independent constructs (media richness and interactivity) increases, the integration capability becomes greater and knowledge integration becomes more effective. This does not mean that knowledge with a low degree of media richness and/or media interactivity can’t be integrated. Rather, it means that it would be more efficient to being integrated by participants if the degrees of these media characteristics are high. As a dependent variable of KIM, knowledge integration is continuous, not discrete, and should be thought of as a matter of degree, not of kind. This is a critical distinction for this study from other knowledge synthesis research. The propositions of KIM that should not be interpreted as on/off are simply descriptions of the efficiency of knowledge integration in organizations. In propositional terms of KIM, integration capability has a positive mediating effect on the relations between the independent variable and the dependent variable. Therefore we propose the research framework of KIM through integrating the relevant research streams, as shown in Figure 1.

![Figure 1. KIM Framework](image)

3.1 Knowledge Integration

As a crucial result of knowledge management, integration of pocketed, dispersed and multiple sources component knowledge in distributed environments always emphasizes the economic value of specialization and effectiveness. The dependent variable in KIM theory is knowledge integration, which presents the performance of knowledge management with certain media channels. The existent
Literatures have made an agreement about the measurements of knowledge integration which include three dimensions: efficiency, scope and flexibility (Grant 1996b; Michielet al. 1999; Subramanian and Soh 2008). First, efficiency dimension of knowledge integration refers to the way in which the architectural knowledge accesses and utilizes component knowledge. Another one, scope dimension of knowledge integration refers to the breadth of component knowledge the architectural knowledge drawing upon. Finally, flexibility dimension of knowledge integration refers to the extent to which the architectural knowledge can access additional component knowledge and integrate exiting component knowledge.

Knowledge integration of organization can increase the pool of services available to users, remove cooperation barriers, and enable the network effect matter at the application level. Knowledge integration based on the systems of data synthesis and information synthesis needs more socio-technical factors such as social networks, transactive memory systems (Hong et al. 2012; Zhang et al. 2012). Theoretically, the state of organization knowledge integration can be measured objectively either as user acceptance or adoption of the organization production or the financial revenue (Overby 2008). As stated in the previous session, this study regards knowledge integration as a continuous rather than discrete process, and a matter of efficiency degree, not of kind. Therefore, knowledge integration can be measured in practice according to the actual application environment considering both a behavioral theory and a computational theory.

3.2 Media Richness

Media richness that is a critical component of media characteristics is the way in which an environment presents information and knowledge to the human beings’ senses. The richness of a medium with affluent semantic and background information will influence organizational member’s perception of the environment lies in the ability of a media-rich environment to diminish user perception of mediation and misunderstanding. The premise for research is that the integrated knowledge would finally be applied to practice by human beings. The media can be used to simulate the sensory elements of the physical world for people. This simulation of media richness will determine the level of user perception for the mediated environments where participants are involved. Media richness is a better indicator to analyze transmission media choice and to help participants reduce the ambiguity and equivocality of information processing for knowledge management in organizations.

Media richness can be divided into two core elements of the transmission media which are sensory breadth (number of media channels) and depth (quality within each channel). Sensory breadth presents the number of different sensory channels that a medium utilizes (e.g., aural, olfactory, visual, tactile, gustatory), while sensory depth refers to the resolution within each of this perceptual channels. Thus, multimedia communications have greater breadth than single media communications (e.g., advertisement of flash on the Internet versus on newspaper). The experience of a mediated representation will be related to the number of user sensory channels that can be engaged. The greater the number and quality of sensory channels, the greater is the likelihood of immersion in the mediated environment (Grant 1996a) and much more effective information and knowledge transmission for integration capability. Media richness is posited to have a positive relation to integration capability of organization.

**Proposition 1 (P1a).** Increased media richness promotes organizational importation capability.

**Proposition 1 (P1b).** Increased media richness promotes organizational synthesis capability.

3.3 Media Interactivity

Media interactivity is indeed viewed as a multidimensional construct with the rapid spread of information and knowledge transmission. Media interactivity is the extent to which the user can participate in modifying the form and content of a mediated environment with an immediate response. Prior study proposed that interactivity should have five critical components: the number of inputs acceptable; the number and type of characteristics that are modifiable; the range of response possible;
the speed of response; the degree of correspondence between input and response (Lombard & Snyder-Duch 2001). Media interactivity describes a dynamic environment of information transmission that affects entities from those directly involved to those who have to manage it and those who use it.

