Knowledge Management System Usage and Organization Learning: Recent Trends and Open Problems

Lucia Ika FITRIASTUTI
STIE SBI Yogyakarta, Jl. Ringroad Utara No.17, Condong Catur, Depok, Sleman
Universitas Teknologi Yogyakarta, Indonesia
luciaika79@yahoo.com

Sujoko SUJOKO
Universitas Teknologi Yogyakarta, Jl. Ringroad Utara, Jombor, Sendangadi, Sleman, Yogyakarta, Indonesia

Tutut HERAWAN*
Ambarrukmo Tourism Institute, Yogyakarta, Indonesia
AMCS Research Center, Yogyakarta, Indonesia
*tutut@unkris.ac.id

Yohannes VEMBERI
STIE SBI Yogyakarta, Indonesia

Abstract:

Knowledge management system and organizational learning are now increasingly popular and receiving much attention from organizations. Knowledge management system and organizational learning are important assets that could support the achievement of organizational goals. The objective of this article is to review and present a comprehensive review of the latest research related to knowledge management systems and organizational learning related to innovation and organizational performance. This article analyzes previous studies conducted in 1995 to 2018 (51 references) in terms of the research methods, advantages and limitations. The analysis results bring up issues and opportunities for future research related to knowledge management system and organizational learning. This article will help future researchers in finding interesting ideas to develop both theories and methodologies relation to future conditions. Besides, this article will provide more information and knowledge for organizations in implementing knowledge management systems and organizational learning.

Keywords: Knowledge management; Knowledge management system; Organizational learning; Innovation; Performance.

JEL Classification: D23, D83, L25

1. Introduction

Companies have to face external environment that usually changes rapidly. Organizations that are able to adapt shall conduct learning processes in the organizations. During the learning processes, organization have to be able to detect and correct mistakes that already occur so that no repetition occurs. Knowledge is also a very important factor to improve productivity within the work environment. Knowledge management systems help organizations share knowledge related to business processes to be undertaken, the problems faced by each part or department, and various previous organizational experiences (Schiliro, 2012). Therefore, knowledge management system and organizational learning are important factors that organizations shall consider as they can motivate organizations

to innovate and affect organizational performance. Several studies showing that these variables are related to company performance are Zack, *et al*. (2009), Akgün, *et al.,* (2007), Mardani *et al.,* (2018), Khunsoonthornkit & Panjakajornsak (2018).

Knowledge Management is management using a collaborative and integrated approach to create, obtain, organize, access and use corporate intellectual assets Dalkir (2013). Knowledge Management is also a management tool that creates the belief that knowledge is an asset to increase organizational capacity so as to work more effectively Nonaka & Takeuchi (1995) in Tung (2018). If an organization is able to work more effectively, the organization's performance will be better. Tung (2018) mentions that organizational learning is any learning carried out by an organization. An organization learns from its successful achievement and failure. Organizational learning helps organizations innovate, reapply knowledge and take measures so as to avoid doing the same mistakes.

Based on previous studies, there are still different opinions about the conclusions drawn in relation to knowledge management system as well as organizational learning in relation to innovation and performance. Studies by Zack, *et al*. (2009), Mardani *et al.,* (2018), Khunsoonthornkit, & Panjakajornsak (2018), successfully proved the importance of using knowledge manajement system and organizational learning. However, researches by Ferraresi, *et al.*, (2012), Nowacki & Bachnik (2016), Zack, *et al*. (2009), Mardani, *et al.,* (2018), Khunsoonthornkit & Panjakajornsak (2018) have not proven empirically that the use of knowledge management system and organizational learning improves organizational performance.

This study aims to review various theories related to knowledge management system and organization learning. It is important to study these topics because, in an organization, they can influence the level of innovation which in turn affects the achievement of company performance. The result of this review will be analyzed to find research opportunities in the future.

This paper is organized as follows. Section 2 reviews theories related to knowledge management systems, organizational learning, innovation and performance. Section 3 reviews articles related to knowledge management system in terms of the research methods, their advantages and limitations. Section 4 reviews articles related to organizational learning in terms of the research methodologies, their strengths and limitations. Finally, Section 5 analyzes the potential challenges to be researched in the future.

2. Rudimentary
2.1 Theories related to Knowledge Management System

According to Tung (2018). knowledge management started to develop along with the rapid development of organizations and information technology used by organization. Institutionalizing individual knowledge which is a part of organization ownership is an asset that shall be managed in organization learning processes. The factors that influence knowledge management development are globalization, technological development, change in pattern or communication access, shift from industrial era to an era of knowledge and cost efficiency.

The ability to process information and knowledge is one of the key sources to win competition. Employees who transfer from one company to another may result in corporate amnesia if the organization does not know how to manage knowledge Dalkir (2013). When employees transfer to another organization, then their individual knowledge also transfers Nonaka & Takeuchi (1995) in Tung (2018). Knowledge management will make certain arrangements so that such individual knowledge will be a part of organizational knowledge. When accompanied with technological developments, this will allow the management and storage of knowledge to be easier. Technological changes will also change human attitudes and behavior. Finally, the shift to this era of knowledge will result in easier access to information and cost efficiency.

Knowledge management system is important to be implemented in a company as this is beneficial, where it can improve the knowledge of employees accurately since its sources from a single knowledge management system, speed up the work processes because gaining knowledge is faster, and facilitate the dissemination of knowledge to all employees. Knowledge management system can ease new employees in learning about the company because all information from all parts of the organization and other knowledge related to such information that may support the development of the company are available. Cooperation between managers and employees is needed to establish a sharing culture to support the success of creating and implementing knowledge management system.

