Assessing the Success of the Perceived Usefulness for Knowledge Management Systems: A Case Study of Iraqi Higher Education

Atheer Abdullah Mohammed, University of Baghdad, Iraq

ABSTRACT

As far we know that studies regarding the assessment of the success of the perceived usefulness for Knowledge Management Systems (KMSs) in the higher education settings are mostly in their infancy, thereby the research problem has not been considered before in most developing countries including Iraq. The predominant part of studies are outer the tertiary learning industry, and the related research is in non-Iraqi settings as well as focusing on a single aspect (i.e. e-learning systems) and a single sample (i.e. students). Hence, based on the modernized DeLone and McLean’s Information Systems Success Model (DMISSM), this study sets out to assess the success of the Perceived Usefulness of Knowledge Management Systems (PUKMS) in Iraqi universities. To achieve this objective, the quantitative method is selected as the research design. In total, 421 IT staff members from 13 Iraqi private universities were conducted. This study highlights significant results depending on structural equation modeling which confirms that six of nine hypothesized links have a significant effect among the research constructs. We can essentially conclude that Iraqi private universities are significantly aware of the system, service, and information quality toward user satisfaction and the PUKMS.

KEYWORDS

Knowledge Quality, User Satisfaction, Service Quality, System Quality, Knowledge Management Systems, Structural Equation Modeling, Higher Education

In the wider Arabic world, more specifically in developing countries, there has been an increasing emphasis on KMSs within Higher Education Institutions (HEIs) (Aldholay, Isaac, Abdullah, Abdulsalam, & Al-Shibami, 2018). KMSs serve universities with faster response time to main matters, facilitating a decision-making process to achieve efficiency, the desirable status of performance, improve job effectiveness and productivity, and share vital knowledge (Cham, Lim, Cheng, & Lee, 2016; Deja, 2019; M.-H. Wang & Yang, 2016). In the same line, Secundo, Ndou, Del Vecchio, and De Pascale (2019) state that these systems contribute significantly to performances that are achieved by conducting high-level research projects and high-quality teaching and learning, acquiring funds, providing the enhancement of their surrounding fields, and offering commercialization of their research. To clarify, HEIs adopt KMSs to facilitate the transference of their scientific knowledge from the university’s researchers to external stakeholders (e.g. government, society, and industry) (Guerrero, Herrera, & Urbano, 2019; Secundo et al., 2019). Thus, all the stated advantages of KMSs could make universities to be more dependable and efficiently perform their daily actions.

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Throughout the last decade of this century, there has been growing interest in the educational quality due to scientific and technological development, economic changes, educational expansion, and social pressures on HEIs (Ameen, Willis, Abdullah, & Shah, 2019). Nevertheless, these institutions need effective tools, programs, and strategies to improve their competitive standing through improving the value of their activities, increasing their efficiency and effectiveness, as well as adapting to persistent environmental changes (Aldholay et al., 2018). Because of being a small developing country, one of the major challenges that facing the Iraq economy is the complexity of transferring from industrial to knowledge (Okour, Chong, & Asmawi, 2019). Another problematic challenge is related to tertiary education regarding methods, programs, teaching processes, resources, research, and modern technology activities (Alshatnawi, Abd Ghani, & Kunanusorn, 2018). To overcome these difficulties, Iraqi HEIs require effective strategies and tools to strengthen their technical abilities and minimize the risks of negative social spillovers (Ameen et al., 2019). This is because the improvement of educational value-added requires great efforts and effective tools. KMSs could become imperative elements for organizational success through producing knowledge-intensive services with high value-added (Murray E Jennex, 2019; Murray Eugene Jennex, 2020). For example, the systems of KM provide distinguished opportunities for the university’s success. To explain, KMSs can collect, process, distribute, and share information in an inserted and appropriate way.

As far we know that studies regarding the assessment of the success of the perceived usefulness for KMSs in the higher education settings are mostly in their infancy, thereby the research problem has not been considered before in most developing countries including Iraq. The vast majority of studies are outside the higher education sector, and the few studies from within are in non-Iraqi contexts as well as focusing on a single aspect (i.e. e-learning systems) and a single sample (i.e. students) (Ameen et al., 2019). Additionally, developing countries have obvious dissimilarities in their level of education, economic aspects, and cultures. Consequently, the opportunities for further research are highly recommended to examine recognized quality usefulness into the KM success model (M. Jennex, 2017). Hence, more comprehensive investigations need to be carried out in this space, especially in higher education settings (Aldholay et al., 2018). From above, we can formulatethe original research question as follows:

Which are the three quality dimensions more significantly associated with the user satisfaction and the perceived usefulness of KMSs in Iraqi private universities? Accordingly, the present study attempts to investigate the strength of the interdependent relationships among the dimensions that make up the KMSs success model for Iraqi private universities using a quantitative methodology.

2. LITERATURE REVIEW

Extensive research of Information Systems (IS) and KM has bayed attention in the academic society, and shown that dual theoretical underpinnings have been broadly cited in the area of IS success or the success of KMSs: DMISSM (Delone and McLean, 1992, 2003) and (M. Jennex, 2017; Wu & Wang, 2006). Based on the revised KM success models, the proposed model of this study is slightly extended and prespecified. It can attempt in increasing our theoretical understanding as well as providing a comprehensive investigation of the KMSs literature per the following sides:

2.1 Knowledge Management Systems

With transitioning from IS success to KMSs’ success, management systems of knowledge as an IT-based system moved further to be multidimensional concepts with more complicated characteristics than systems of information (Cham et al., 2016; M. Jennex & Olfman, 2005; Kulkarni, Ravindran, & Freeze, 2006). In the literature of KMS, a stream of definitions has been terminological confusion. The term KMSs tends to principally refer to a set of designed systems to administer organizational
knowledge (Murray E Jennex & Olfman, 2006). As such, KMSs are utilized to underpin organizational information through acquisitive knowledge, shared knowledge, and applied knowledge for enhancement (Alavi & Leidner, 2001; M.-H. Wang & Yang, 2016). KMSs might be defined as meta-knowledge and a systematic process of input, storage, sharing, transfer, retrieval, and capturing of knowledge (Kulkarni et al., 2006). KMSs serve as a stand of decision-making, share significant information, construct a strategy, and increase organizational intellectual-capability (Cham et al., 2016). Those systems provide an organisation with easier access to the knowledge sources, effectual engine search, as well as highly recovered techniques for locating proper information (Alavi & Leidner, 2001; Kulkarni et al., 2006).

