Computers in Human Behavior 59 (2016) 258–264

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Full length article

Success model for knowledge management systems used by doctoral researchers

Alberto Un Jan [a, *], Vilma Contreras [b]

[a] Universidad San Ignacio de Loyola, Perú. Av. La Fontana 550 La Molina, Lima 12, Perú
[b] Cantaros Peruanos. Av. Gálvez Barrenechea 1027 San Borja, Lima 41, Perú

ARTICLE INFO

Article history:
Received 28 September 2015
Received in revised form
31 January 2016
Accepted 4 February 2016
Available online xxx

Keywords:
Knowledge management system
Information system
Success model
Searchability
Perceived usefulness
User satisfaction

ABSTRACT

The purpose of this paper is to propose a model to anticipate the success in the use of a Knowledge Management System (KMS) by doctoral researchers. Doctoral researchers who are preparing their doctoral dissertation are requested to prepare a tool to manage the knowledge they are collecting. The tool is based on data base techniques, and the researchers will use this tool to collect data about the knowledge they use. Doctoral researchers will perceive satisfaction in the use of this tool, depending on internal aspects that they could previously perceive, such as ease of use, usefulness, or quality. Also, there could be external aspects such as rewards, trust and social norms that could affect the perceived satisfaction. As a conclusion, the correct identification of internal and external aspects can improve the success in the use of a KMS.

1. Introduction

Doctoral students, who gather knowledge to prepare their researches, need to manage this knowledge. Tools to manage knowledge are in some cases software products like Moodle, and in other cases data base models adapted to the knowledge needs students have. Uribe-Tirado, Melgar-Estrada, and Bornacelly-Castro (2007) report the use of Moodle as a tool to manage information, documents and knowledge in two research groups at the Inter-–American School of Library Science, University of Antioquia, in Medellin, Colombia. Their conclusion is that the process is more valuable than the results; research groups must look for strategies to complement processes and results, supported by information technology (IT) professionals. For this purpose collaborative tools, like Moodle, are a valuable alternative. Lackner (2012) describes the introduction of Moodle as learning platform at the University of Graz in the Winter Semester 2010. Also, Lackner and Raunig (2012) introduce a multimedia manual for Moodle Praxis at the Academy of New Media and Knowledge Transfer. Solana-González and Pérez-González (2008) give a strategic step as they present the experience and results of the development and implementation of a technical-documentary information management system at the enterprise Nuclenor. As a conclusion, they find the need for information technology to combine digitizing and image treatment, text processing and others. Also, it is necessary to integrate the disperse knowledge in different sources.

The problem all organizations have is to efficiently discover knowledge, create new knowledge, capture it, share it, and use it to gain competitive advantage (Hevner & Chaterjee, 2010). Organizations need to develop a system to manage their knowledge: a knowledge management system (KMS). This system refers to a class of information system applied to managing organizational knowledge. The objective of KMS is to support creation, transfer, and application of knowledge in organizations (Alavi & Leidner, 2001). Students who prepare their doctoral dissertation need to manage their knowledge as well, and prepare their own KMS to fulfill this need. This research will measure the success of KMS's developed by doctoral students, by proposing a success model. The research question in this paper is: What are the variables that influence the success in the use of a knowledge management system by doctoral researchers?

Knowledge management uses information technology as a tool. The purpose of this research is to prepare a model to evaluate the success of technology applied to handle knowledge management.

* Corresponding author.
E-mail addresses: emilio.unjan@usil.pe (A. Un Jan), cantarosperuanos@yahoo.com (V. Contreras).

http://dx.doi.org/10.1016/j.chb.2016.02.011
0747-5632/

This technology will be called a knowledge management system (KMS) and the model will be referred to as success model (SM). The success model proposed will identify external and internal variables; their participation in the model and their relationship to other variables will be validated with a survey.

This paper will first explain the variables to be used. Then, in the next section, the method to collect data and the survey used will be explained. Later, an analysis will be made. Finally, the implications will be discussed.