2.2 Theories on Organizational Learning

The concept of organizational learning is popular due to various reasons Kaswan (2016). First, organizations always face changes and have to adapt to a rapidly changing environment. Second, there is a shift in the knowledge-based economic system. Third, the perspective of organization as a system. The concept of organizational learning started to develop when modern management began to develop its theory. One of the examples is scientific management

theory, showing that learning can be transferred to employees which further increases organizational efficiency (Bendaravičienė, 2016). Organizations are not only a collection of individuals, but also a system of collective actors. Organizational learning involves the detection and correction of errors. There are five different dimensions of organizational learning, namely structure, information (acquisition, sharing and retention), human resources practices, organizational culture and leadership (Văcărescu-Hobeanu, 2018).

The statement in a research by Senge (2006) in Tung (2018) identifies the core competence that organizational learning shall contain. First, mental models, i.e. a set of models or understandings that allow individuals to understand their perspectives and decision making. Second, shared vision, i.e. mastery that refers to a set of competencies, values and attitudes so that individuals are committed to lifelong learning. Third, personal mastery, i.e. mastery which refers to a set of competencies, values, and attitudes so that individuals are committed to lifelong learning. Fourth, team learning, i.e. organizational attitude about values as a learning team. Last, thinking system, i.e. a system that refers to the perception or definition of an organization as gestalt (an integrated pattern of system components).

2.3 Theory on Innovations and Company Performance

Innovation is the initial commercialization of inventions by producing and selling a new product, service or process Pearce and Robinson (2011). Innovation is about turning making profits from ideas. There are two types of innovations, namely incremental innovation (simple changes or adjustments to existing products, services, or processes) and radical or disruptive innovations (leaps towards improving products, services, or processes within a company). Sheng & Chien (2016), conducted a research on learning orientation related to radical and incremental innovations in high-tech companies among Taiwan companies listed in Fortune Magazine 2014. The results showed that high-tech industries commonly carry out exploitative learning and develop additional innovations. In addition, their learning activities have a stronger effect on incremental innovation rather than radical innovation. Intrapreneurship affects company performance, where the multidimensional intrapreneurship structure is affected by the important role of proactive and innovative measures Augusto Felício *et al.* (2012). Several studies found that innovation is related to performance. Ali, M., Kan, K. A. S., & Sarstedt, M. (2016) concluded that three of ACAP (acquisition, assimilation, exploitation) dimensions affect innovation which in turn improve organizational performance.

2.4 Review on Knowledge Management System Usage and Organization Learning

The review method used in this paper is as follows. First, collecting articles related to knowledge management systems and organizational learning. Second, analyzing the selected articles by reviewing the methodology, advantages and limitations. Third, drawing conclusions regarding opportunities for future research.
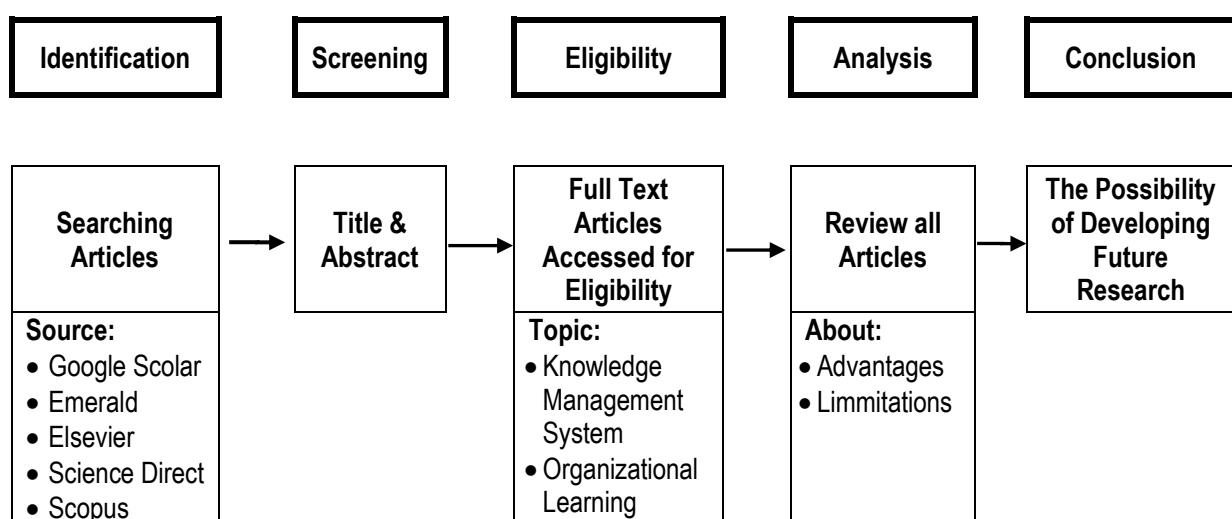

Figure 1. Review stages

We identified studies for inclusion in the article review through several approaches. First, we searched the article in google scholar using the search terms "knowledge management system," and "learning organization". Second, we supplemented the electronic search with an issue-by-issue search of the abstracts of articles published in the same journals for studies published in 1995 until 2018. The data sources were from many websites (google scholar, emerald, elsevier, science direct, dan scopus). The complete process starting from the data collection until the conclusion drawing is presented in Figure 1 as follows:

2.5 Review on Knowledge Management System Usage

This sub-section presents a review on knowledge management system usage. Table 1 presents a summary of these studies in terms of the methods, advantages, and limitations, so that it could be used to analyze the opportunities for future research related to knowledge management system usage.