Until the last thirty years, unfortunately, HEIs have not detected the change in their traditional learning and teaching (face-to-face lectures) (Ameen et al., 2019). Historically, it is only since the work of Metaxiotis and Psarras (2003); Rowley (2000) that the research of KMSs within HEIs as knowledge-based institutions has been gained momentum to attract considerable interest by academic works. One well-known concept has been emphasized that effective KMSs are an essential strategy for assisting HEIs to achieve sustainable competitiveness through supporting organizational knowledge with the best practices of academic sharing knowledge (e.g., research and learning/teaching) as essential functions (Deja, 2019). KMSs can be conceptualized as an orderly activity associated with achieved research objectives, including appropriate KM technology instruments and improvement of created scientific knowledge (Tsui, Tian, Nakamori, & Wierzbicki, 2009). According to Rowley (2000), KMSs are several existing systems or facilities within a university such as libraries, communication, e-learning systems, networks for e-mail.

Concerning the context of Arab countries, there have been several practical examinations that focus on KMS as a key variable. Some of them highlight IT based systems. For instance, a study Al-Busaidi, Olfman, Ryan, and Leroy (2010) which applied in the Omani oil sector has focused on service quality, peers’ trustworthiness, system quality, management support, and rewards policy as a scale of KMSs. A study by Albassam (2019) conducted in Saudi Arabia has highlighted the concern of developing government sector productivity, enabling supremacy systems, and conflicting corruption as essential variables of KMSs. Another previous research focuses on KMSs as practices. For example, a practical study that took place in the Egyptian ICT sector was adopted knowledge creation, acquisition, transfer, codification, and sharing as key constructs of KMSs (Saade, Nebebe, Mak, & Leung, 2011). In conclusion, we can reveal that KMSs are essential tools for Arabic organizations (Okour et al., 2019).

### 2.2 Knowledge Management Success Models

During the past 30 years, much more information has become available in the context of IS to identify IS success measures. The M. Jennex (2017); Wu and Wang (2006) models are considered some of the well-known models for assessing the success of KMSs. Other well-founded theories and models exist in both IS and KMSs literature such as a user acceptance of information technology model (Davis, 1989); the DeLone and McLean (1992, 2003) IS Success Model (Delone and McLean, 1992, 2003); a theory of innovation diffusion (Rogers, 1995); modifications of Delone and McLean (1992) IS Success Model which proposed by P. Seddon and Kiew (1996); P. B. Seddon (1997); “a model of the productivity and quality of the IS function” (Myers, Kappelman, & Prybutok, 1997); a model of Knowledge Management (KM) success by Kulkarni et al. (2006); a technology acceptance model of KMSs by Kuo and Lee (2009); and a KMSs model of the individual level (Muhammed, Doll, & Deng, 2009). There is also a plethora of investigations that have been carried out the DMISSM in several various sectors and countries including e-government (Akram, Malik, Shareef, & Goraya, 2019; Carter, Weerakkody, Phillips, & Dwivedi, 2016; Mardiana, Tjakraatmadja, & Aprianingsih, 2015; Stefanovic, Marjanovic, Delić, Culibrk, & Lalic, 2016; Veeramootoo, Nunkoo, & Dwivedi, 2018; Y.-S. Wang & Liao, 2008), e-commerce (Delone & Mclean, 2004; Y. S. Wang, 2008), private (Almutairi & Subramanian, 2005; Choi, Ahn, Jung, & Kim, 2020), manufacturing (Kuo & Lee, 2009; Roky &
Al Meriouh, 2015), technology (Kundapur & Rodrigues, 2017; Lee & Chung, 2009), banking (Cham et al., 2016; Okour et al., 2019), healthcare (Bossen, Jensen, & Udsen, 2013; Tretiakov, Whiddett, & Hunter, 2017), and higher education (Al-Gahtani, 2016; Aldholay et al., 2018; Hassanazadeh, Kanaani, & Elahi, 2012; Kulkarni et al., 2006). However, this model is surprisingly neglected by IS and KMS’ researchers in developing countries. Up to now, most of these theories and models that have been established, extended, and revised in western countries are still unclear across other cultures/states. The cultural aspects are crucial as the culture of any country can impact how are KMSs utilized in that country (Al Amoush & Sandhu, 2020). Correspondingly, although the Jennex and Olfman (2006) model has been validated, there was feebleness, many technological innovations (i.e. social media, software, the cloud, and mobile technologies) have been highly emergent since that time which could be negatively affected the validation of model (Murray E Jennex, 2019). Likewise, the mentioned theories and models are controversially admitted and thereby more investigations should be carried out in other countries, especially in developing countries such as Iraq, in order to validate the KMSs model (Aldholay et al., 2018; Okour et al., 2019).

2.3 Hypotheses Development and Research Model

Our theoretical model is built on the categorization of the updated DeLone and McLean model (2003) and other models of KMSs described above (M. Jennex, 2017; Wu & Wang, 2006) in the Iraqi Higher Education Industry (IHEI). According to M. Jennex (2017), the success of PUKMS at any organization is a multidimensional concept that can be achieved utilizing up to six interdependent dimensions: Information/Knowledge Quality (I/KQ), system quality, service quality, system use, user satisfaction, and PUKMS. Therefore, this study provides a pragmatic investigation through adapting the DMISSM in the higher education industry.

Figure 1 shows the conceptual model of the study according to the updated DMISSM (Delone & McLean, 2003). In this model, each dimension from the three quality dimensions: “knowledge quality,” “systems quality,” and “service quality” affects user satisfaction and system use. Delone and McLean (2003) state that user satisfaction and system use are closely interrelated. To avoid the complexity of the current research model, the researcher has not included the feedback links from PUKMS to both user satisfaction and system use. This investigation is based on data gathered from 13 Iraqi private universities.