It is pertinent to focus on the interactivity property of media features when we discuss the diffusion of information and knowledge. In traditional direct communication experience, individual have a high level of interactivity over how they interact with the objects what to look at, touch, smell, in what order, and for how long. In contrast, with highly mediated world, such as those transmitted via the Internet or wireless communication systems, the range of media interactivity choices is limited. In such situation where fewer interactivity options are available, users will thus perceive their experiences as more mediated leading to misunderstanding for knowledge management. Because of the association of interactivity with direct information processing experience, users may perceive environments in which they have greater interactivity as less mediated and much more capability for information processing. Therefore, media interactivity is posited to have a positive relation to integration capability of organization.

Proposition 2 (P2a). Increased media interactivity promotes organizational importation capability.
Proposition 2 (P2b). Increased media interactivity promotes organizational synthesis capability.

3.4 Integration Capability

Integration capability for various specialized knowledge has been recognized as the essence of organizational capability. Organizational capability of knowledge integration that includes ability to access and import multi-sources knowledge and ability to synthesize and deploy the existing knowledge has been discussed in academia and industry. Knowledge integration capability refers to an ability to integrate, build, and reconfigure internal and external knowledge evolved from data and information to respond to environmental change. Integration capability has a series of processes including effectively acquire, assemble, combine, and deploy valued data resources. Contributions on dynamic capabilities and combinative capabilities present insight into the relationship between integration capability and knowledge integration effect/performance (Ariely 2000; Lombard & Ditton 1997; Subramanian and Soh 2008).

Organizations need great capability to cope with environmental uncertainty and improve their decision making. Capability building of knowledge integration is critical step for knowledge integration of organization performance. Knowledge integration with better integration capability leads to high performance compared with others in the same area. According to previous literatures, insights into the relationship between integration capability and knowledge integration performance have been studied in organizational integration capability (Kogut and Zander 1992; Zollo and Winter 2002). Organizational integration capability leading to knowledge integration is embodied into importation capability and synthesis capability which is determined by the transmission media. Thus, organizational integration capability is posited to have a positive relation to knowledge integration.

Proposition 3 (P3a). Increased organizational importation capability promotes knowledge integration.
Proposition 3 (P3b). Increased organizational synthesis capability promotes knowledge integration.

4 CASE STUDY

4.1 Methodology

Theories are regarded as necessary tools to make meaning of observations and to predict the presence of yet-undiscovered facts. The utility and accuracy of a theory can be gauged by its correspondence to events in the real world. As applied to information and knowledge management, KIM theory can be measured by how well it promotes participants in their day-to-day communication and moment-to-moment information transmissions through media in organization. An analysis of case study in the real world allows researchers to study contextual detail and to provide rich, deep descriptions of findings. A case study enables researchers to empirically investigate and gain an in-depth, in-context understanding of a contemporary phenomenon from key informants who are directly involved in the
activities being studied (Yin 2009). In order to construct a comprehensive, logically sound and coherent KIM theory, we design a case-study research which can be described as the collection and presentation of detailed, unstructured data obtained via various media to better understand particular knowledge integration phenomena in organization. Explanations of phenomena emerge from the study as multiple data sources are analyzed which is a comprehension of secondary data and interview data.

The case study methodology has been applied in various fields including information systems, computer science, management science, social science, psychology, economics, and so on. Case studies can be used to describe specific phenomena (descriptive case studies), to answer ‘how’ and ‘why’ questions (explanatory case studies), and to answer ‘what’ questions (exploratory case studies), such as ‘what happened here?’ (Yin 2009). Researchers conducted an exploratory case study and found that a soft systems methodology could indeed improve requirements practices (Niu et al. 2011). Another paper presented a case study in a scientific research scenario to show the effectiveness of their access control framework and models for supporting secure and reliable collaboration (Ma et al. 2010). Researchers proposed the utilization of a multifaceted approach to traceability generation and recovery in facilitating software evolution process and completed experiment applied in a real case study (Rochimah et al. 2011). This section will conduct an explorative research designed by the KIM application to explore the real situation of knowledge integration fulfilling normative scientific criteria. All data have been collected through the methodological triangulation method-case studies to obtain in-depth information about the problem (secondary data and social survey: interview).

