Review Literature of Knowledge Management Systems
Adopting Models: Individual Level Evidence

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Abstract

For the modern business, Knowledge Management Systems (KMS) in organization is described as a comprehensive Information and Communication Technology (ICT) platform for collaboration and knowledge sharing with advanced services built on top. The KMS should be contextualized, integrated on the shared ontology basis and personalized for participants networked in communities. In addition, IT-based systems should be developed to support and enhance the organizational process of knowledge creation, storage/retrieval, transfer and application. This paper aimed to present a literature reviews of adoption models at the individual level of information systems both theories and prior papers. Researchers were interested in each different set of impacted factors of three prominent models: A Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and Unified Theory of Acceptance and Use of Technology (UTAUT) for adopting KMS in organization. Researchers also reviewed current three major findings: First, model of IT adoption at the individual level; Second, empirical literature of the UTAUT and finally, definitions of knowledge management systems.

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1. Introduction

The information technology (IT) is universally regarded as an essential tool in enhancing the competitiveness of the economy of a country. It is currently accepted that IT has significant effects on the productivity of firms (Oliveira & Martins, 2010). These effects only are fully realized if, and when, IT is spread and widely used. It is crucial, therefore, to understand the determinants of IT adoption and the theoretical models that have arisen addressing IT adoption. However, there are a few reviews of literature about the comparison of IT adoption models at the individual level. This stimulates researchers to examine in depth in the comparison of IT adoption models; in addition, this study is able to fulfill this gap.

In this study, researchers review theories related to adoption models at the individual level used in information systems (IS); in addition to discuss three prominent models, presented in Section 2, which are: Technology Acceptance Model (TAM) (Davis, 1985), Theory of Planned Behavior (TPB) (Ajzen, 1991); and Unified Theory of Acceptance and Use of Technology (UTAUT). Section 3 presents an extensive analysis of the UTAUT framework and also paper related to this theory, and finally the studies that combine the UTAUT framework with other theories. In the last section, the conclusions are provided.

2. Review of Literature

2.1 Model of IT Adoption at the Individual Level

There are many theories used in IS research (Hart & Dowell, 2010). Most researchers are interests only in theory about technology adoption. The most popular theories are the Technology Acceptance Model (TAM) (Davis et al. 1989), Theory of Planned Behavior (TPB) (Ajzen, 1991), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et.al, 2003). Therefore, researchers focused only on the TAM, TPB and UTAUT, because they specify only the individual level.

2.2 A Technology Acceptance Model

A Technology Acceptance Model (TAM) is a theory that has a reputation for being a measure of the success of the technology proposed by Davis, 1985 which is customizable. In addition to the Theory of Reasoned Action (TRA) presented by Fishbein and Ajzen described about social psychology (Fishbein & Ajzen, 1977). TRA explains how to develop a theoretical model TAM and studied in the context of the adoption of information systems. The theme of the party is unlikely to surrounding behavior but it is used as a factor in predicting the actual behavior as shown in Figure 1.
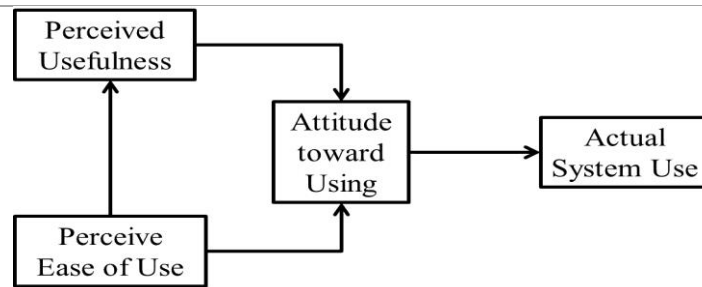
Figure 1: The Original Model of TAM (Fred D. Davis, 1985)

However, the model (Devis et.al, 1989) adapted TAM by excluding attitude toward the behavior. Intention might explain behavior more thoroughly (Venkatesh, Morris, Davis, & Davis, 2003) and can be used to forecast the adoption of information technology of individual. For example, the research of Davis et al., 1989 described the relationship between intention and behavior recognition technologies, shown in the Fred D Davis, Bagozzi, & Warshaw model (1989) below (Figure 2).
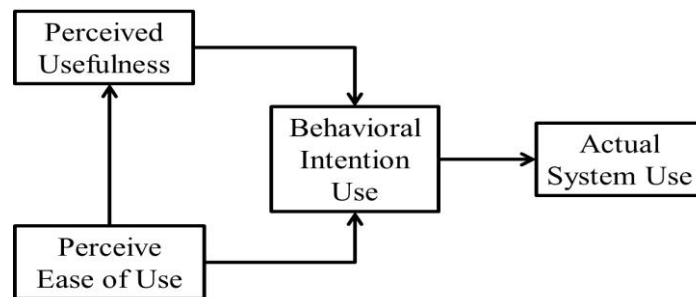