Figure 1. The hypothesized model of KMSs’ success
As shown in Figure 1, the nine hypotheses developed for this research were going to examine the key research objective. The IS and KMSs literature provide strong theoretical and empirical confirmations that the quality dimensions (knowledge quality, system quality, and service quality) are influenced by the utilization dimensions (KMSs’ use and user satisfaction) and PUKMS. Nevertheless, other studies confirm the opposite.

2.3.1 The Theoretical Relationships Between Quality Dimensions with the Perceived Usefulness of KSS

Examining the correlation between I/KQ and PUKMS has shaped mixed outcomes. For instance, Kuo and Lee (2009) found in their research that information quality was associated with perceived ease of KMSs’ use, but perceived knowledge quality was not correlated to perceived usefulness. In contrast, a study conducted in higher education settings by Kulkarni et al. (2006) has been discovered that knowledge content quality did not influence on perceived usefulness of knowledge sharing. Hence, it was hypothesized that: **Hypothesis 1- Information/ knowledge quality affects the perceived usefulness of KMSs in a university.**

In terms of the link between system quality and PUKMS, the connection between system quality and PUKMS has moderate support in both the organizational and individual contexts. Kulkarni et al. (2006) found that KM system quality directly affects perceived system usefulness of knowledge sharing. Nevertheless, one study, investigating perceived technological resources and KM level with perceived helpfulness, was not directly linked (Wu & Wang, 2006). To sum, these claims discussed above indicate that system quality may play a vital role in determining PUKMS. So, the following hypothesis was expressed: **Hypothesis 2- System quality influences the perceived usefulness of KMSs in a university.**

About the connection between service quality and a recognized usefulness of KMSs, surprisingly, few investigations have investigated the reverse connection between service quality and PUKMS. There is conclusive evidence indicating that higher management support, KM governance, and a KM strategy are positively linked with enhanced decision making as measured by enhancements in functional performance such as a KM strategy and content (M. Jennex, 2017; Murray E Jennex, 2019). Based on this, it was then articulated the following hypothesis: **Hypothesis 3- Service quality influences the perceived usefulness of KMSs in a university.**

2.3.2 The Theoretical Relationships Between Quality Dimensions with User Satisfaction

2.3.2.1 Knowledge Quality to User Satisfaction

The original dimension “information quality” was extended to contain I/KQ (Maier & Hadrich, 2007). Following Murray E Jennex (2019), knowledge quality refers to the helpfulness of knowledge architectures regarding their inclusion and rightness of contextual meaning. The knowledge quality constructs in this research can be comprehended in terms of knowledge content process, linkages, and richness (M. Jennex, 2017).

Many investigations have examined the connection between I/KQ with user satisfaction at both the institutional and individual levels across a variety of IS/ KMSs and a variety of industries. The connotation between perceived knowledge quality and use dimensions (i.e. user satisfaction) has been widely investigated (M. Jennex, 2017). Many examinations have found that knowledge quality has a constant association with user satisfaction (M.-H. Wang & Yang, 2016; Wu & Wang, 2006), while others have not found any significant relationship (Kulkarni et al., 2006). In conclusion, by using the arguments discussed above, quality knowledge can become an imperative element for determining user satisfaction (Cham et al., 2016; Nattapol, Peter, & Laddawan, 2010). This study, therefore, sets out to test the hypothesis that **Hypothesis 4: Information/ knowledge quality influences user satisfaction in a university.**

2.3.2.2 System Quality to User Satisfaction
System quality is referred to how well KM performs concerning knowledge creation, storage, retrieval, and application (Murray E Jennex, 2019). In this study, KM system quality can be understood in terms of technological resources, KM form, a KM level, and interface (M. Jennex, 2017). Empirical investigations provide an unambiguous connection between the system quality dimension and user satisfaction. Several investigations have found a significant connection (Cham et al., 2016; Kulkarni et al., 2006; Nattapol et al., 2010; M.-H. Wang & Yang, 2016; Wu & Wang, 2006). Previous research applied in higher education environments has investigated that system quality influences user (learner) satisfaction (Mtebe & Raisamo, 2014). Clearly, when the KM system quality is adequate, knowledge individuals might find usefulness in utilizing knowledge, thereby system quality results in great satisfaction to utilizers (Cham et al., 2016; M.-H. Wang & Yang, 2016). Based on theoretical analysis, the hypothesized links could be explained as follows: **Hypothesis 5- System quality affects user satisfaction in a university.**

2.3.2.3 Service Quality to User Satisfaction

The service quality constructs of this study mean as a measurement of support for the KM initiative which includes top management support, KM governance, and KM strategy (M. Jennex, 2017; Murray E Jennex, 2019). Academics have measured service quality utilizing multiple approaches, which might account for the unreliable results. Several investigators have observed service quality through considering the characteristics of technical staff support; nevertheless, researching the correlation between the quality of knowledge workers’ support which is provided by top management to KMSs’ end-utilizers and user satisfaction has yielded mixed findings. Some research found that perceived service quality was not positively associated with learner (user)satisfaction (Al-Busaidi et al., 2010; Mtebe & Raisamo, 2014; Nattapol et al., 2010). On the other hand, numerous examinations have been measured the service quality dimension with utilizer satisfaction and found positive associations in various operationalization as well as a variety of KMS/IS at both organizational and individual levels of analysis (Cham et al., 2016; M.-H. Wang & Yang, 2016; Wu & Wang, 2006). Furthermore, top management support is particularly decisive to support KMSs and subsequently change workers’ behaviours to be satisfied (Cham et al., 2016). It was therefore postulated that: **Hypothesis 6- Service quality affects user satisfaction in a university.**