4.2 Illustrated Case

With the increasing of IT applications, many industry watchers are forecasting the expansion of e-commerce to be characterized by rapid growth and revolutionary changes for data and information management in business transactions and markets. This section will explore the evolution of knowledge integration in an e-commerce exchange system (ABC Company) which has operated with 10 million in registered capital, but its accumulated gross revenue is more than RMB 161 million. Although theorizing about this topic is hot and some conceptions are new, it nonetheless explores how the KIM framework can be applied to an emerging setting.

![Figure 2. Total Market Capitalization on ABC Platform (RMB)](image)
The ABC Wine Exchange Company is located in Shanghai and has been operated from December of 2011. The ABC Company connected with collectors, clients, distilleries, commercial banks via IT means provides an integrated information platform and a public e-commerce platform for international wine exchange. At the end of April in 2013 there were 12 listed liquor-stocks on this e-platform with a total market capitalization of more than RMB 819 million, as shown in Figure 2. The ABC Company has performed well from its opening operation and its accumulated gross revenue was more than RMB 161 million and the accumulated transaction amounts was nearly 500 million at the end of April, 2013, as shown in Figure 3 and Figure 4. As an international wine and liquor exchange platform for stakeholders, the responsibility of ABC is to set rules, keep fine operating environments and provide a wine-transaction service and knowledge integration to registered members and clients. From the operation performance, in specific the turnover and revenue, we find that this organizational knowledge integration effect in the wine exchange area has been accepted by collectors with a good performance.

**Media Richness.** Media richness including sensory breadth (number of communication channels) and depth (quality within each channel), can be used to help reduce the ambiguity and equivocality of information communication and thereby enhance users’ abilities of information and knowledge processing. Media richness with affluent semantic and background information will diminish user’s perception of mediation and misunderstanding. The ABC Company provides sufficient and efficient media channels, based on online exchange systems for users, such as consumers, distilleries,
commercial banks, and so on. All users can find the necessary data, information and knowledge for their transactions in the wine exchange systems, such as News Delivery, Announcements, Issue Information, Online and Offline Consultant Support etc. Transferring media of information and knowledge greatly increase participants’ capability and promote the volume of transaction. Media richness, which includes sensory breadth and depth, promotes the organizational integration capability and knowledge integration such as the adoption of e-commerce exchange systems and the revenue of this organization.

**Media Interactivity.** Media interactivity presents the extent to which the organization member can participate in modifying the form and content of a mediated environment for information and knowledge transmission with an immediate response. Media interactivity describes a dynamic environment that affects participants from those directly involved to those who manage it and those who use it. All users of the wine exchange system have a high level of interactivity over how they interact with the objects and each other for transaction knowledge. The stakeholders can participate in modifying the form and content of a mediated transaction environment with an immediate response. The range of interactivity choices is various, and the speed of correspondence between input and response is fast. In such situations, participants will perceive their transactions as less mediated because of the media control and have greater capability of knowledge integration. Media interactivity with a high level spurs organizational integration capability, and further promotes the transaction platform adoption and revenue of the organization.

**Integration Capability.** The same as a financial business, participants of the ABC exchange system mainly pay attention to the wine exchange knowledge and on the wine value. Organizational capability of knowledge integration is the ability to access and import multi-sources knowledge and ability to synthesize and deploy the existing knowledge. Integration capability of data, information and knowledge is critical step for knowledge integration of organization performance. Greater integration capability leads to more effective knowledge integration with more transaction platform adoption rate and higher performance compared with others in the same area. Contributions on dynamic capabilities and combinative capabilities present insight into the relationship between integration capability and knowledge integration. As we assume that different communication participants have different capabilities for knowledge integration, users with greater integration capability are amenable to adopt the communication systems and have good performance. This IT based e-commerce platform of ABC can assist participants to process data, information, and knowledge for greater integration capability at present which facilities the systems adoption and revenue of the exchange systems. The conclusion can be drawn that the mediating effect of integration capability in KIM framework is very important and should be considered carefully.