1.1. Rewards

Bock, Sabherwal, and Qian (2008) found the following definitions for rewards: "*Extrinsic rewards* are defined as rewards that are not inherently connected to the activity performed, which include factors such as direct or indirect monetary compensation." "*Intrinsic rewards* can be defined as satisfaction that arises out of performing an activity such as enjoyment from knowledge sharing or problem solving." Saparito and Gopalakrishnan (2009) found that the use of a KMS can be characterized by assumptions about rewards that make behavior more predictable. A party can be confident about entering into a vulnerable situation because it believes that other parties will behave in a fashion that is consistent with its welfare. However, predictions can relate behavior positively or negatively to knowledge sharing. For example, Kock and Davison (2003) found a study about an implementation of an asynchronous computer conferencing system (Lotus Notes) at a large consulting firm and concluded that the reward systems prevented knowledge sharing among consultants, in spite of the availability of technological support.

1.2. Trust

Simple collaborative technologies can have a positive effect on knowledge sharing in organizations (Kock & Davison, 2003). When combined with appropriate social processes, collaborative technologies may foster knowledge sharing. In previous models, trust has been identified as a variable that contributes to knowledge sharing. Bock et al. (2008) examined the determinants of knowledge repository systems success, and focused on organizational trust as an aspect of social context. They then defined organizational trust as "the willingness of workers to vulnerably rely on others based on positive expectations or beliefs about them". Bock et al. (2008) also found that "trusting relationships lead to greater knowledge exchange. Organizational trust has been regarded as essential factor in knowledge sharing; in the presence of organizational trust, people are more willing to contribute useful knowledge, and to listen and absorb others' knowledge". Saparito and Gopalakrishnan (2009) defined trust as "the intention of one party to accept vulnerability based upon positive expectations of the intentions or behavior of another party". Because trust reflects beliefs about predictability and functionality, Thatcher, McKnight, Baker, Arsal, and Roberts (2011) examined how beliefs about trust in information technology affect intention to explore information technology. In studying relational trust, Santoro and Saparito (2006) found in previous researches that trust between partnering organizations facilitates knowledge transfer. Also, an important ingredient for the success of inter organizational partnerships is trust. Trust between a firm and university research centers will enable more open communications and knowledge transfer (Santoro & Bierly, 2006). Furthermore, Hsu and Sabherwal (2011) found that trust among employees promote knowledge exchange and combination.

1.3. Subjective norm

Subjective norm has been identified by previous authors in their models. For example, to control for the influence of social context and individual differences on intention to explore, Thatcher et al. (2011) collected data on subjective norm. Although Bock et al. (2008) did examine how attributes of social context might influence individuals' ability and motivation to share knowledge, in bounding the scope of the study; they excluded subjective norms, and recommended that future research on knowledge use should examine the effects of it.

1.4. Perceived usefulness and perceived ease of use

Perceived usefulness and perceived ease of use have been widely studied in the Technology Acceptance Model. Behavioral beliefs, such as perceived usefulness and perceived ease of use, finally determine intention and behavior.

Thatcher et al. (2011) found that perceived usefulness refers to "the degree to which a person believes that using a particular system would enhance his or her job performance". For Bock et al. (2008), perceived usefulness is defined as "the extent to which the user believes that the particular system has contributed to his or her job performance". Bock et al. (2008) found evidence that perceived usefulness would lead to increased user satisfaction, including empirical support. Therefore, Bock et al. (2008) argue that if a user considers the technology to be more useful, he or she is more likely to be satisfied with it.

Thatcher et al. (2011) found also that perceived ease of use, refers to "the degree to which a person believes that using a particular system would be free of effort". Bock et al. (2008) used the term perceived searchability instead of ease of use. Perceived searchability indicates how well the system can help individuals who seek to reuse certain knowledge residing in the system find that knowledge.

1.5. Information quality

The previous models of KMS success include information quality; Bock et al. (2008) use perceived Knowledge Repository System (KRS) output quality instead of information quality. Perceived KRS output quality reflects the quality of the output that is available from the KRS to the specific user. In this research, perceived KMS output quality will also mean the quality of the output available to the user, in this case the doctoral researcher. Earlier models of information system success found by Bock et al. (2008) also included information quality and system quality.

1.6. User satisfaction and system use

Bock et al. (2008) found that user satisfaction was defined by Seddon (1997) as "the extent to which the user believes that a KRS meets his or her information and knowledge requirements"; next Bock et al. (2008) argued that if a user considers the KRS more useful, then he or she is more likely to be satisfied with it. In this research, perceived KMS user satisfaction is the extent to which the user, in this case the doctoral researcher, believes that the KMS meets his or her knowledge requirements.