2.3.3 The Theoretical Relationships Between The Perceived Usefulness Of Kms Dimension And Use Dimensions

Past investigations examining the association between PUKMS and user satisfaction have discovered moderate support. Many studies indicate a significant link between the PUKMS and user satisfaction (Cham et al., 2016; M. Jennex & Olfman, 2005; Kulkarni et al., 2006; Okour et al., 2019; Wu & Wang, 2006). Moreover, past research applied in Venezuelan higher education has also shown that there is a significant effect of user satisfaction on PUKMS (De Freitas & Yáber, 2018). The overall KMSs’ usefulness delivered by enhancements in functional performance such as KM strategy and content can positively reflect on the satisfaction of KMS’s utilizers and subsequently improve the quality of work-life (M. Jennex, 2017). Regarding the link between user satisfaction and KM usage, several prior studies found that utilizer satisfaction is linked with KM usage (De Freitas & Yáber, 2018; Halawi, McCarthy, & Aronson, 2008; Kulkarni et al., 2006; Mtebe & Raisamo, 2014; Nattapol et al., 2010; Okour et al., 2019; M.-H. Wang & Yang, 2016; Wu & Wang, 2006). In total, based on the facts discussed above, it was subsequently formulated the following two hypotheses:

Hypothesis 7- The perceived usefulness of KMSs influences user satisfaction in a university.

Hypothesis 8- User satisfaction affects KMSs’ use in a university.

The final relationship between use dimensions and the PUKMS that will be examined in this study is KMSs’ use with the PUKMS. Prior studies examining the association between KM usage
and recognized KMSs’ helpfulness have discovered mixed support. As such, studies by Nattapol et al. (2010); M.-H. Wang and Yang (2016) have been identified a significant association between KMSs’ use and net usefulness. Another study carried out in the academic area found that KM usage has a positive relationship with PUKMS (De Freitas & Yáber, 2018). Another research found similar outcomes when assessing the connection between the usage of KMS and PUKMS (i.e., decision-making effectiveness) (Okour et al., 2019). Nevertheless, two different studies examined the connotation between KMSs’ use and PUKMS and found that KMSs’ use was not related to PUKMS (Kulkarni et al., 2006; Wu & Wang, 2006). Based on this, it was therefore suggested that: Hypothesis 9- Perceived usefulness of KMSs influences system use in a university.

3. RESEARCH METHODOLOGY

This research adopted a quantitative method as its research design with a purposive sampling technique. Besides the objectivity, the quantitative investigation is particularly proper when there is a potentiality of collecting numeric measurements of variables and deductions from a population’s samples (Queirós, Faria, & Almeida, 2017). Moreover, it requires little time for data analysis as this approach utilizes statistical software (Rahman, 2020) such as SPSS and AMOS. To test the hypothesized model of this study, it was adopted the quantitative survey questionnaire as a key data collection approach (Venkatesh, Brown, & Bala, 2013). Different approaches were adopted for administrating the questionnaire such as in-person via hand, email, or online. The research lasted sixth months from 05/07/2019 to 05/01/2020. In general, this section discusses three methodological aspects: measures, research sampling, and data analysis.

3.1 Measures

According to the conceptual model of the study, the survey questionnaire consists of six overarching constructs of PUKMS. Each construct operates across a five-item questionnaire. The researcher carefully chose items from previous investigations to assure content validity. The survey questionnaire of the study is listed in Appendix 1. It rated on a standard 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Due to respondents being Arabic speakers, the decision was taken that the questionnaire had to accurately translate from English to Arabic.

3.2 Research Sampling

Information technology individuals functioning at IHEI were recruited as a targeted sample. These persons come to be a vital resource for organizations in attaining sustained rival features (Al-Azawei, Parslow, & Lundqvist, 2016). In addition, knowledgeable persons supply truthful data about PUKMS because of their high-ranking of experienced knowledge. We have determined the sample size based on the university database of staff members. The sample was randomly selected. The collected data were comprised of a mission illustrating the investigation’s purposes and details within the information provided to potential participants. When the moment that a participant’s agreement had occurred, the questionnaire instrument and participant information sheet documents were supplied to them. Meanwhile, a withdrawal from the study was allowed to respondents if they decided. The period for returning the questionnaires was two weeks. The researcher initially sampled between 450 and 500 individuals among 13 selected Iraqi private universities. 421 forms were obtained nevertheless just 378 were correctly finished and utilized for final analysis. Table 1 summarises the respondents by the university.

3.3 Data Analysis

As indicated earlier, the key objective of this research is to assess the success of the PUKMS in Iraqi private universities. Achieving this objective was through hypotheses testing. Prior testing hypotheses, it should be ensured the validity of the questionnaire instrument and measurement model using
Confirmatory Factor Analysis (CFA) (Schreiber, Nora, Stage, Barlow, & King, 2006). Regarding analysis techniques, the Covariance-Based technique of Structural Equation Modeling (CB-SEM) was used to test the research hypotheses (Jiewanto, Laurens, & Nelloh, 2012). Considering the multivariate analysis, SEM is one of the most useful techniques for social science studies (Hair Jr, Hult, Ringle, & Sarstedt, 2016). SEM offers more information in terms of extracting the size of the effect, assessment of statistical significance, assessment of whether the models fit, and assessment of the appropriateness of the data, as well as more accurate causal relationships between endogenous and exogenous composite variables (MacCallum & Austin, 2000).

4. THE RESULTS AND DISCUSSION

There is strong evidence by Anderson and Gerbing (1988) who recommend utilizing a two-stage approach: measurement model and the structural model to analyse multivariate data (Schumacker & Lomax, 2010):

4.1 Measurement Model

The measurement model examines the interrelationships among PUKMS constructs using CFA AMOS, V25 (Schumacker & Lomax, 2010). CFA is employed to ensure the measurement model quality which depends on the following indexes (Table 2) (Zainudin, 2011):

4.1.1 The Confirmatory Factor Analysis Procedures for The Measurement Model

Anderson and Gerbing (1988) recommend conducting a two-step approach to decrease any potential cross-loading between the variables prior examining the research model using SEM. As mentioned before, CFA procedures were used to enhance the fit model. Table 3 presents the outcomes of fit indices for the initial measurement model that includes six constructs and 30 observed variables (items) with their loadings.