Table 1. Summary of Studies on Knowledge Management System Usage in terms of method, advantages, and limitations

Ref	Model/Method	Advantages	Limitations
Zack *et al.* (2009)	1. The model was tested using a survey. 2. The survey was piloted with two groups of knowledge managers – one based in Canada and one based in the USA. The survey was launched on the Business School's web site. An e-newsletter was then sent to 1,500 executives. The final sample size was 88. 3. Partial least squares (PLS) approach was used to test the model.	The results of this study encouraged practitioners to focus on knowledge management related to organizational performance.	1. The findings in this study were based solely on organizations from North America and Australia. 2. This study was still exploratory. 3. The majority of constructs used were formative. 4. This did not consider how organizations develop knowledge management mindset.
Han & Park (2009).	1. Reviewing articles/theories and proposing models for the development of Knowledge Management Systems.	This paper proposed a framework of knowledge model and enterprise ontology for the process-centered enterprise structure.	1. Only limited to discussing related articles and proposing models. 2. There was no statistical testing of the model. 3. Did not consider combining Knowledge Management with Bussiness performance management and business process management.
He *et al.* (2009)	1. Case study method. 2. Internal survey. 3. Additional empirical data were collected for triangulation through interviews. 4. Qualitative descriptive analysis and correlation.	1. Involving rarely-researched variables of social relations in the use of knowledge management systems. 2. Being able to show behavior in China, preferring to transfer knowledge through interpersonal contact rather than transferring knowledge formally.	1. Did not use longitudinal data to test social relations. 2. The conclusions drawn cannot be generalized widely because it was only a case study.
Zhang *et al.* (2009).	1. Theoretical review and Case study. 2. A transport interchange project was used to demonstrate the	1. Explanation using detailed images. 2. Able to demonstrate the development of VE-KMS by combining TRIZ tools.	The development of knowledge management system which was demonstrated was only suitable for construction industry.

	application of the proposed VE-KMS.		
Gunsel *et al.* (2011)	1. Studying literature. 2. Analyzing previous conceptual and empirical studies.	Able to demonstrate a holistic approach to build organizational innovations using knowledge management and Organizational Learning Ability	There was no empirical testing to prove the proposed model.
Thatcher *et al.*, (2010)	1. Factor analysis using SPSS 16. 2. Testing the model using Partial Least Squares (PLS) & structural equation modeling analysis. 3. Study 1 examined users' perceptions of a knowledge portal. Study 2 examined IT professionals' perceptions of KMS. 4. Sample in study 1: 172 business students at a large public university in southeastern United states. 5. Sample instudy 2: 167 knowledge workers employed in the IT Industry in India	1. Producing new models 2. Able to demonstrate that beliefs in IT are well correlated to behavioral beliefs and intentions to explore the use of KMS in the future.	1. The data were collected using a single instrument at a single point in time. 2. The samples filling out the questionnaires in the first study were geographically very different from those filling out the questionnaires in the second study, making it possible for bias to occur due to the different organizational conditions and cultures.
Ferraresi *et al.*, (2012)	1. A sample of 241 Brazilian companies was surveyed. 2. Using web-based questionnaires with 54 questions, using ten-point scales. 3. Exploratory factor analysis, confirmatory factor analysis, and path analysis. 4. Structural equation modeling was applied to the data.	1. Producing new models. 2. This study analyzed all constructs simultaneously using the existing scale, allowing it to be compared with the results of previous studies.	1. The data collection using questionnaire was likely to be biased because individuals filled out the questionnaire to represent the company level. 2. The return rate of the survey was still low. 3. The variable of market orientation should be made more detailed. 4. The data were limited to one region, Brazil, so the generalization was low.
Alatawi *et al.* (2013)	1. Literature analysis approach and the Technology-Organisation-Environment (TOE) as a guiding theoretical framework to propose and discuss a research model. 2. Using in public sector organizations in Saudi Arabia.	1. The model developed and proposed could provide a complete analysis of any aspects that might be considered for KM system adoption in public sector organizations. 2. This study could develop a KMS model that could inspire future research to conduct empirical tests using field data in the respective environment.	1. Empirical validation of the constructs considered for this model was yet to be validated. 2. Only proposing the model, but not yet empirically proven.
Kusuma. (2013)	1. Testing the model. 2. The variables: Knowledge management, advantages and performance. 3. Samples: 100 managers who worked for companies in Surabaya who implemented Knowledge management and who already had at least one-year experience.	Able to prove the hypothesis and provide a clear model.	Small scope of research.