Figure 2: The Modified TAM

Although TAM can be used to forecast the adoption of information technology effectively, but TAM has some limitations as the complete lack of demand for new recurring addition (Taylor & Todd, 1995). Furthermore, some models intended to show the behavior, leading to further development the TAM model by adding different factors to examine the context of the adoption of information technology for a wider coverage(Chan & Lu, 2004; Kim & Malhotra, 2005)

The principle of TAM is to study factors influencing the behavioral intention to use information technology, which is composed of four aspects: external variables, recognition of the benefits of information technology (Perceived usefulness or U), recognition of the system is easy to use (Perceived ease of Use or E) and attitudes toward the use (Attitude toward using or A). The adopted model from TAM (Davis et al., 1989) is shown in Figure 3.
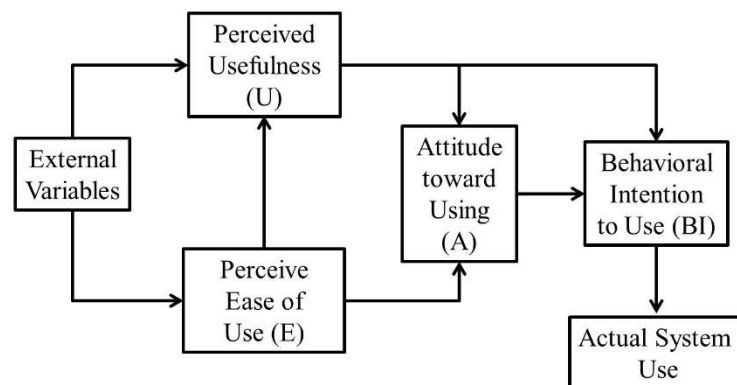
Figure 3: The adopted model from the TAM

Since the early applications of TAM to IS research, the theory has been applied and adapted in various aspects. Some examples of IT adoption are presented in Table 1.

Table 1: Some Studies Related to TAM Adoption (Davis, 1985)

IT Adoption	Author (s)
E-commerce/E-Business	Chooprayoon & Fung, 2010
A new software system	Venkatesh & Morris, 2000

2.3 Theory of Planned Behavior

Theory of Planned Behavior (TPB) proposed by Ajzen (1991) is a theory in social psychology developed from Theory of Reasoned Action (TRA). This theory pointed out the more awareness to control their own behavior, including perceived behavioral control. The varieties of behavior is a major context for the theory to help an understanding of the adoption of individual technologies (Taylor & Todd, 1995; Harrison, Mykytyn Jr, & Riemenschneider, 1997).

TPB examines the principles of individual behavior has been driven by the intended behavior. The factors that influence the behavioral intention consists of three main factors; namely the attitude toward the behavior, norms of the surrounding behavior and perceived behavioral control in any way. The relationship between TPB above theoretical model (Ajzen, 1991) is shown in the Figure 4.
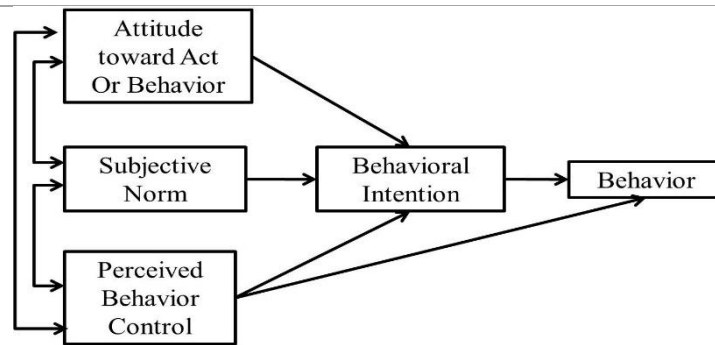
Figure 4: The Relationship Among Factors in TPB

Figure 4 shows the relationship between intention/behavior influenced by three main factors: attitude behavior, norms of the surrounding behavior and perceived behavioral control their behavior in any way. A direct influence on behavior recognition to control their own behavior is an acknowledgment of the difficulty or ease of behavior. If people perceive that they are able to behave in such circumstances and can achieve their desire, they are more likely to display behavior.