### Table 1. The respondents by university

| No | The university                        | The received questioners | The completed questioners |
|----|---------------------------------------|--------------------------|---------------------------|
| 1  | Isra                                   | 38                       | 33                        |
| 2  | Al-Mamoon                              | 32                       | 28                        |
| 3  | Al-Rafidin                             | 36                       | 34                        |
| 4  | Dijla                                  | 29                       | 27                        |
| 5  | Baghdad College of Economic Sciences   | 45                       | 38                        |
| 6  | Al-Mansour                             | 32                       | 29                        |
| 7  | Al-Turath                              | 26                       | 25                        |
| 8  | Baghdad College of Pharmacy            | 21                       | 19                        |
| 9  | Al-Rasheed                             | 27                       | 23                        |
| 10 | Imam Ja’afar al-Sadiq                 | 42                       | 39                        |
| 11 | Sadr al-Iraq                           | 25                       | 24                        |
| 12 | Al-Hikma                               | 37                       | 31                        |
| 13 | Al-Nisoor                              | 31                       | 28                        |
|    | The total                              | 421                      | 378                       |
It can be seen from the results in Table 2, initial measurement model had five unsatisfied indices which did not fit the criteria of goodness for SEM. In this first measurement model, $GFI, AGFI, IFI, TLI, and CFI$-values are 0.822, 0.788, 0.835, and 0.815 respectively, which are lower than 0.90 (the acceptable level). Therefore, a modification indices technique was utilised to improve the quality of the measurement model via removing low-loading items (Anderson & Gerbing, 1988). Chin (1998a) recommends that loading items should be 0.60 $^2$. Loading items under this scale should be removed from the measurement model. This is because low loading-items do not meet the minimum thresholds of goodness for SEM. Accordingly, modification indices were used to upgrade the quality of the measurement model which was reassessed eight times to be considered as a highly fit model (Table 4).

In conclusion, the fit indices for the final measurement model with new factor loadings for each item are presented in Table 5. The measurement model fits the criteria of goodness for SEM. The modification indices technique improved factor loadings (0.611-0.78).

Prior testing the research hypotheses, there are further tests that should be examined to ensure the validity and reliability of the results. Average Variance Extracted (AVE) and Composite Reliability (CR) are considered common measures for measuring the validity and reliability of the measurement model (Hair, Black, Babin, & Anderson, 2010). AVE is used to assess the convergent validity of a variable (Fornell & Larcker, 1981), while CR is utilised to evaluate variable reliability (Bagozzi & Yi, 1988) and Squared Multiple Correlation (SMC) to evaluate item reliability (Al-Sabawy, Cater-Steel, & Soar, 2013). Furthermore, the reliability of the quantitative data gathered for this study was examined by using a Cronbach’s alpha test ($\alpha$) to examine construct-items correlation (Cronbach, 1951; Nunnally & Bernstein, 1994). The acceptable rate of correlation coefficient should be at least 0.70 (Gefen, Straub, & Boudreau, 2000; Hair et al., 2010). SMC test was examined using AMOS software. AVE was calculated manually while CR was calculated following the standard set in the composite reliability calculator (http://www.thestatisticalmind.com/calculators/comprel/composite_reliability.htm). In regards to satisfactory and significant values, AVE values of a composite variable should be at least 0.50 (Bagozzi & Yi, 1988) while an acceptable level of item loadings is 0.60 or more (Chin, 1998a). CR should be at least 0.70 to be satisfactory (Fornell & Larcker, 1981; Nunnally & Bernstein, 1994). The acceptable rate of correlation coefficient should be at least 0.70 (Gefen et al., 2000; Hair et al., 2010). Holmes-Smith (2011) recommends that SMC should be at least 0.30 to be satisfactory (Al-Sabawy et al., 2013). Table 6 provides a summary of the validity and reliability results.

As shown in Table 6, the general mean of the I/KQ construct is 3.798 which is greater than the standard mean (3) $^1$, with high consistency in the answers towards this construct through the value of standard deviation 0.609. Looking at the results of compares means using one-way analysis, that the I/KQ construct is the first important construct among the updated D&M ISSM constructs. These

### Table 2. Fit goodness indexes of CFA

| Name of category | Indexes | Level of Acceptance |
|------------------|---------|---------------------|
| Parsimonious fit | Adjusted Goodness-of-Fit Index (AGFI) | AGFI ≥ 0.80 |
|                  | Chi-Square/ Degree of Freedom (Chisq/df) | Chisq/df ≤ 5.00 |
| Incremental fit  | Incremental Fit Index (IFI) | IFI ≥ 0.90 |
|                  | Comparative Fit Index (CFI) | CFI ≥ 0.90 |
|                  | Tucker Lewis Index (TLI) | TLI ≥ 0.90 |
| Absolute fit     | Root Mean square Residual (RMR) | RMRE 0.05 |
|                  | Goodness of Fit Index (GFI) | GFI ≥ 0.90 |
|                  | Root Mean Square Error of Approximation (RMSEA) | RMSEA ≤ 0.08 |
|                  | Chi-square (Chisq) | p ≥ 0.05 |
Table 3. The outcomes of fit indices for the initial measurement model of the study

| Items | Path | Constructs | Loadings |
|-------|------|------------|----------|
| IKQ1  | <--- | Information/ Knowledge Quality (IKQ) | 0.621 |
| IKQ2  | <--- | | 0.537 |
| IKQ3  | <--- | | 0.715 |
| IKQ4  | <--- | | 0.632 |
| IKQ5  | <--- | | 0.722 |
| SYQ1  | <--- | System Quality (SYQ) | 0.662 |
| SYQ2  | <--- | | 0.366 |
| SYQ3  | <--- | | 0.458 |
| SYQ4  | <--- | | 0.809 |
| SYQ5  | <--- | | 0.593 |
| SEQ1  | <--- | Service Quality (SEQ) | 0.617 |
| SEQ2  | <--- | | 0.657 |
| SEQ3  | <--- | | 0.652 |
| SEQ4  | <--- | | 0.645 |
| SEQ5  | <--- | | 0.687 |
| KU1   | <--- | KMS Use (KU) | 0.753 |
| KU2   | <--- | | 0.650 |
| KU3   | <--- | | 0.467 |
| KU4   | <--- | | 0.714 |
| KU5   | <--- | | 0.490 |
| US1   | <--- | User Satisfaction (US) | 0.517 |
| US2   | <--- | | 0.737 |
| US3   | <--- | | 0.710 |
| US4   | <--- | | 0.715 |
| US5   | <--- | | 0.743 |
| PUK1  | <--- | Perceived Usefulness of KMSs (PUK) | 0.762 |
| PUK2  | <--- | | 0.780 |
| PUK3  | <--- | | 0.738 |
| PUK4  | <--- | | 0.736 |
| PUK5  | <--- | | 0.459 |