	4. The hypothesis was tested using Partial Least Square.		
Klemes *et al.* (2014)	Reviewing literature and demonstrating KMS to pharmaceutical companies.	This paper presented the functionality and technical details of a workflow-based knowledge management system and demonstrated its use in supporting the operation of a pilot plant for manufacturing liquid-based drug products.	This paper was limited to the delivery of illustrations and descriptions of Workflow-Based Knowledge Management System without any empirical proof.
Wang & Lai (2014)	1. Testing the model. 2. The data were collected from 295 employees of a petroleum corporation and its business partners. 3. The data were examined using structural equation modeling.	This study developed a multi-dimensional model to understand KMS adoption among employees from an integrated perspective of technology, individual, and organization.	1. This was limited to petroleum corporation. 2. Only focusing on the effects of influential and regulatory institutional factors.
Nowacki & Bachnik (2016)	1. Correlation Test among variables 2. Using 608 companies randomly (manufacturers, service providers, trading companies, micro, small, medium, and large enterprises) in Poland. 3. The data were calculated and analyzed using: the central tendency (weighted arithmetic average), dispersion (standard deviations), and the kurtosis and skewness (Pearson's coefficients).	The research considered four aspects of organizational effectiveness: enterprise competitiveness, revenues, buyers' satisfaction, and business partners' satisfaction.	1. The test was limited to testing only the correlation among variables, instead of testing the effect as well. 2. Not a Time series analysis.
Akhavan, *et al.* (2016)	1. An overview of the knowledge management literature from 1980 through 2014. 2. Employing bibliometric and text mining analyses on a sample of 500 most cited articles to examine the impact of factors.	1. Illustrating how trends in knowledge management research have evolved over time and demonstrating the characteristics of the most cited articles in this literature. 2. Revealing that the most cited articles are from United States and United Kingdom.	Simple overview of the knowledge management literature.
El Said (2015)	1. The paper started with exploratory study (interviews). 2. In light of the interview results, a research hypothetical model was built. 3. To validate the model, a survey was then conducted with 95 administration and technical staffs of different managerial levels in two organizations. 4. The sampling method: convenience sampling technique. 5. The qualitative data were collected from user interviews.	Using a complete methodology, both qualitatively and quantitatively, and producing a model.	1. Using 2 different organizations that use different KMS (considered the same) 2. The interview results might be biased because the interviewees were volunteer administrative staffs
Wang & Wang (2016)	1. The study developed and tested an integrated model of KMS implementation. 2. The survey data were collected from 291 businesses in Taiwan.	1. Presenting complete literature review, models and empirical testing 2. Analyzing the technological innovation factors, organizational factors and	1. The samples were likely to have ample resources and IT experience. 2. The samples might be biased because the survey

		environmental factors that influence KMS implementation.	was a self-administered and voluntary. 3. This study did not discriminate between different KMS types but rather placed them all in a single category. 4. This study only adopted a cross-sectional approach. 5. This study used logistic regression and only focused on the direct effects of the determinants of KMS implementation.
	3. Analysis: Confirmatory factor analysis and logistic regression technique.		
Li, *et al.* (2016)	1. Research Survey using the stages: Developing a research model with literature review and interviews, designing questionnaires, surveys and analyzing the questionnaire results. 2. Processing data using PLS.	1. This study investigated an important phenomenon of KMS resistance that was largely neglected by previous studies on knowledge management. 2. This study extended the existing status quo bias framework to the knowledge management resistance context. 3. This study examined the moderating effect of inertia in the status quo bias framework.	1. The data used in this article were collected from the same company, thus limiting the generalization of our findings. 2. All the variables used in this study contained only self-reported data. 3. This study investigated only the moderating effect of inertia on the three status quo bias variables.
Santoro, *et al.* (2018).	1. Correlation and Model Testing 2. Variables tested: KMS, open innovation, innovation capacity and KMC 3. Samples: 298 Italian firms from different sectors. 4. Discussion using Structural Equation Modeling (SEM).	This study contributed to literature by suggesting a comprehensive view of knowledge management and open innovation that considers both internal and external sources of knowledge as basis of competitive advantage.	1. The sample included firms from very different sectors. 2. The data were collected only from Italian firms. 3. The sample considered firms of different sizes.
Al-Emran, *et al.* (2018)	Literature review with analysis of 41 research articles published in peer-reviewed journals from 2001 to 2018.	This study systematically reviewed and shed the light on KM processes studies related to ISs aiming.	Systematic review was restricted to certain databases for collecting the research studies (i.e., Springer, ACM Digital Library, Taylor & Francis, ScienceDirect, IEEE, Wiley, Emerald, and Google Scholar).
Xie, *et al.* (2018)	1. Model Testing 2. Analysis of correlation and mediation among variables 3. Variables: Knowledge Acquisition, Knowledge Assimilation, Knowledge Transformation, knowledge exploitation & Innovation Performance 4. 379 high-tech data in China 5. OLS Regresion analysis tool.	This study theoretically and empirically demonstrated how knowledge absorptive capacity affects firms' innovation outputs from a multi-mediating perspective.	This was limited to using data from high-tech companies in China.
Mardani, *et al.* (2018)	1. Quantitative research.	1. Describing a complete model.	1. The sample was limited to one region in Iran.

2. Variable: knowledge management, innovation, and performance. 3. Using data from 120 firms (Iranian Power Syndicate). 4. Structural Equation Model (SEM) results by Partial Least Square (PLS) method.	2. This paper could help academicians and managers in designing KM programs to achieve higher innovation, effectiveness, efficiency, and profitability.	2. Not comparing or using an international perspective. 3. The performance measurement was still subjective by using questionnaires.

2.6 Discussion

This sub-section discusses previous studies related to knowledge management system. This section presents a discussion of the topics, methods, advantages and limitations of these previous studies.

From Table 1, the issue regarding the use of knowledge management system is mostly related to the development of organizational innovation Mardani, *et al.* (2018), Ferraresi, *et al.* (2012), Nowacki & Bachnik (2016), Gunsel *et al.* (2011), Wang & Wang (2016), Santoro, *et al.* (2018), Xie, *et al.* (2018). Some of these studies revealed that knowledge management systems correlate and affect the level of innovation that companies have. However, some studies also found that knowledge management does not have direct effect on innovation, such correlation becomes statistically significant when mediated by strategy orientation Ferraresi, *et al.* (2012).