Bock et al. (2008) explain the variable "system use" using Rai, Lang, and Welker (2002) definition, as "the behavior of using the system as indicated by the effort an individual puts into using the system". Next, Bock et al. (2008) mention two difficulties for including system use in their study: a) they found at least three different meanings for system use, and b) they found two different reasons for system use. Bock et al. (2008) decided to exclude system

use from their model. In this research system use will not be measured, according to Bock's model; the final variable measured in this research will be user satisfaction.

1.7. Proposed model

The proposed success model for the current research is based on the Knowledge Repository Systems (KRS) model by Bock et al. (2008). According to Bock et al. (2008), knowledge is codified and stored in a KRS on the assumption that it will be useful to others in the organization; thus, knowledge sharing through KRS involves individuals contributing as well as seeking knowledge. The model developed by Bock et al. (2008) includes four constructs: Perceived output quality (based on ease of use and information quality), Perceived searchability, Perceived usefulness and User satisfaction. From the social context, the variables in the model receive external influence from: Extrinsic rewards, Intrinsic rewards and Organizational trust. The model by Bock et al. (2008) will now be applied to the Knowledge Management System. To propose a more general model, Subjective norm has been added. The influence of variables on each other is shown by the arrows. To the original model by Bock et al., (2008) two influences have been added, namely: from intrinsic rewards to perceived searchability and from intrinsic rewards to user satisfaction. However, these two new influences must be confirmed in the model. Also, subjective norm has been identified as an extrinsic variable. Fig. 1 shows the proposed model. Please note that, in a general way, arrows from the four external variables are related to each of the four internal variables.

The relationships among variables are proposed in the following hypotheses and will be confirmed with a correlation analysis.

Hypothesis 1: Extrinsic rewards positively affect perceived KMS user satisfaction.

Hypothesis 2: Intrinsic rewards positively affect perceived KMS user satisfaction.

Hypothesis 3: Subjective norm positively affects perceived KMS user satisfaction.

Hypothesis 4: Organizational trust positively affects perceived KMS user satisfaction.

Hypothesis 5: Perceived KMS searchability positively affects perceived KMS user satisfaction.

Hypothesis 6: Perceived KMS quality positively affects perceived KMS user satisfaction.

Hypothesis 7: Perceived KMS usefulness positively affects perceived KMS user satisfaction.

2. Method

This section describes a sampling method applied among doctoral students who developed knowledge management systems using technology tools. First, students were asked to develop a knowledge management system for their own needs. Fig. 2 gives a simplified version of the example given to explain the exercise.

2.1. Development of the knowledge management system

A group of 23 doctoral students in the Knowledge Management course, conducted by Dr. Un Jan (author1) in 2012, had the work to develop a knowledge management system, defined for the course, as a technological resource to manage the necessary knowledge; this system would be used to prepare the doctoral dissertation.

The students worked in teams of four to five participants, on a proposal starting on data base models and entity relationships; they recognized that although they were working with knowledge, they were handling data about knowledge. Fig. 2 shows one of the proposals from the teams.

Later, in the same year, another group of six doctoral students in the Data Base course, also conducted by Dr. Un Jan, had the work to develop a data base system to manage knowledge used to prepare their doctoral dissertation (see Table 1). To better explain the purpose of this work, Fig. 2 was used, as an example from a previous course about how data bases were used to manage knowledge in a knowledge management course.

2.2. Data collection and sample

In year 2014 Dr. Un Jan conducted three groups of 21 doctoral students each in the Knowledge Management course. The participants were professors from different universities in Ecuador, mainly from the Manta and Machala regions. Among 63 participants who attended the Knowledge Management course, a