Also Ajzen (2002) believes that the person is trying to control various factors, internal factors and external factors. What conditions facilitate the use of factors such as perceived behavioral control of their own to show any behavior is determined by individual beliefs towards factors (such as the use of continuous operation) that may promote or inhibit behavior (Control beliefs) and the recognition of the power of such factors affecting the confidence (Efficacy) that the persons can behave. However, TPB has some limitations, potential errors, such as restrictions caused by inconsistencies between the willingness of individual behavior and actual behavior over time (Davis, 1985) and thus led to the development of the TAM.

Table 2: Some Studies Based on TPB (Ajzen, 1985)

IT Adoption	Author (s)
KM	Karim, Razi, Mohamed, & Abdullah, 2012
KMS in e-business	Lai, Ong, Yang, & Tang, 2005

2.4 Unified Theory of Acceptance and Use of Technology

Unified Theory of Acceptance and Use of Technology or UTAUT proposed by Venkatesh (2003). To gain more useful theory, there is a need to develop a model to explain the adoption of technologies of each party under the Unified theory, which based on the relationships depictions of various factors, from eight theories or field uses. The adoption of technology in individual sectors

(such as Entertainment, Telecommunication, Banking and Pubic administration) uses behavioral intentions /behavior as a primary variables (Ajzen, 1991).

The UTAUT theories is used to study the factor drivers for the intention behavior. The factors influencing behavioral intentions composed of three aspects: 1) expectations in performance (Performance expectancy), 2) expectations on effort (Effort expectancy) and 3) the influence of social (Social influence). Whereas, the facilitating condition are directly related to the usage habits. For the parameter / variable, there is four variables: (1) Sex (2) Age (3) experience and (4) the voluntary use. This is an important link in the act (Conjunction) model theory provides an eight theories. The relationship between the factors and parameters/variable theory UTAUT (Venkatesh et al., 2003) is shown in Figure 5.
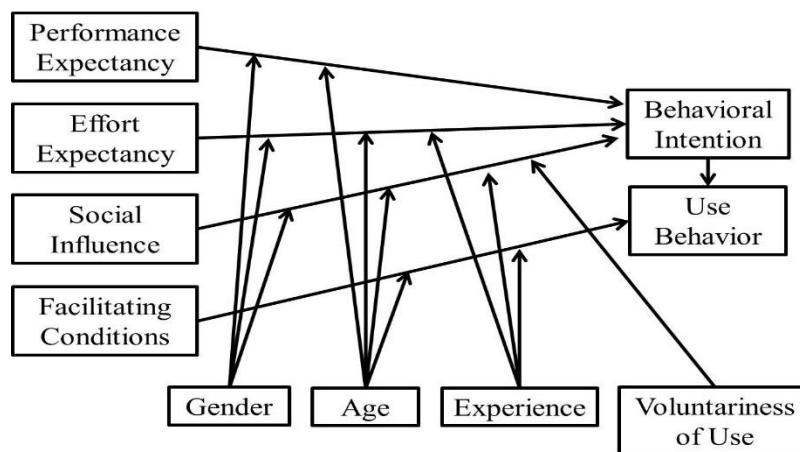

Figure 5: The Modified Model of UTAUT

Figure 5 presents the relationship between behavioral intention and behavior influenced by three main factors except facilitating conditions which has a direct influence on spending habits. The applied model is an extension and expansion of the main factors responsible for the four sides of the intention influencing behavior / usage behavior across four key areas.

However, the UTAUT model can forecast recognition technology efficiently. The extension model by adding more variables is able to forecast behavior more accuracy. However, recent research includes a small factor; therefore, there is a need to develop and expand the scope of theories to find more key factors to cover the context of technology users by focusing on consumers' use (Consumer technology use). The study concerns in these individuals whether it is a new technology application and the target group of the service. A different emphasis between the conditions of use of technology within business organizations of employees (UTAUT) and the condition of the consumer technology (UTAUT2) leads to more modify UTAUT or UTAUT 2.

2.5 Empirical Literature of the UTAUT

Researchers thoroughly analyse the UTAUT framework and presents an exhaustive description of studies that draw on the theory.

2.5.1 Prior papers related only to the UTAUT

Several researchers used only the UTAUT framework to study the different IT adoptions such as: Program packet, Electronic recordkeeping system (Lewellen, 2013). The variables analysis, method used, data, and context of empirical studies are presented in Table 3.