**Goodness of fit statistics**
- Chisq/df = 3.095
- P-value = 0.001
- GFI = 0.824
- AGFI = 0.790
- IFI = 0.841
- TLI= 0.821
- CFI= 0.839
- RMSEA= 0.075
- RMR = 0.036
### Table 4. The step-by-step measurement model

| No. | Items | Re-solution decision |
|-----|-------|----------------------|
| 1   | SYQ2  | Removed based on factor loading of 0.36 |
| 2   | SYQ3  | Removed based on factor loading of 0.45 |
| 3   | KU3   | Removed based on factor loading of 0.47 |
| 4   | KU5   | Removed based on factor loading of 0.47 |
| 5   | PUK5  | Removed based on factor loading of 0.49 |
| 6   | US1   | Removed based on factor loading of 0.52 |
| 7   | IKQ2  | Removed based on factor loading of 0.53 |
| 8   | IKQ1  | Removed based on factor loading of 0.58 |

### Table 5. The outcomes of fit indices for the final measurement model of the study

| Items | Path | Constructs                      | Loadings |
|-------|------|----------------------------------|----------|
| IKQ3  | <--- | Information/Knowledge Quality (IKQ) | 0.695    |
| IKQ4  | <--- |                                  | 0.671    |
| IKQ5  | <--- |                                  | 0.742    |
| SYQ1  | <--- | System Quality (SYQ)             | 0.636    |
| SYQ4  | <--- |                                  | 0.796    |
| SYQ5  | <--- |                                  | 0.611    |
| SEQ1  | <--- | Service Quality (SEQ)            | 0.615    |
| SEQ2  | <--- |                                  | 0.656    |
| SEQ3  | <--- |                                  | 0.652    |
| SEQ4  | <--- |                                  | 0.654    |
| SEQ5  | <--- |                                  | 0.682    |
| KU1   | <--- | KMS Use (KU)                     | 0.777    |
| KU2   | <--- |                                  | 0.655    |
| KU4   | <--- |                                  | 0.703    |
| US2   | <--- | User Satisfaction (US)           | 0.746    |
| US3   | <--- |                                  | 0.705    |
| US4   | <--- |                                  | 0.719    |
| US5   | <--- |                                  | 0.743    |
| PUK1  | <--- | Perceived Usefulness of KMSs (PUK)| 0.759    |
| PUK2  | <--- |                                  | 0.780    |
| PUK3  | <--- |                                  | 0.748    |
| PUK4  | <--- |                                  | 0.743    |

**Goodness of fit statistics**
- Chisq/df = 2.739
- P-value = 0.001
- GFI = 0.901
- AGFI = 0.843
- IFI = 0.910
- TLI= 0.903
- CFI= 0.909
- RMSEA= 0.068
- RMR = 0.030
results indicate that universities seek to provide accurate information provides sufficient information. In addition, the knowledge or information content of KMS fits employees’ needs and is always updated. The second important construct among the updated D&M ISSM constructs is system quality. The overall mean of this construct is 3.699 with great consistency in the answers to this construct through the value of standard deviation 0.600. These outcomes refer that there are some restrictions about using KMS when employees need it. Likewise, there are some difficulties regarding response time for login. In regards to service quality, respondents were slightly interested in this construct through the overall mean (3.589) with high consistency in the answers towards this construct across the value of standard deviation 0.575. This means that KMS have a lack in providing the desired service such as an availability of using KMS at all times and understanding of an employee’s specific needs. On the other side, IT individuals were moderately interested in the system use construct with a mean and standard deviation of 3.565 and 0.640 respectively. This result indicates that there is a lack to increase training and increase the dissemination of cognitive culture among employees.

Focusing on the user satisfaction construct, the overall mean of this construct is 3.568 with great consistency in the answers to this construct through the value of standard deviation 0.612. Finally, the PUKMS construct was the least attention of respondents through the overall mean (3.377) with consistent responses towards this construct across the value of standard deviation 0.624.
As can be seen from the table above (6), the outcomes confirmed the validity and reliability of the whole measurement model. There are 22 significant items six of which are the assigned weights as a reference to IKQ4, SYQ5, SEQ3, KU1, US2, and PUK1, so a solution can be established. The significant weight levels for other items were at \( p < 0.001 \). These indicated that there were strongly significant effects for each variable and its items. This is because their p-values were greater than 0.05. All factor loadings of the constructs were greater than 0.60. The values of AVE for the six constructs ranged between 0.508-0.674, which are greater than the satisfactory rate (0.50). Values of CR for all the constructs included in the measurement model ranged between 0.724-0.844, which meant they were greater than the acceptable rate (0.70). These confirm that all values were statistically satisfactory. This is because their values are greater than 0.70. Values of SMC for the measurement model variables ranged between 0.370-0.634, which was greater than the acceptable rate (0.30). These ensured that all values were statistically satisfactory.

Furthermore, Fornell-Larcker’s criterion (Fornell & Larcker, 1981) was utilized to assess the discriminant validity which depends on the comparison between the square root of Average Variance Extracted (AVEs) for each composite variable and its inter-correlations with other composite variables (Chin, 1998b). A sufficient level of discriminant validity for the measurement model of the study was achieved when AVEs for each composite variable is more than its inter-correlations with other composite variables (Chin, 1998b). Thus, Table 7 shows the outcomes of Fornell-Larcker’s criterion that confirmed the measurement model achieved the sufficient level of discriminant validity.