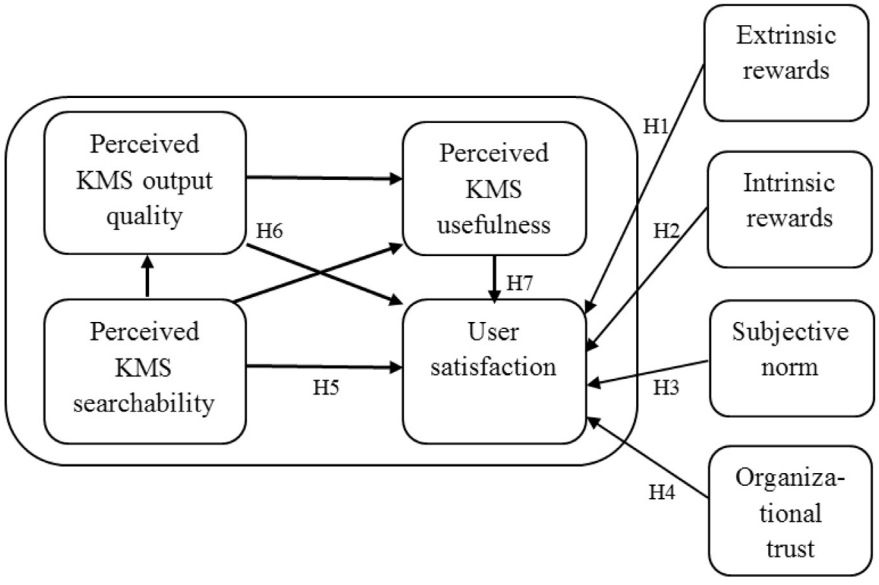

Fig. 1. Success model proposed. Arrows from the four external variables are related to each of the four internal variables.

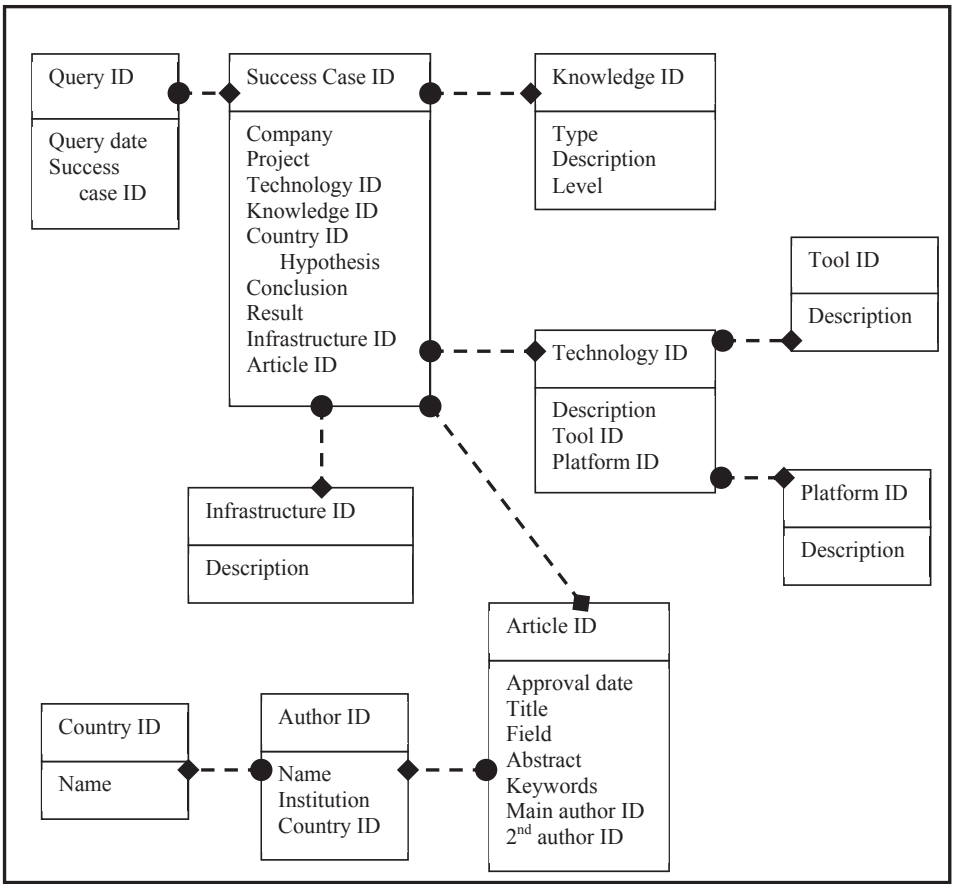

Fig. 2. Proposal for a Knowledge Management System (Simplified version).

proposal was made to produce a knowledge management system, defined earlier in this article as the technology applied to knowledge management. A starting proposal is shown in Fig. 2. This proposal was used to trigger new ideas about the need to have a knowledge management system. The participants gathered in groups of three to five persons to prepare new proposals. Three months after finishing the course with the third group, the survey for this article was run. By this time, participants were expected to have used the systems they had developed. It took one month to collect data; only 51 out of the 63 participants answered; 13 answers were incomplete and were not used.