## 5 DISCUSSION

### 5.1 Related Work

In the relevant research area, there is an abundance of literature on knowledge integration such as data and information synthesis, knowledge integration based applications. To reduce the time-to-market, researchers propose an autonomous integrated prototyping approach to utilize the benefits of virtual prototyping and physical prototyping methodologies by integrating knowledge (Rai and Kang 2009). Authors develop an intelligent system architecture to facilitate and guide the product development autonomously and simultaneously with knowledge integration based systems. The architecture is applicable to embedded real-time systems, sensor applications, robotics, and ubiquitous applications where system interaction with the external environment is necessary. Other researchers, in order to improve the performance of a pattern recognition system, seek to investigate the benefit of incorporating prior knowledge about measurement noise into system construction and propose a kernel density classifier which integrates such prior knowledge (Li et al. 2008). Instead of using an identical kernel for each sample, this study transforms the prior knowledge into a distinct kernel for each sample. Compared to the basic methods, the new kernel density classifier can give a significantly better classification performance. However, the improvement is more obvious for small sample size datasets and large number of features.
In decision support systems research, the authors present a solution for enterprise-wide information and knowledge integration for intelligent decision making (Janjua et al. 2013). This research proposes a conceptual framework for representing, reasoning and integrating incomplete and conflicting reasoning chains for knowledge integration, and presents the algorithms for knowledge integration and the prototype application for validation of results. But, with the increasingly complex, competitive and dynamic of enterprise environments, the approaching of big data, more flexible and effective techniques should be developed in decision support systems. Another research introduces data and knowledge integration in the life sciences and assumes that data integration is one of the first milestones on the long road to find a satisfying answer for an open question (Philippi 2008). Since data and knowledge in the life science are scattered over millions of publications and thousands of heterogeneous databases, their integration is still a major challenge for science and industry alike. The author mentions many different topics in this area ranging from biomedical literature mining over web services and workflows to the construction of a knowledge base for systems pathology and the integration of mouse-related data. Researchers investigate tacit knowledge integration based on social networks from transactive memory systems (TMS) perspective (Zhang et al. 2012). This study focuses on ties dimension (expressive tie, instrumental tie, and tie strength) and nodes dimension (value similarity), and presents the mechanism of social networks on tacit knowledge integration with TMS lens. Other researchers investigate integration process of tacit knowledge based on social networks and propose a novel theory of tacit knowledge integration drawn on social networks perspective and technology acceptance model (Hong et al. 2012). The explorative study demonstrates several findings and fills an apparent gap of the direct effect of social networks on knowledge integration. Because the fact is that most social relations eventually lead to the integration action mediating individual intentions.

All above literature provides sufficient evidence for knowledge integration research including so many subjects. The importance of knowledge integration in organization has been emphasized, such as increasing the pool of services available to users, promoting cooperation, and enabling the network effect matter at an application level. Practically, data, information, and knowledge are transferred from place to place via various media; integration capability is the antecedent to knowledge integration. However few literatures research knowledge integration from the comprehensive perspective of transmission media and organizational capability. To fill this gap we conduct a deep study on knowledge integration of organization based on the media features and integration capability of organization which as a comprehensive integration have been ignored by most researchers.

5.2 Contributions

The KIM theoretical framework explains what kinds of media characteristics and integration capability affect knowledge integration in organization and how these factors work under the data and information booming era. In other words, this study describes why different knowledge integration applications for industry via IT media have different user adoption rates and different levels of performance for applied systems. In this theory, if the independent variables (media richness and media interactivity) are low, the integration capability will be weaker and knowledge integration will be more difficult to be adopted than if they were high. Integration capability has a positive moderating impact on the relations between the independent variables (media richness and media interactivity) and the dependent variables (knowledge integration). We analyze the practical knowledge integration of an e-commerce system in ABC Company with a KIM lens and draw a reasonable interpretation. A wider applied-promotion of the KIM framework can be conducted through further empirical study in the near future.