### Table 7. Fornell-Larcker’s criterion of discriminant validity for the measurement model

| Composite variables | IKQ  | SYQ  | SEQ  | KU   | US   | PUK  |
|---------------------|------|------|------|------|------|------|
| IKQ                 | 0.723|      |      |      |      |      |
| SYQ                 | 0.642| 0.712|      |      |      |      |
| SEQ                 | 0.602| 0.680| 0.748|      |      |      |
| KU                  | 0.711| 0.619| 0.670| 0.730|      |      |
| US                  | 0.610| 0.679| 0.555| 0.565| 0.793|      |
| PUK                 | 0.585| 0.555| 0.606| 0.643| 0.561| 0.757| 0.820|

Note: AVEs are in bold while other values are correlations among composite variables.

### 4.2. Structural Model

To assess the structural model results concerning a description of the relationship between explanatory and dependent variables, there are dual key indicators: coefficient of determination (R²) and Critical Ratio (CR) (critical t-values) (Hair Jr et al., 2016). The first indicator measures the model accuracy through a squared correlation between actual independent variables and dependent variables (Chin, 1998b; Gefen et al., 2000; Hair Jr et al., 2016). The R²-value ranges between 0-1 (Field, 2018; Hair et al., 2010; Hair Jr et al., 2016). In terms of an acceptable level of R²-value, determining the satisfactory value is difficult and depends on the research complexity (Hair Jr et al., 2016). The t-value should be at least 1.96 with \( P-value \) not more than 0.05 (Byrne, 2016; Hair Jr et al., 2016), or at least 2.58 with \( P-value \) not more than 0.01 to be significantly acceptable (Schumacker & Lomax, 2010). Overall, Figures 2 and 3 show the outcomes of fit indices for the initial and final structural model of the study.

Overall, the core objective of this study is to assess the success of PUKMS in Iraqi private universities. This objective was achieved by testing nine hypotheses (Table 8 below). Regression paths conducting by SEM showed that six of nine hypothesized links have a significant effect among the research constructs. Thus, the results and discussion of this investigation are detailed as the following:
The first hypothesis is as follows: H1: *Information/knowledge quality influences the perceived usefulness of KMSs*. Table 8 elucidates that the regression line of H1 is reasonably acceptable as well as sufficient to provide a description of the correlation between IKQ and PUK. This result emphasized a significant impact for IKQ on PUK and enabled acceptance of H1. This denotes that if a tertiary organization intends to develop its I/KQ, it ought to capitalize the PUKMS. The yielded outcome of this study is not in agreement with previous research conducted in the university sector which confirms that knowledge content quality did not impact on perceived usefulness of knowledge sharing (Kulkarni et al., 2006). The second hypothesis is as follows: H2: *System quality influences the perceived usefulness of KMSs*. Table 8 elucidates that the regression line of H2 is reasonably acceptable as well as sufficient to give a description of the correlation between SYQ and SU. This result emphasized a significant impact for SYQ on PUK and enabled us an acceptance of H2. This denotes that if the organization intends to develop its system quality, it ought to focus on the perceived
usefulness of KMSs. This finding underpins the results of previous research (implemented inside the higher education sector) which indicates that the SYQ of KMS directly affects the perceived system usefulness of knowledge sharing (Kulkarni et al., 2006).

The third hypothesis is titled as service quality influences the perceived usefulness of KMSs. Table 8 elucidates that the regression line of H3 is reasonably acceptable as well as sufficient to provide a description of the correlation between SEQ and PUK. This finding confirmed a significant influence for SEQ on PUK and enabled us an acceptance of H3. This denotes that if an educational organization intends to develop SEQ, it ought to capitalize on PUKMS. This yielded finding is in agreement with the arguments of M. Jennex (2017) who confirms that high support of top management, KM governance, and KM strategy are positively linked with enhanced decision making as measured by enhancements in functional performance such as KM strategy and content. The fourth hypothesis is addressed as H4: Information/knowledge quality influences user satisfaction. As shown in Table 8, the regression line of H4 is not reasonably acceptable as well as insufficient to provide a description of the correlation between IKQ and US. This result confirmed an insignificant impact for IKQ on
US and enabled us a refusal of H4. This indicates that if the organization intends to develop its I/KQ, it ought not to advance user satisfaction. This finding does not support the finding of M.-H. Wang and Yang (2016) confirmed that knowledge quality has a constant association with user satisfaction.

The fifth hypothesis is addressed as: System quality affects user satisfaction. Table 8 illuminates that the regression line of H5 is reasonably acceptable as well as sufficient to provide a description of the correlation between SYQ and US. This finding emphasized a significant impact for SYQ on US and enabled us an acceptance of H5. This denotes that if an educational organization intends to develop its SYQ, it ought to advance user satisfaction. This result is supported by Mtebe and Raisamo (2014) who confirm that academic system quality influences user (learner) satisfaction.

The sixth hypothesis is addressed as H6: service quality affects user satisfaction. As shown in Table 8, the regression line of H6 is reasonably acceptable as well as sufficient to provide a description of the nexus between SEQ and US. This result confirmed a significant impact for SEQ on US and enabled us an acceptance of H6. indicates that if an academic organization intends to develop SEQ, it ought to capitalize on user satisfaction. The seventh hypothesis is as follows: H7: The perceived usefulness of KMSs influences user satisfaction. Table 8 elucidates that the regression line of H7 is reasonably acceptable as well as sufficient to provide a description of the correlation between PUK and US. This result emphasized a significant impact for PUK on US and enabled us an acceptance of H7. This indicates that if the researched organizations intend to develop PUKMS, their users may highly be dissatisfied. This finding is in agreement with the study of De Freitas and Yáber (2018) which has been discovered that there is a significant effect of user satisfaction on PUKMS.