In year 2015 the Knowledge Management course was given again to a group of 19 participants, who were encouraged to produce a knowledge management system. After the course finished the participants were also requested to evaluate the use and success of the KMS, by answering the survey for this article. Twelve out of the 19 participants answered; 4 answers were not used for different reasons. Table 2 shows the distribution for the answers. Finally, 46 answers were ready to be used.

2.3. Variables, survey and sample

The survey by Bock et al. (2008) was redesigned. Some variables in the survey were related to a new concept: subjective norm, which was not considered by Bock et al. (2008). Also, two questions were combined in one to simplify the survey without losing accuracy.

Independent variables are those affecting the model from an external point of view; in this case, intrinsic and extrinsic rewards, organizational trust and social norms are the independent variables. These variables exist, no matter if there is a model or not.

Dependent variables are those on which the interest of this research is focused on. Dependent variable for this research is perceived KMS user satisfaction.

Moderating variables are in the middle, between dependent and independent variables; three perceptions establish a relationship: perceived KMS quality, perceive KMS usefulness and perceived KMS searchability.

The survey used was developed in Spanish. The English version of the survey used is shown in Fig. 3.

The sample size can be calculated with equation (1):

Table 1
Participants in the development of the Knowledge Management System.

Doctoral students in the knowledge management course	23
Doctoral students in the Data Base course	6

Table 2
Sample distribution.

Function	Procedence	Number
Professor	Eight Universities in Ecuador	44
Director		6
Specialist	Servicio de Rentas Internas. Loja, Ecuador	1
Professor	Four Universities in Lima, Peru	7
Director	Different companies in Lima, Peru	5
	Total participants answered:	63

Variable		Item description
A: Extrinsic rewards	1	I receive benefits
	2	I get promotions
B: Intrinsic rewards	3	I enjoy helping others
	4	I enjoy solving problems
C: Subjective norm	5	I enjoy earning respect
	6	The knowledge output of the KBS is of good reputation
D: Organizational trust	7	Company members are generally trustworthy
	8	Company members have reciprocal faith in others' intentions and behaviors
	9	Company members have relationships based on reciprocal faith
E: Perceived KMS searchability	10	The KMS provides quick search response
	11	The KMS has the ability to narrow search
F: Perceived KMS output quality	12	The knowledge output of the KMS is accurate
	13	The knowledge output of the KMS is trustworthy
G: Perceived usefulness	14	The KMS is an important and valuable aid to me in the performance of my job
	15	The KMS has a large, positive impact on productivity and effectiveness in my job
H: User satisfaction	16	Overall, I am satisfied with the KMS
	17	I feel the KBS adequately meets my knowledge needs

Fig. 3. Survey used (translated from Spanish to English).

$$n = z^2\sigma^2 \Big/ d^2 \quad (1)$$

With z = 1.96 for a confident coefficient = 0.95, σ = 3 points in the survey and d = 1 point in the survey, n = 35 was obtained as a sample size; however, 46 available answers were used. Points in the Likert scale from the survey are used as unit of measurement (Daniel, 1987).

3. Results

Data collected in groups A, B, C, D, E, F, G and H had Cronbach's alpha greater than 0.75. Relationships that showed high correlation, greater than 0.5 (Cohen, 1988), were accepted in the model. Other relationships were not accepted. According to Cohen (1988), a value of 0.5 is acceptable for social investigations. Table 3 shows the results obtained.

For hypotheses 1 and 2, the matrix does not show that rewards affect perceived KMS user satisfaction. User satisfaction does not depend on rewards, extrinsic or intrinsic, or on what others might give; the reason for being satisfied with the KMS does not depend on rewards. However, the correlation matrix shows that extrinsic rewards affect other independent variable, namely, organizational trust. For hypothesis 3, the matrix does not show that subjective norm affects perceived KMS user satisfaction. User satisfaction does not depend on what others might say or others opinions; the reason for being satisfied with the KMS does not depend on subjective norm.