Table 3: Some Studies Based Only on the UTAUT

IT Adoption	Analysis Variables	Methods	Data and context	Author(s)
Program packet	Main constructs: Performance expectancy →Intention to use Effort expectancy→ Intention to use Social influence → Intention to use Facilitating conditions → IT use Intention to use → IT use Latent variables: Voluntariness → Intention to use IT Knowledge →Facilitating conditions Experience → IT use IT use→ Use Frequency IT use→Care & Report use IT use→ Administration use IT use→Communication use	Partial least squares (PLS) path modeling	Observation research to 1,607 employee of CHCs	(Kijsanayotin, Pannarunothai, & Speedie, 2009)

Table 3: Some Studies Based Only on the UTAUT (Cont.)

IT Adoption	Analysis Variables	Methods	Data and context	Author(s)
KMS	Prior KMS use by superiors →Current KMS Use Prior KMS use by peers →Current KMS Use Prior KMS use by subordinates →Current KMS Use Prior KMS use by extended professional population →Current KMS Use Hierarchical Level →Prior KMS use by superiors , peers, subordinates and extended Professional Population Prior KMS Use →Current KMS Use	OLS regression	80,000 employees firm of industry	(Wang, Meister, & Gray, 2013)
KMS	Employees' technology acceptances towards KMSs influence the perceived dimensions of a learning organization.	regression	DLOQ questionnaires, 327 data from 3 South Korean companies	(Yoo & Huang, 2014)
KMS	Intention of contribute → Contribution Performance expectancy → Intention of contribute Effort expectancy→ Intention of contribute	SEM	Questionnaires online by sent e-mail	(Isabelle & Sandrine, 2009)
Electronic Recordkeeping system	Technology Acceptance: Performance expectancy Effort expectancy Organizational Context: Social influence Perceived power security Knowledge Interpretation: Perceived value of records	Transcribed interviews use thematic analysis	12 interview from the New Zealand public sector	(Lewellen, 2013)

2.5.2 Studies that employed the UTAUT and other theories

Some papers developed more theories to find out appropriated modified model by using both the UTAUT framework and other theories to understand IT adoption. In Table 4 shows the model used the combination basis between the UTAUT framework and other theories to gain better understanding in IT adoption decisions. Additional theories are also included in Table 4 below.

Table 4: Some Studies that Combine the UTAUT Framework and Other Theories

Theoretical Model	IT Adoption	Analysis Variables	Methods	Data, and context	Author(s)
UTAUT and TAM models	E-business adoption: Electronic Document and Records Management Systems (EDRMS)	Technology acceptance: Effort expectancy→ Intention to use Effort expectancy →Performance expectancy Performance expectancy →Intention to use Organizational Context: Perceived power security →Effort expectancy →Intention to use Social influence →Performance expectancy →Intention to use Knowledge Interpretation: Perceived value of records →Performance expectancy →Intention to use →Actual use behavior	SEM and PLS-PM	Online survey to public sector employees from New Zealand	(Lewellen, Hooper, & Oliver, 2014)
Ground Theory (GT)	KMS	Process: Management intervention KM processes		case study oil and gas industry in Malaysia	(Matayong & Mahmood, 2011)

Table 4: Some Studies that Combine the UTAUT Framework and Other Theories (Cont.)

Theoretical Model	IT Adoption	Analysis Variables	Methods	Data, and context	Author(s)
UTAUT2 and social influence theory	KMS	Facilitating conditions → Current KMS use Habit → Current KMS use Prior KMS use → Current KMS use Prior KMS use by Superiors → Current KMS use Prior KMS use by Peers → Current KMS use Prior KMS use by Subordinates → Current KMS use Hierarchical level: → Prior KMS use by Superiors → Prior KMS use by Peers → Prior KMS use by Subordinates		survey to employees from 192 industry	(Fretwell, Lewis, & Ryan, 2014)
UTAUT and social factors	KMS	Social Factors: Voluntariness→Adoption and Usage Visibility→Adoption and Usage Image →Adoption and Usage Reciprocity Expectation →Adoption and Usage Technological Factors: Ease of use →Adoption and Usage Trial ability →Adoption and Usage Relative advantage →Adoption and Usage Result demonstrability →Adoption and Usage	PLS	survey to employees of business organizations	(Hester, 2010)

Table 4: Some Studies that Combine the UTAUT Framework and Other Theories (Cont.)