The eighth hypothesis is addressed as user satisfaction affects KMS use. As shown in Table 8, the regression line of H8 is not reasonably acceptable as well as insufficient to provide a description of the correlation between US and KU. This outcome emphasized an insignificant impact for US on KU and enabled us a refusal of H8. This denotes indicates that if a tertiary organization intends to maximize its user satisfaction, it has to decrease the KMS use. Against this result, several prior studies found that user satisfaction is linked with KM usage (De Freitas & Yáber, 2018; Halawi et al., 2008; Kulkarni et al., 2006; Mtebe & Raisamo, 2014; Nattapol et al., 2010; Okour et al., 2019; M.-H. Wang & Yang, 2016; Wu & Wang, 2006). The ninth and final hypothesis is titled as the perceived usefulness of KMSs influences system use. As shown in Table 8, the regression line of H9 is not reasonably acceptable as well as insufficient to provide a description of the correlation between KU and PUK. This result emphasized an insignificant impact for PUK on KU and enabled us a rejection of H9. This indicates that if an academic organization intends to maximize PUKMS,

| Hypothesis | The path | Regression Weights | Results |
|------------|----------|--------------------|---------|
| H1         | PUK <--- IKQ | β = -0.438, S.E = 0.210, C.R = -2.084, P value = 0.037* |Accepted |
| H2         | PUK <--- SYQ | β = 0.744, S.E = 0.286, C.R = 2.599, P value = 0.009** |Accepted |
| H3         | PUK <--- SEQ | β = 0.754, S.E = 0.147, C.R = 5.137, P value = 0.001*** |Accepted |
| H4         | US <--- IKQ | β = 0.343, S.E = 0.204, C.R = 1.687, P value = 0.092 |Rejected |
| H5         | US <--- SYQ | β = -0.652, S.E = 0.285, C.R = -2.285, P value = 0.022* |Accepted |
| H6         | US <--- SEQ | β = 0.630, S.E = 0.184, C.R = 3.431, P value = 0.002*** |Accepted |
| H7         | US <--- KU | β = 0.427, S.E = 0.149, C.R = 2.870, P value = 0.004** |Accepted |
| H8         | KU <--- US | β = -0.021, S.E = 0.138, C.R = -0.154, P value = 0.877 |Rejected |
| H9         | KU <--- PUK | β = -0.142, S.E = 0.152, C.R = -0.932, P value = 0.351 |Rejected |

*** = Significant at level 0.001, ** = Significant at level 0.01, * = Significant at level 0.05
it ought to decrease system use of KMS. This outcome supports the results of such prior research which indicates that KMSs’ use was not related to PUKMS (Kulkarni et al., 2006; Wu & Wang, 2006). Against this result, Nattapol et al. (2010); M.-H. Wang and Yang (2016) have found that there is a significant association between KMSs’ use and PUKMS.

5. IMPLICATIONS AND CONCLUSIONS

Our findings provide theoretical and workable perceptions. This investigation contributes to the KM literature regarding the success of KMSs in the country’s context with an emergent economy, especially by identifying a wider fashion of its effectiveness in the university performance. Moreover, the outcomes of this paper would be a guideline for Iraqi HEIs to improve their efficient strategies which can be reflected in an improvement of academic performance. In this respect, methodical strategies out to be followed to carry out KMSs. For example, a collaboration with other HEIs that have accomplished in-progress stages in KMS implementation is extremely recommended whether from developed or neighboring states. Empirically, this study provides a practical model for the prominence of KMSs and effective utilization. It offers the fundamental required guidelines for officials, designers, and decision-makers who utilize KMSs in order to enforce their functional performance, more especially the decision-making environment within universities. Likewise, this work provides further evidence of the suitability and verification of utilizing a KMP model developed by Jennex and Olfman.

We can essentially conclude that Iraqi private universities are significantly aware of quality dimensions toward PUKMS and user satisfaction. However, the usage of KMSs in Iraqi private universities is still at very precocious stages. It can also deduce that there are several challenges are facing Iraqi private universities regarding the usage of KMSs such as the lack of electrical energy, the qualifications acquired from online learning could hardly be certified via universities, a slow quickness of the Internet network, a lack of knowledge and information stored on the storage area, insufficient functionalities and facilities of ICT, a weakness of accessing the Internet, high-expenses Internet links, and a weak of the university’s culture toward encouraging its staff members to utilize modern technologies for learning. Therefore, it is required to cooperate among policymakers at university, academic and professional staff members, and Internet providers to diagnose these problematics and solve them perfectly. In addition, there is a high need to increase the training regarding using KMSs and increase the dissemination of cognitive culture among the university’s managerial departments. As a result, Iraqi universities through their participants deem these systems as critical keys to educational success. This suggestion could not be accomplished without efforts instigated via top management, academic staff, as well as technical and administrative staff.
APPENDIX 1 - INFORMATION/ KNOWLEDGE QUALITY

In my university:

IKQ1: KMS provides accurate information
IKQ2: KMS provides sufficient information
IKQ3: The knowledge content of KMS fits my needs
IKQ4: The knowledge or information in KMS is always updated
IKQ5: It is easy to document information the right places

System Quality

In my university:

SYQ1: KMS is easy to use
SYQ2: The use of KMS can provide the desired service
SYQ3: Response time for login is satisfactory
SYQ4: KMS has all the features that I need.
SYQ5: KMS is available when I need it.

Service Quality

In my university:

SEQ1: KMS is always ready to help
SEQ2: Transactions within KMS are secure and protect privacy
SEQ3: Top management supports KMS
SEQ4: KMS gives you individual attention
SEQ5: KMS understands your specific needs

KMS Use

In my university:

KU1: I use KMS to assist me make decisions
KU2: I use KMS to assist me record my knowledge
KU3: I use KMS to communicate knowledge with colleagues
KU4: I use KMS to share my general knowledge
KU5: I use KMS to share my specific knowledge

User Satisfaction

In my university:

US1: I am satisfied with KMS
US2: Services of KMS are of high quality
US3: KMS has met your expectations
US4: KMS is useful
US5 KMS improves the quality and efficiency of daily work
The perceived usefulness of KMSs

In my university:
PUK 1: KMS assists me acquire new knowledge and innovative ideas
PUK 2: KMS assists me effectively manage and store knowledge that I need
PUK 3: KMS enables me to accomplish tasks more efficiently
PUK 4: My performance on the job is enhanced by KMS
PUK 5. KMS improves the quality of my work life.
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ENDNOTE

1 To calculate the standard mean: \( \frac{1+2+3+4+5}{5} = 3 \)