For hypothesis 4, a correlation value of 0.500 is obtained from the matrix. Although this is a low value for some researches, Cohen (1988) accepts this value for social studies; thus hypothesis 4 is accepted and organizational trust positively affects perceived KMS user satisfaction. For hypothesis 5, a correlation value of 0.524 is obtained from the matrix. Perceived KMS searchability positively affects user satisfaction. For hypothesis 6, a correlation value of 0.647 is obtained from the matrix. Perceived KMS quality positively affects user satisfaction. For hypothesis 7, a correlation value of 0.743 is obtained from the matrix. Perceived KMS usefulness positively affects user satisfaction.

The final model is shown in Fig. 4.

4. Discussion

The final model shows that doctoral researchers are encouraged by organizational trust. The relationship of doctoral researchers with the organization, in this case other doctoral students, who in

Table 3
Correlation matrix. Correlation limit = 0.5

	A	B	C	D	E	F	G	H
A	1	0.340	0.341	0.530	0.284	0.272	0.130	0.283
B		1	0.197	0.261	0.431	0.307	0.441	0.347
C			1	0.280	0.257	0.152	0.424	0.447
D				1	0.384	0.351	0.258	0.500
E					1	0.519	0.543	0.524
F						1	0.455	0.647
G							1	0.743
H								1
Cronbach's alpha	0.806	0.852	0.820	0.960	0.913	0.780	0.766	0.815
Average	4.848	9.087	7.522	10.891	9.022	8.717	9.304	9.109
Standard Deviation	7.732	1.770	4.122	10.455	2.155	1.452	1.105	1.077

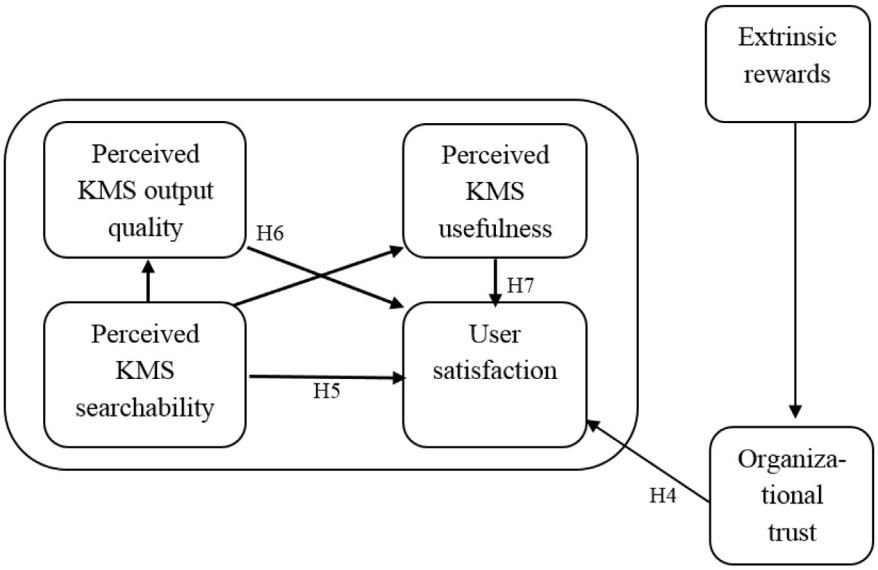

Fig. 4. Resulting success model.

some cases will use the KMS, and in other cases will introduce new knowledge to enrich the KMS, determines the successful development and use of a KMS. Organizational trust determines that: a) the KMS will be shared with other researchers in the organization, and b) the richness of KMS comes also from other researchers in the organization. Ease of use of the technology, i.e. searchability, quality and usefulness are also reasons for considering satisfaction in the use of a KMS.

4.1. Limitations

This study needs certain conditions.

- Population and sample must be formed by doctoral researchers or participants must have a master degree and must be working on a next research.
- This has been a transversal study. A longitudinal study can be conducted in order to check the behavior of the researcher along his lifetime.