The use of knowledge management system is also commonly linked to or supports the achievement of company performance or increases the value of a company Zack, *et al.* (2009), Mardani *et al.,* (2018), Ferraresi, *et al.*, (2012), Kusuma (2013). Particularly in a research Ferraresi, *et al.* (2012), it was found that knowledge management does not have any direct effect on enterprise performance, but such correlation becomes statistically significant when mediated by strategy and innovation orientation. Some studies also associated the use of knowledge management systems with other variables, such as social relations He, *et al.* (2009), organizational learning Gunsel, *et al.* (2011) loss aversion, transition costs and social norms Li, *et al.* (2016), and absorptive capacity Xie, *et al.* (2018). The fact that there is a link between knowledge management system and the level of innovation of a company has attracted a lot of researchers to conduct research using high-tech companies or organizations related to IT Thatcher, *et al.* (2010), El Said (2015), Xie, *et al.* (2018).

In terms of the research methodology, the majority of previous studies proposed and tested models using Structural Equation Modeling (SEM) with SPSS/ PLS/ Amos/ Lisrel software Zack, *et al.* (2009), Mardani, *et al.* (2018), Ferraresi, *et al.* (2012), Thatcher, *et al.* (2010), Alatawi, *et al.* (2013), Kusuma (2013), Wang & Lai (2014), El Said (2015), Wang & Wang (2016), Li, *et al.* (2016), Santoro, G., Vrontis, D., Thrassou, A., & Dezi, L. (2018). Xie, *et al.* (2018), and using simple testing such as correlation test among variables Nowacki, R., & Bachnik, K. (2016), He, *et al.* (2009). Most of the articles that tested the proposed models collected the data using questionnaires with employees or organizational leaders in a particular industry group as the ones filling out the questionnaires. There are also articles that reviewed previous studies using literature review method Gunsel, *et al.* (2011), Klemes, J. J., Varbanov & Liew (2014), Al-Emran, *et al.* (2018). Another option is to observe the implementation of knowledge management system in a particular organization by using a case study method as done by He, *et al.* (2009) Kusuma, F. S. D. (2013), Zhang, *et al.* (2009). Issues related to knowledge management system are quite interesting, so that researchers are competing to propose models to be tested in various industry groups, regions or certain countries.

From various previous studies, there are some limitations that they admitted. The following are the limitations that are commonly found in previous studies on knowledge management system. First, the problem related to small scope of sample or sampling that only concentrates on a particular company or industry group, causing it difficult to generalize the results Zack, *et al.* (2009), Mardani *et al.,* (2018), Ferraresi, *et al.* (2012), Kusuma (2013), Wang & Lai (2014), Li, *et al.* (2016), Xie, *et al.* (2018). Second, the use of cross-sectional data instead of time series He, *et al.* (2009), Wang & Wang (2016). Third, a limitation related to the measurement of variables which is still subjective or related to the survey method because the interviewees or respondents who fill out questionnaires are quite inaccurate, thus causing bias Zack, *et al.* (2009), Mardani, *et al.,* (2018), Ferraresi, *et al.* (2012), Thatcher, *et al.* (2010), El Said (2015), Wang & Wang (2016), Li, *et al.* (2016). Fourth, some studies considered certain variables that might influence conclusions such as geographical and cultural factors. Last, a limitation related to difficulty in finding references of previous studies. This especially becomes a limitation faced by research using literature study.

2.7 Review on Organization Learning

This sub-section presents a review on Organization Learning. Table 2 shows a summary of previous studies in terms of the methodologies, advantages, and limitations.

Table 2. Summary of studies on organization learning in terms of method, advantages, and limitations

No	Ref	Model/Method	Advantages	Limitations
1	Liao & Wu (2010)	1. Samples based on Common Wealth Magazine's Top 1000 manufacturers and Top 100 financial firms in 2007 by mails. 2. Questionnaire survey was conducted and 327 valid replies were received. 3. Structural Equation Modeling analysis.	1. This study tests a comprehensive model. 2. Able to explain that business not only carries out knowledge management to increase innovation. Organizational learning will promote organizational innovation after one business accomplishes KM.	1. The research was prone to common method bias. 2. Using a cross-sectional data. 3. This study was conducted in a specific nation context, Taiwan firms, thus the results cannot be generalized to different cultural contexts. 4. The sample size was relatively small.
2	Jiménez & Sanz-Valle (2011)	1. The sample included 451 Spanish firms. 2. Using a structured questionnaire. 3. The study used structural equation modeling (SEM).	1. Contributing to the literature, a model illustrated the links between organizational learning, innovation and performance. 2. Using a sample of Spanish companies that the empirical literature was especially scant.	1. The survey used single informants as the source of information. 2. The cross-sectional design of this research. 3. The measure of organizational performance was subjective.
3	Salim & Sulaiman (2011)	1. The data were collected via electronic survey from 320 small and medium enterprises operating in the ICT industry in Malaysia. 2. Regression model.	1. The results of this study may be helpful for firms to understand the crucial link between organizational learning, innovation and performance. 2. The results of this study confirm that the importance of innovation is not limited to well established and large firms which enjoy substantial economies of scale.	The sampling frame was restricted to include content and software providers for service platforms, communication networking, and internet-based businesses.
4	Nielsen, et al. (2011)	1. The data were collected from the Instituto Tecnologico de Costa Rica. 2. A total of 795 valid questionnaires. 3. Using confirmatory factor analysis. 4. Structural Equation Model (SEM).	Organizational learning capability measurement instruments had considered cultural differences, sectorial differences, and different educational background distribution of the sample.	This study only selected samples in one organization.
5	Fang, et al. (2011)	1. This study collected 563 valid questionnaires. 2. The participants in this study were taken from a regional hospital in middle Taiwan, including nurses, supervisors and managers. 3. Hierarchical regression analysis.	1. The hypotheses were supported by the empirical evidence. 2. Knowledge inertia variables were still rarely tested in the model.	1. The responses in this study were only workers in Taiwanese medical industry, the external validity was limited. 2. The questionnaires were completed by the workers who worked in the same industry.
6	Sanz-Valle, et al. (2011)	1. Using a sample of 451 firms in Spanish. 2. Analysis: confirmatory factor analysis & structural equation models (SEM).	Focusing on the Spanish context, where there was a lack of studies on this issue.	1. Cross-sectional design of the empirical research. 2. The data were collected from one source only.