Although KIM theory is mainly drawn from the literature, the research result is relevant to both academia and practice. The KIM framework provides researchers with a lens to explain and predict the media characteristics that influence whether a knowledge integration practice is amenable to be adopted via a certain media. Practically, knowledge integration occurs in nearly all aspects of society and organization with IT applications, which facilitates multiple field research including information systems, computer, management, and communication studies. The KIM theory also presents the significance of media such as IT, which play a vital role in the information and knowledge management field. This aspect of KIM theory will help researchers better understand why and how
media characteristics continue to have profound impacts on integration capability and knowledge integration of organization including adoption and revenue of applications.

KIM theory provides a useful framework for information and knowledge management and prediction in which information and knowledge are transmitted between participants via various media. The analytical framework provided by KIM theory, which can help engineers and managers with the communication process and channel design, become increasingly important as a combination of media factors and integration capability. For example, users can assess the effect of knowledge integration by considering media richness, media interactivity and integration capability of organization. If the components of media characteristics are low, engineers and managers will make more effort to conduct viable knowledge integration than if they are high. Especially in the same media environment condition, organizational integration capability should be considered thoroughly for more effective knowledge integration.

5.3 Improvements

As a new theory, there is a certain amount of space to improve its development and practice. First, KIM theory, which is mainly drawn on both a theory of media characteristics and a theory of organizational capability, explains the mechanism of knowledge integration in organization. This study discusses domain-specific factors of media and capability in knowledge integration which may hamper the general usage. Second, KIM theory is not meant to be used to evaluate whether IT-based knowledge integration is good or bad. Rather, it assesses whether a knowledge integration practice is amenable to be effective and adopted from the perspective of media characteristics and organizational capability. Finally, to theorize KIM, this research draws on the theory construction methodology, media characteristics and organizational capability with case study. All constructs are based on our interpretation from those perspectives and relevant streams. This study is just the first part of three steps in our research agenda of knowledge integration which includes a large-scale survey based on this case study and developing a pilot systems for organization in the future. Much more endeavor and promotion of knowledge integration in organization need to be conducted.

6 CONCLUSIONS

Practically, data, information, and knowledge diffuse gradually between entities via various media; integration capability affects knowledge integration directly. However few literatures research knowledge integration of organization from transmission media and organizational capability. To fill this gap this research focuses on media characteristics and integration capability affecting knowledge integration and proposes a KIM theory drawn on relevant theories and theory construction methodology. The KIM theoretical framework provides a new lens for researching information and knowledge integration which plays a central role but has been neglected in this big-data and information booming era. The study identified the main constructs and propositions which offer guidance for knowledge integration performance from user adoption and revenue perspectives. As a newly proposed theory, the KIM framework can benefit from empirical and experimental testing which will improve the main constructs. In the future, we will conduct the empirical and experimental research on organizational knowledge integration.

With the approaching of big-data era, there is little doubt that more and more data, information, and knowledge will be transferred by means of various IT in organizations. The KIM theory is useful to understand and predict which media applications will continue to hinder knowledge integration from media features and integration capability. It also may be used to help practitioners predict by which media a knowledge integration practice is effective in the near future versus the long term. As a useful research perspective and framework, the KIM theory can explain the most knowledge integration phenomenon in contemporary organizations.
ACKNOWLEDGEMENTS

The authors equally contributed to this study and thank the anonymous referees for their valuable comments and suggestions. This work was supported partly by CSC (201206105028), NSFC (61170095), Shanghai Committee of Science and Technology (13DZ2272700) and Senior Visiting Professor Project of Key Labs at Fudan University.

References

Hong DC, H Ling, and CH Zhang. (2012). An Exploration of Individual Level Tacit Knowledge Integration. KES IDT12 (J. Watada et al. (Eds.): Intelligent Decision Technologies), SIST 16(2), 213–224.