Theoretical Model	IT Adoption	Analysis Variables	Methods	Data, and context	Author(s)
UTAUT and social factors	KMS	Organizational Culture: Process vs. Results → Perceived Usefulness Process vs. Results → Perceived Ease of Use Process vs. Results → Perceived Behavioral Control Employee vs. Job → Perceived Behavioral Control Open vs. Closed → Subjective Norms Perceived Usefulness → Behavioral Intention Towards KMS use Perceived Ease of Use → Behavioral Intention Towards KMS use Perceived Behavioral Control → Behavioral Intention Towards KMS use Subjective Norms → Behavioral Intention Towards KMS use	SEM	Questionnaire employees	(Ciganek, Mao, & Srite, 2010)

2.5.3 Knowledge Management Systems (KMS)

In common, the KMS are IT that enables organizations to manage effective and efficient knowledge. However, some the definitions of KMS have been proposed by researchers as shown in Table 5 below.

Table 5: Definitions of Knowledge Management Systems

Authors	Definition of KMS
(Gray, 2000)	"The considerable interest subject amount the academics and practioners from the past decade that less of cumulative empirical researches are formed to place the causal mechanisms of the influence of KMS on the organization performance."
(Hahn & Subramani, 2000)	"emerging as powerful sources of competitive advantage"

Table 5: Definitions of Knowledge Management Systems (Cont.)

Authors	Definition of KMS
(Alavi & Leidner, 2001)	"The development of IT-based systems will support and enhance the knowledge creation, application, transfer and storage/retrieval processes in the organization."
(Gallupe, 2001)	"The tools and technique that support knowledge management practices in organizations"
(Hasan & Gould, 2003)	"An "activity" using architecture in the unit of analysis with be able to implement together in the current approaches and technologies."
(Kankanhalli & Tan, 2004)	"a class of information systems applied to managing organizational knowledge"
(Money & Turner, 2004)	"A web-based management tool and document repository with the primarily intent to support the goals of the organization."
(Jennex & Olfman, 2005)	"IT/ICT components included system with the users, repositories, using processes and/or knowledge generating, knowledge use culture, and the initiative for KM."
(Poston & Speier, 2005)	"Facilitation of the company's intellectual resources sharing in efficient and effective ways."
(Sambamurthy & Subramani, 2005)	"also encompass other technology-based initiatives such as the creation of databases of experts, the development of decision aids and expert systems, and the hardwiring of social net-works to aid access to resources of non-collocated individuals"
(Xu & Quaddus, 2005)	"It involves IT systems application with other resources in the organization for the strategically knowledge management in more systematic and effective way with quite a recent."
(Abdullah, Selamat, Jaafar, Abdullah, & Sura, 2008)	"as a concept that can be used for creating knowledge repositories, improving knowledge access and sharing as well as communicating though collaboration and managing knowledge as an asset in learning organization"
(Khalifa, Yan Yu, & Ning Shen, 2008)	"The specific organizational knowledge processes and resources focusing information system."

Table 5: Definitions of Knowledge Management Systems (Cont.)

Authors	Definition of KMS
(Orth, Smolnik, & Jennex, 2011)	"Offering the organization with the benefits but with strong of failure either from technical or IT-related factors, plus, the KM-related cultural, behavioral and strategic factors-similar to several of information systems (IS) types."
(Qwaider, 2011)	"Special type of information systems that supports activities related to the acquisition, generation, codification, storage, transfer, retrieval, and use of knowledge within organization."
(Yeh, 2011)	"the framework of an integration of organizational elements in organizational culture, organizational information technology infrastructure and the organization's store of individual and collective experiences, learning, insights, values"

Finally, this study used the KMS definition by Alavi & Leidner (2001), which defines that knowledge management is an organizational systemic and specified process to acquire, communicate and organize for the explicit knowledge and tactics for employees to use and gain more effectiveness and productive towards their works. In general, KMS would not have differences from other information systems, instead of content and activities by users. KMS would consist of hardware, software, people, and organization environment surrounding it.

The KMS review from the organizational IT usage might be consequently discussed, followed by the UTAUT reviews. Researchers provided both academic and practitioner approaches on the effort expectancy, performance expectancy, facilitating conditions and social influence, and then the behavioral of users and behavioral intention of the organization application of KMS.

The characteristics component of Knowledge Management Systems are derived from prior research shown in Table 6 below.