7	Çömlek, *et al.* (2012).	1. The survey was conducted to 199 middle and senior managers of firms operating in metal industry in Marmara Region of Turkey. 2. The data from the questionnaires were analyzed through the SPSS statistical packaged software. 3. Descriptive analysis, factor analysis, reliability analysis, correlation and regression analyses were used.	The regression models concluded important findings that two dimensions of organizational learning capacity (system orientation and knowledge acquisition-utilization orientation) affect firm innovative performance positively.	Simple model.
8	Tohidi & Maryam (2012)	1. The sample was 18 Iranian ceramic tile manufactures. 2. The survey was sent to the employees of the business session of each factory and a total of 173 valid questionnaires were obtained. 3. Testing the research model by confirmatory factor analysis approach using the Lisrel 8.7 software.	1. Empirical studies with a complete literature review. 2. The model was valid and OLC had positive and significant effect on the firm innovation.	The samples were taken from only one industry group.
9	Yu, *et al.* (2013)	1. Structural model analysis. 2. The samples were selected from 114 firms operating in China. These firms implemented information technology portfolio. The survey instrument was developed from a research by Brislin (1986). 3. Variables: organizational innovations and strategic orientation, innovativeness, the size of KMS usage, organizational learning.	1. This research demonstrated that it is appropriate for firms to adopt the entrepreneurship and technology-oriented strategies in pursuit of organizational innovativeness in a dynamic and turbulent environment. 2. This research implied two important complementary knowledge integration mechanisms at an operational level (i.e., KMS usage and organizational learning) for developing innovation capability. 3. These findings can also serve as a reference for non-Asian firms.	1. This study was conducted under the condition of a transformational and emerging economy in China. 2. The cross-sectional survey design limited the exploration of the interactional effect between KMS usage and organization learning.
10	Ansari & Kalantar (2013)	1. Information of companies accepted in Tehran Stock Exchange in 2011 was used. 2. Multivariate regression 3. SPSS software	Company value variables were still rarely investigated related to organizational learning.	Not using samples of banks and financial companies.
11	Abbasi & Zamani (2013)	1. A sample of 329 faculty members was selected using stratified random sampling method with proportional allocation. 2. Questionnaires were the main tool for data collection.	Able to provide a good model.	1. This study investigated only two factors influencing organizational learning and faculty performance. 2. Not measuring instrumental performance.

		3. The collected data were analyzed by structural equation modeling technique. 4. Using Lisrel 8.50 software package.		3. Neither interviewing key experts nor conducting direct observations. 4. Concentrated solely on Iran's public agricultural faculties.
12	Akgün, *et al.* (2014)	1. Studying 193 firms in Turkey. 2. The questionnaire was mailed to the general manager or managing director of each organization. 3. Developing a SEM and using AMOS 4.0.	This paper demonstrated that OLC fully mediates the relationship between TQM and business innovativeness.	1. The research was prone to common method bias since the dependent variable in the questionnaire was answered by the same respondents who answered the independent variable in a cross-sectional manner. 2. The study was conducted in a specific national context, Turkish firms in general and the Istanbul district in particular.
13	Onağ, *et al.* (2014)	1. The data were collected from entry and middle level managers of firms, which were the members of Manisa Chamber of Commerce and Industry. 2. The data were collected from 143 managers through survey (by web page and by personal visits). 3. Regression analysis.	1. Able to prove that the higher the level of Organizational Learning capability the greater the degree of organizational innovativeness. 2. Researchers could use the instrument for further development to accurately assess Organizational Learning capability.	1. This study was limited to a specific national context and Manisa province in particular. 2. The study measured the variables at the same point in time and the independent and dependent variables were answered by the same respondents, raising questions for the common method bias.
14	Anderson *et al.* (2014)	1. Literature review. 2. Period 2002 to 2013.	1. Reviewing the rapidly growing body of research in Creativity and innovation area. 2. Proposing a guiding framework for future research comprising 11 major themes and 60 specific questions for future studies.	The summary results of the data were not presented in tables.
15	Kalmuk, *et al.* (2015)	1. Literature studies. 2. Model Proposed.	Showing research opportunities related to whether organizational learning capability is effective as intermediate variable to the effects of innovation on company's performance.	The model was not proved yet by collecting data.
16	Valdez-Juárez, *et al.* (2018).	1. The research was conducted using a quantitative approach, descriptive and causal, and cross-sectional survey. 2. The sample was composed of 92 enterprises in the textile industry. 3. The data were analyzed using Structural Equation Modeling.	1. The findings provided theoretical insights and could inspire further research. 2. The study contributed to the literature in a single model related to the relations among organizational learning, innovation and performance.	1. The sample considered only SMEs in Vale do Itajaí – SC and it involved only one respondent as a source of information. 2. The cross-sectional design research and the analysis were done at a single point in time. 3. The use of a subjective measure for organizational performance may cause bias in the results.