4.2. Future research

The next research could include a more general population, whose knowledge is used for various academic purposes, but not necessarily at a doctoral level. Brewer and Brewer (2010) emphasize the importance of human resource management activities involved in assuring the acquisition and transfer of knowledge; they examined the relationship between knowledge management, human resource management, and typical knowledge learning goals for an accredited business education program. Also, nonacademic levels can be looked for. A longitudinal research could continue with the same sample used in this research, to measure the improvement (or not) in the success of the KMS. System use could be measured as a variable, since the participants in the survey will be expected to have used their KMS as a tool for a longer period of time. Finally, the influence of extrinsic rewards on organizational trust has been observed and needs to be studied in more detail.

4.3. Managerial implications

The concept searchability replaced ease of use only in the context of the current research, and must not be generalized. Managers can identify in the model the variables that will improve the use of a KMS in order to make it successful in a business environment. The study must be done for different types of companies. This study has been done in an academic environment; however, Saz (2001) identifies knowledge management as a tendency in the way operations are managed in a company. Other aspects such as workers' gender, work experience, designated division, and appointment, not included in this research, have been included by other authors (Kuo & Ye, 2007; Chai & Nebus, 2012; Chen, Shih, & Yang, 2009; Esteban & Navarro, 2003; Lee & Choi, 2010) when studying organizational performance. The impact of information technology and transactive memory systems on

knowledge sharing, application, and team performance has been studied with a field study prepared by Choi, Lee, and Yoo (2010), who finally show that organizations must ensure that shared knowledge is in fact applied in order to improve team performance.

5. Conclusion

The purpose of this research was to prepare a model to evaluate the success of technology applied to handle knowledge management. The model measured the success of knowledge management systems developed by doctoral students. First, doctoral students worked on a knowledge management system (KMS) to fulfill their knowledge management needs. Next, a survey was run among the group of doctoral students who prepared their own KMS. Hypotheses were proposed to describe the model built. Hypotheses showed the effect of external variables on perceived KMS user satisfaction. A correlation matrix was used among the variables. Correlation values between variables showed the relationships that were valid within the model. With the results of the correlation matrix, a final model was validated and proposed.

As a conclusion, the success model developed found that perceived KMS user satisfaction depends directly on the external variable organizational trust. User satisfaction also depends indirectly on extrinsic rewards. User satisfaction does not depend on intrinsic rewards, or subjective norm.

The influence of organizational trust can be explained because doctoral researchers share knowledge among them; therefore they know the type of research other members of the organization are doing. They also know that their fellow students do a serious work, and that they all depend on each other.

User satisfaction depends directly on moderating variables: perceived KMS output quality, and perceived KMS usefulness. User satisfaction also depends indirectly on perceived searchability. The model shows that doctoral students find the KMS useful if the knowledge stored has quality and is useful. Searchability has an indirect influence on user satisfaction. If searchability is not present, it is not an obstacle for doctoral researchers.

Acknowledgments

This paper has been prepared while Dr. Un Jan was in a staff exchange program at Karl Franzens Universität, University of Graz, in Austria, July August 2014, under the supervision of Professor Dr. Rudolf Egger. The exchange program belongs to the Erasmus Mundus - Preciosa program. At home, our girls Vilma and Sandra encourage us to continue.

References

Alavi, M., & Leidner, D. (2001). Knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly, 25*(1), 107–136.

Bock, G., Sabherwal, R., & Qian, Z. (2008). The effect of social context on the success of knowledge repository systems. *IEEE Transactions on Engineering Management, 55*(4), 536.

Brewer, P., & Brewer, K. (2010). Knowledge management, human resource management, and higher education: a theoretical model. *Journal of Education for Business, 85*, 330–335.

Chai, K., & Nebus, J. (2012). Personalization or codification? a marketing perspective to optimize knowledge reuse efficiency. *IEEE Transactions on Engineering Management, 59*(1), 33.

Chen, C., Shih, H., & Yang, S. (2009). The role of intellectual capital in knowledge transfer. *IEEE Transactions on Engineering Management, 56*(3), 402.

Choi, S., Lee, H., & Yoo, Y. (2010). The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: a field study. *MIS Quarterly, 34*(4), 855–870.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Daniel, W. (1987). *Bioestadística* (3ra ed.). Limusa Noriega Editores.

Esteban, M., & Navarro, D. (2003). Gestión del conocimiento y servicios de inteligencia: la dimensión estratégica de la información. *El profesional de la información, 12*(5), 269–281.