Table 6: Characteristics Component of Knowledge Management Systems

KMS Characteristics Component	Authors	Explanation of Component
Goals	(Lewin & Minton, 1986); (Stein & Zwass, 1995)	➢ Bring knowledge from the past to bear on present activities, thus resulting in increased levels of organizational effectiveness

Table 6: Characteristics Component of Knowledge Management Systems (Cont.)

KMS Characteristics Component	Authors	➢ Explanation of Component
	(Maier & Sametinger, 2004)	➢ As the technological part of KM initiative that also comprises person-oriented and organizational instruments targeted at improving the productivity of knowledge work
Processes	(Detlor, 2002); (Jennex & Olfman, 2005)	➢ Developed to support and enhance knowledge intensive task, processes, or projects
	(Davenport, Jarvenpaa, & Beers, 1996)	➢ Supported knowledge processes such as, knowledge creation, organization, storage, retrieval, transfer, refinement and packaging, (re) use, revision, and feedback, also called the knowledge life cycle, ultimately to support knowledge work
Comprehensive Platform	(Maier & Hädrich, 2006)	➢ KMS is not an application system targeted at single KM initiative, but a platform that can be used either as IT to support knowledge processes or integrating base system and repository in which KM application systems are built
	(Jennex & Olfman, 2005)	➢ There are two platform categories, the first user centric approach with focus on processes, and IT centric approach which focuses on base system to capture and distribute knowledge
Advanced Knowledge Services	(Bair & O'Connor, 1998);(Holtshouse, Borghoff, & Pareschi, 2013);	➢ KMS are ICT platform consist of a number of integrated services ➢ Basic services such as, collaboration, workflow management, document and content management, visualization, search and retrieval ➢ Advanced services such as, personalization, text analysis, clustering and categorization to increase the relevance of retrieved and push information, advanced graphical techniques for navigation, awareness services, shared workspace, and learning services as well as the integration of reasoning about various sauces on the basis of shared ontology

Table 6: Characteristics Component of Knowledge Management Systems (Cont.)

KMS Characteristics Component	Authors	➢ Explanation of Component
Knowledge Instruments	(Tsui, 2003)	➢ KMS are applied in a large number application area
	(Alavi & Leidner, 2001); (McDermott, 1999); (Tsui, 2003)	➢ KMS specially support KM instruments
	(Maier & Hädrich, 2006)	➢ KMS offers targeted combination and integration of knowledge services that together foster one or more KM instruments
Specifics of Knowledge	(Alavi & Leidner, 2001)	➢ KMS help to assimilate access to sources of knowledge, and with the help of shared context, increase the breadth of knowledge sharing between persons rather than storing knowledge itself
Participants	(Maier & Hädrich, 2006)	➢ Users play roles of active, involved participants in the knowledge network forested by KMS

2.6 Key Success Factor for Knowledge Management Systems

The knowledge management system development agenda in most organizations is the key driver of creating and sustaining competitive advantage in the 21st century economy. Chang, Hsieh, & Chen (2015) describe the factors influencing the success of a KMS for clinic including organizational culture and structure, top manager support, user perceived usefulness and perceived ease of use, user satisfaction, beneficial system quality, and accurate knowledge. Lee & Lan (2011) proposes the examination of the relative performance of KM in SMEs in Taiwan and Hong Kong for two keys success factors of KM, including Infrastructure capability (Technology, Structure, Culture) Process capability (Acquisition, Conversion, Application, Protection). Finally, The Knowledge management systems divided into two categories 1) Knowledge management practices (KM-Practices) and 2) Knowledge management tools (KM-Tools) (Cerchione & Esposito, 2017)

3. Conclusions

This paper made a review of literature of IT adoption models at the individual level. Most empirical studies are derived from the technology acceptance model (TAM), theory of planned behavior (TPB), unified theory of acceptance and use of technology (UTAUT), knowledge management systems (KMS). As the UTAUT model included the environment context (not included in the TAM theory and TPB theory), it becomes better ability to explain intra-firm innovation adoption;

therefore, researchers consider this model to be more complete. The UTAUT model has a solid theoretical basis, consistent empirical support, and the potential of application to IS adoption. For this reason, an extensive analysis of the UTAUT model was undertaken, analysis Electronic Journal Information Systems empirical studies that use only the UTAUT model and knowledge management systems (KMS). In the empirical studies, it combines this model with the TAM theory, Ground theory, and the social factor models, and concluding the same context in a specific theoretical model can have different factors.

In term of further research, researchers think that for more complex new technology adoption, it is important to combine more theoretical models to achieve a better understanding of the IT adoption phenomenon.

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