17	Sutanto (2017).	1. A quantitative research projects. 2. Using a purposive random sampling method which involved 179 lecturers from all universities in East Java Province, Indonesia. 3. The data collection technique was questionnaire. 4. Multiple linear regression analysis.	1. There was conformability among the topics, literature and research methodology that were used. 2. Able to prove the effect of organizational learning and organizational creativity on organizational innovations.	The sample was too small (only one province and only in high educational institutions).
18	Saadat & Saadat (2016)	1. Studying Literature. 2. Reviewing presentative literature pertinent to learning, organizational learning, its main objectives, barriers, and benefits.	1. Able to explain the concepts/theories related to organizational Learning. 2. Presenting a new perspective to today's organizational managers to enhance their organizations efficiency.	Containing only theoretical reviews.
19	Webb (2018)	1. Qualitative analysis: Multiple case study with embedded units of analysis. 2. Three colleges in California. 3. Semi-structured interviews.	This study could illustrate that many of the works of organizational learning occur during social processes.	1. The research scope was too small (only 3 higher educational institutions). 2. Focusing only on the organizational learning perceived by leaders (not involving the perception of staffs).
20	Liu (2018)	1. The data consisted of face-to-face interview surveys. 2. Involving industries from Taipei City, New Taipei City, Taoyuan County, Taichung City, Tainan City and Kaohsiung City, which were located in the Northern, Central, and Southern Taiwan. 3. 432 usable questionnaires. 4. Amos 18.0 was used to perform the structural equation modelling (SEM) and test the mediation hypothesis.	The findings advanced theoretical extensions of organizational learning, social capital and entrepreneurship for cultural and creative firms.	1. This study only used multiple dimensions references of social capital: cognitive capital, structural capital, and relational capital 2. Not using longitudinal data.
21	Khunso onthorn kit& Panjakaj ornsak (2018)	1. A questionnaire survey was used to collect empirical data. 2. The model was tested using a structural equation model. 3. The model fit was analyzed using confirmatory factor analysis technique. 4. The SPSS version 16 and AMOS software programs were used.	Able to prove a model using factors: organizational learning, commitment, performance.	This study only focused on quantitative research. Qualitative research was used to gain more information through in-depth interviews or focus groups.

2.8 Discusion

This sub-section presents the discussion on the topics, methodologies, advantages and limitations of these previous studies on organizational learning. The levels of organizational learning of one organization and the others are different. The research topics related to organizational learning are mostly related to the development of knowledge management system of an organization Liao, *et al.* (2010), Fang, *et al.* (2011), Çömlek, *et al.* (2012).

Yu, Y., *et al.*, (2013). In addition to it, several studies found that organizational learning is correlated to or affects the level of innovation of a company Liao & Wu (2010) , Jiménez & Sanz-Valle (2011), Salim & Sulaiman (2011), Sanz-Valle, *et al.*, (2011) ,Çömlek, *et al.* (2012), Tohidi & Maryam (2012), Yu *et al.*, (2013). Onağ *et al.* (2014), Kalmuk & Acar (2015) Valdez-Juárez, *et al.* (2018), Sutanto, *et al.* (2017). Organizational learning is also commonly associated with the achievement of company performance or increase in company values Khunsoonthornkit & Panjakajornsak (2018), Jiménez & Sanz-Valle (2011), Salim & Sulaiman (2011), Ansari & Kalantari (2013), Abbasi & Zamani-Miandashti (2013), Akgün, *et al.*, (2014), Kalmuk & Acar (2015). Some other studies also examined organizational learning using various variables, for instance organizational commitment Khunsoonthornkit & Panjakajornsak (2018), cultural differences Nielsen *et al.* (2011), organizational learning capacity Çömlek, *et al.* (2012)., Total Quality Management Akgün, A. E., *et al.*, (2014), the level of organizational creativity Sutanto, E. M. (2017), social processes or social capital Webb (2018), Liu (2018). In terms of the research methodologies, most of the previous studies also proposed and tested models using Structural Equation Model (SEM) with Amos/ Lisrel/ PLS software Khunsoonthornkit & Panjakajornsak (2018), Liao & Wu (2010) , Jiménez & Sanz-Valle (2011), Nielsen *et al.* (2011) , Sanz-Valle *et al.* (2011), Tohidi, H., & Maryam, M. (2012), Yu, *et al.*, (2013), Abbasi & Zamani-Miandashti (2013), Akgün, *et al.*, (2014), Valdez-Juárez *et al.* (2018), Liu (2018). In addition, regression data analysis using SPSS was still commonly found in research on organizational learning Salim & Sulaiman (2011), Fang *et al.* (2011), Çömlek, *et al.* (2012)., Ansari & Kalantari (2013), Sutanto, *et al.* (2017). Similar to the topics related to knowledge management system, most of the topics related to organizational learning also test models and the data collection mainly uses questionnaires filled out by employees or organizational leaders in a certain group of industry. Literature review is also used for research on organizational learning Anderson, *et al.* (2014), Kalmuk & Acar (2015), Saadat & Saadat (2016).

Some of the limitations that are found in these previous researches are the use of cross-sectional data, small scope of sample leading to low generalization of the results, subjective measurement of variables, survey using questionnaires that measure perceptions, and only using quantitative test instead of using qualitative test as well.

3. Open Research Problem
3.1 Open Problem on Knowledge Management System Usage
Some problems of the previous studies on knowledge management system can be developed in terms of the methodologies and topics related to knowledge management system. The problems that can be brought up in future research in terms of the methodologies are as follows. Extending the scope of samples, not only conducting a case study on a particular organization, if possible, conducting inter-region, inter-industry, or international comparison. Using time series data. The data collection should use not only questionnaires, but also in-depth interviews. Self-reported interviews or the measurement of perception should be confirmed with the assessment of other parties/data in order to produce more objective results. For instance, performance is not only measured based on the statements of those who fill out questionnaires, but also measured using balance scorecarcard. If the research is based on literature review, the search for articles shall make use of information technology facility which enable researchers to find as complete sources as possible; the analyzed data should be presented in tables or graphs since they will ease readers in understanding the concepts being discussed.