Hevner, A., & Chaterjee, S. (2010). Design research in information systems. In *Integrated Series in information systems* (vol. 22). Springer.

Hsu, I., & Sabherwal, R. (2011). From intellectual capital to firm performance: the mediating role of knowledge management capabilities. *IEEE Transactions on Engineering Management, 58*(4), 626.

Kock, N., & Davison, R. (2003). Can lean Media support knowledge sharing? investigating a hidden advantage of process improvement. *IEEE Transactions on Engineering Management, 50*(2), 151.

Kuo, Y., & Ye, K. (2007). How employeees' perception of information technology application and their knowledge management capacity influence organisational performance. *Behaviour & Information Technology, 29*(3), 287–303.

Lackner, E. (2012). *Am Anfang steht der leere Kurs: Ein Moodle-Praxisbuch als e-Book*. Forum neue Medien in der Lehre Austria <fnm-austria> newsletter 04/2012.

Lackner, E., & Raunig, M. (2012). *Die Avantgarde der Lehr-Lern-Materialien? Lehren lehren mit E-Books (Praxisreports)*. Medien in der Wissenschaft Gessellschaft für Medien in der Wissenschaft e.V. Digitale Medien – Werkzeuge für exzellente Forschung und Lehre. Waxmann 2012.

Lee, J., & Choi, B. (2010). Determinants of knowledge management assimilation: an empirical Investigation. *IEEE Transactions on Engineering Management, 57*(3), 430–449.

Rai, A., Lang, S., & Welker, R. (2002). Assessing the validity of is success models: an empirical test and theoretical analysis. *Information Systems Research, 13*(1), 50.

Santoro, M., & Bierly, P. (2006). Facilitators of knowledge transfer in University-Industry collaborations: a knowledge-based perspective. *IEEE Transactions on Engineering Management, 53*(4), 495.

Santoro, M., & Saparito, P. (2006). Self-interest Assumption and relational trust in University-Industry knowledge transfers. *IEEE Transactions on Engineering Management, 53*(3), 335.

Saparito, P., & Gopalakrishnan, S. (2009). The influence of communication richness, self-interest, and relational trust on Banks' knowledge about firms within the small-cap debt finance markets. *IEEE Transactions on Engineering Management, 56*(3), 436.

Saz, M. (2001). Gestión del conocimiento: pros y contras. *El profesional de la información, 10*(4), 14–28.

Seddon, P. (1997). A respecification and extension of the DeLone and McLean model of is Success. *Information Systems Research, 8*(3), 240.

Solana-González, P., & Pérez-González, D. (2008). Estrategia empresarial y tecnologías de la información en la gestión del conocimiento técnico-documental. Estudio del caso Nuclenor. *El profesional de la información, 17*(5), 487–501.

Thatcher, J., McKnight, D., Baker, E., Arsal, R., & Roberts, N. (2011). The role of trust in postadoption it exploration: an empirical examination of knowledge management systems. *IEEE Transactions on Engineering Management, 58*(1), 56.

Uribe-Tirado, A., Melgar-Estrada, L., & Bornacelly-Castro, J. (2007). Utilización de Moodle en la gestión de información, documental y del conocimiento en grupos de investigación. *El profesional de la información, 16*(15), 468–474.

Alberto Un Jan, is engineer in electronics from Universidad Nacional de Ingeniería (UNI) in Lima, Perú. He holds an M.Sc. degree in systems engineering (UNI), M.Sc. degree in information and systems in management from Sheffield City Polytechnic, UK; and a Doctor degree in engineering from Universidad Nacional Federico Villarreal, Lima, Perú. He studied the Participatory Planning, Monitoring & Evaluation course at Wageningen University & Research centre, The Netherlands. His research interest is in information systems and dynamic simulation.

Vilma Contreras, is B.S. in systems engineering from Universidad Nacional de Ingeniería (UNI) in Lima, Perú. She has studied the M.Sc. degree in Applied Statistics at Universidad Nacional Agraria La Molina, Lima, Perú. She studied the Managerial Control and Management Information Systems specialization at Maastricht School of Management, and the Participatory Planning, Monitoring & Evaluation course at Wageningen University & Research centre, The Netherlands. Her research interest is in statistical models.