In terms of the topics related to the use of knowledge management system, the problems that can be brought up in future research are the development of rarely-researched variables as suggested by previous studies such as social relationship, the level of IT exploration, organizational business processes, business performance management, institutional factor, the quality of system, satisfaction of user of knowledge management system, and the level of organizational competitiveness.

Research about knowledge management system is still widely studied in the business sector. Therefore, there are still open problems for research on the use of knowledge management system in public sector. The perspective that can be used for the analysis can be developed from the perspective of technology, individual and organization. In fact, previous studies have shown various models related to knowledge management system, and it is open for future studies to compile these models into a more comprehensive model.

3.2 Open Problem on Organization Learning
Some problems of the previous studies on organizational learning can be developed in terms of the methodologies and topics related to organizational learning. The problems that can be brought up in future research in terms of the methodologies are as follows. First, expanding the scope (types of industry, regions, countries) of selecting samples, followed by comparison method related to inter-country organizational learning. Second, samples from companies which work in services sector such as banking or finance are rarely found. Third, questionnaires should

be accompanied with in-depth and direct interviews with key personnel or parties in order to gain more accurate results. Fourth, the analysis could use mix method (qualitative and quantitative). Last, for research using literature review, the result of the literature review should be presented using tables that are easy and understandable for readers.

A research by Saadat & Saadat (2016) explains that the models related to organizational learning that are commonly discussed are related to the elements of management and leadership, culture, knowledge (information and communicational systems), and organizational structure. Based on the discussion of the previous studies, the topics related to organizational learning that can be brought up in future research are: several variables such as social process, company value, change in organizational memories, operational performance, organizational effectiveness, and Total Quality Management. There are still opportunities to propose a comprehensive model using structural equation model analysis which includes the variables of knowledge management system, organizational learning, innovation, and performance, as well as several moderating variables.

4. Conclusion

This article has conducted a critical review on various literatures related to knowledge management system and organizational learning. There are still opportunities for open problems and development of topics. A lot of studies found that knowledge management system and organizational learning are correlated to or affect the level of organizational innovation and performance. There are also a lot of models being proposed and tested related to these topics. The limitations of research are mostly related to the scope of sample, the use of cross-sectional data, subjective measurement of variables, and the selection of interesting variables which are not yet researched. By studying this article, readers could gain better understanding about research on knowledge management system and organizational learning. For beginner researchers, this article may serve as the beginning of topic development, in order to avoid researching the same topics as those brought up by previous research.

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Authors Biography

Lucia Ika FITRIASTUTI is presently a PhD student in Management at Universitas Teknologi Yogyakarta, Indonesia. She received a Master degree in Accounting from Universitas Gadjah Mada Yogyakarta and Bachelor of Accounting from

Universitas Atma Jaya Yogyakarta. She is formerly the chairman of STIE Solusi Bisnis Indonesia (SBI), Yogyakarta, Indonesia. Her research areas are including: Strategic Manajement, financial accounting and taxation.

Sujoko SUJOKO is a permanent academic staff at School of Business, Psychology & Communication, Universitas Teknologi Yogyakarta, Indonesia. He holds bachelor in management and master in accounting both from Gadjah Mada University, Indonesia. Later he received PhD in management from Brawijaya University, Indonesia. His research areas are including: Strategic Manajement, financial management.

Tutut HERAWAN is a visiting professor at Ambarrukmo Tourism Institute, Indonesia. He is previously an associate professor at Department of Information Systems, University of Malaya. He received PhD degree in information technology in 2010 from Universiti Tun Hussein Onn Malaysia. He is a visiting researcher at Parallel and Distributed Computing Research Lab of Deakin University Australia. He is also a part-time lecturer in many universities in Indonesia. He has more than 15 years experiences as academic and also successfully supervised five PhD students. He presently supervises 15 Master & PhD students and has examined Master & PhD Theses. He is the executive editor of Malaysian Journal of Computer Science (ISI JCR with IF 0.405). He has also guest edited many special issues in many reputable international journals. He has edited five Springer-series books and published 300 articles in various book chapters, international journals and conference proceedings which are indexed in Scopus database (with H-index 25). He is an active reviewer for more than 50 international journals including reputable journals e.g. IEEE Transactions on Fuzzy Systems, Knowledge-Based Systems, Information Sciences, IEEE Access, and many more. He delivered more than 20 keynote addresses, invited workshop and seminars and has been actively served as a chair, co-chair, program committee member and co-organizer for numerous international conferences/workshops. He is the founding chair of SCDM & DaEng conferences with are supported by the renowned publisher Advances in Intelligent System & Computing and Lecture Notes in Electrical Engineering of Springer Verlag, respectively. His research area includes information retrieval and decision support in information systems. His research area includes Data Mining and Knowledge Discovery, Decision Support in Information System, Rough and Soft Set theory.

Yohannes VEMBERI received master and bachelor degress both in management from Sekolah Tinggi Ilmu Ekonomi Widya Wiwaha Yogyakarta and Universitas Atma Jaya Yogyakarta, respectively. He has been an academic member of STIE Solusi Bisnis Indonesia (SBI), Yogyakarta, Indonesia. His research areas are including human resources management and marketing management.