Retraction

Retracted: Knowledge Management System Adoption to Improve Decision-Making Process in Higher Learning Institutions in the Developing Countries: A Conceptual Framework

Mathematical Problems in Engineering

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] H. M. Oumran, R. B. Atan, R. N. H. Binti Nor, S. B. Abdullah, and M. Mukred, "Knowledge Management System Adoption to Improve Decision-Making Process in Higher Learning Institutions in the Developing Countries: A Conceptual Framework," *Mathematical Problems in Engineering*, vol. 2021, Article ID 9698773, 15 pages, 2021.

Research Article

Knowledge Management System Adoption to Improve Decision-Making Process in Higher Learning Institutions in the Developing Countries: A Conceptual Framework

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Currently, higher learning institutions (HLIs) are facing their most challenging problem in inefficient information management. The knowledge management system (KMS) application calls for providing several benefits to lecturers and students, producing daily information, documenting records for evidence of a transaction, and eventually improving the decision-making process. Knowledge management can be coupled with fuzzy logic to deal with imprecision and uncertainty of data in a KMS. The ICT dynamic development has shifted the HLI operations from manual to electronic-based handling of related information. KMS is one of the systems that are of significant consideration in this regard. Nevertheless, such a system has not been extensively adopted as expected due to users' rejection of its use. In the present paper, the factors affecting the decision to adopt/reject KMS are highlighted. The study is qualitative and entails a critical review of the related literature concerning the topic, backed by interviews. KMS experts working with highly reputable HLI were interviewed. A total of 11 factors were focused on in light of their effect on the decision to adopt/reject KMS, as argued by the technological adoption theories and literature review. All the factors were validated and placed in ranks by the experts. From the results, a novel conceptual framework of KMS adoption was developed for Libyan HLIs to bring about technology adoption and improved decision-making.

1. Introduction

Many countries have realized the need to adopt an outcome-based approach to provide ongoing educational improvement for increasing unemployed graduates. Higher educational institutions have responded by concentrating on students' sufficient professional and career preparation through the stress on market demands of specific outcomes or abilities. Such outcome-based approaches are directed towards assessing the students' performance and knowledge, mitigating the gap between university learning and practice in their actual careers [1–3].

HLIs in various countries generally acknowledge the value of information in the management and decision-making processes. This has paved the way for further systems development, computer hardware, software, and Internet usage. Furthermore, an information system refers to an organized integration of people, hardware, software, channels of communication, and data resources, functioning in tandem to collect, transform, and spread information in the organization [4]. In this combination, HLIs will find the OBE application and implementation, aided by its evaluation and particular system, invaluable [3]. In the KMS, information is furnished for education institutions to make decisions and assessments and oversee and evaluate educational activities [5].

In the context of educational institutions, adopting KMS can minimize the education demand-supply gap [6, 7], and

such notion has resulted in heightened awareness and investment in KMS innovation in the majority of nations to enhance their system of education [8, 9]. Additionally, KMS adoption that constitutes the education provision has been considered a set of processes to be implemented to enhance the effectiveness of HLI in terms of its performance and objectives achievement. In literature, several barriers to KMS adoption have been evidenced by studies in the context of developing countries, including Garrett [10], Shroff et al. [11], and Alharthi [12] in the Libyan context.

Such studies revealed that the adoption of technology and systems, specifically KMS, is still at the initial stages [9, 12–14]. Most studies of this caliber have stressed three main barrier categories, namely, human-related, organization-related, and technology-related barriers (e.g., [15, 16]). Heeks [17] reported that information systems, combined with technical, social, organizational, and environmental factors, have been successful, although evidence backed by theory regarding adopting KMS at the individual and environmental level is still scarce.

In Arab nations, Gholam and Kobeissi [18] reported the absence of technology implementation for evaluation to support professional development. In this regard, Alfahadi et al. [19] and Alharthi [12] presented a critical look at the implemented evaluation process in Libya that lacks tools and techniques, leading to an ambiguous view of the students' performance. Evaluation procedures in Libyan institutions need reformation for validation, realism, and authentic implementation and use [20].

The stress of the above discussion is the requirement of examining innovation and technology adoption to allow higher education institutions competitiveness and ability to develop into global leaders in the educational platform. Thus, a clearer picture of such adoption is called to extend and promote learning innovations adoption and usage [21].

Moreover, KMS use and adoption in educational institutions for their improvement are part of the advancement of technology. Research studies of this caliber have highlighted KMSs as a crucial tool in assessing the process of evaluation (e.g., Bartlett [22]).

This manuscript is structured to include KMS and the decision-making process in Section 2 after the introduction. Section 3 presents related works on KMS adoption, and Section 4 provides the methodology. Discussion and interpretations of the finding are presented in Section 5, and Section 6 is dedicated for the conclusion.

2. Knowledge Management Systems and Decision-Making Process

Information system (IS) refers to integrating a group of components used to gather, store, and process data to distribute the information and knowledge obtained [23]. It refers to a combination of hardware, software, and telecommunication networks built to collect, create, and distribute required data, generally in organizations. On the other hand, KMS consists of a class of information systems employed to manage the organization's knowledge [24]. KMS is a category of IS used in organizations to manage knowledge with the help of IT-based systems, created to provide support and improvement to the processes involving the creation, storage, retrieval, transfer, conversion, protection, and application of knowledge [25, 26].

KMS refers to an IT-based system developed to provide support and enhancement to the processes of organizations relating to the creation, storage, transfer, and application of knowledge [24]. It was similarly described by Alatawi et al. [27] as a system created and designed to provide the knowledge needed for decision-making and tasks undertaking among decision-makers and users [27]. As Alavi and Leidner [24] definition corresponds to the present study's objective of examining the adoption of KMS in Libyan universities, it best describes the university practices, settings, and processes when it comes to KMS adoption. Therefore, their definition is adopted. Initiatives of KMS depend mainly on IT, which enables and supports KM in several ways including knowledge sharing and collaboration in a virtual environment by team members, accessing prior project information, and documenting knowledge sources through online directories and search databases [28, 29].

Related studies in the literature (e.g., [29]) examine the critical success factors (CSFs) following KMS adoption and implementation and their significance to the system. The study found organizational readiness to affect KMS adoption or continued intention towards such adoption significantly. In this regard, potential adopters with high behavioral uncertainty need to ensure consistency between themselves and the process of KMS. The two subgroups in Shrafat's [29] study indicated that expected advantages had significant impacts on the intention towards adoption or continued use of KMS. This is empirical evidence confirming that perceived benefits have a substantial role in adopting and diffusing innovation-related activities. This also ensures that KMS adoption and continued use success boost experimentation and risk-taking. In contrast, organization-environmental interaction requirements can be established via dialogue, interaction, and participative decision-making process. The study findings supported the relationship between organizational readiness and KMS adoption or continued use and intention among potential adopters compared to current ones [29].

Decision-making (DM) is considered one of the top executive roles, and available authentic knowledge sources play a crucial role in DMP. Knowledge sources may take the form of oral, written, or computer-based sources. KMS is created to enable users to access knowledge that is essential in achieving their activities on the job. The premise of using computer-based systems to support DM has existed throughout the years, and the issue of how computer-based systems can be utilized to provide support to DM under the DSS nomenclature can be traced back to the later years of the 1970s [30].

On the whole, organizations have increased their complexity and stressed decentralized DM, which tends to lead to using KMS with DSS to support decision-making success. According to Turban et al. [31], DSS covers a knowledge component that is useful for supporting DMP. Suitable DSS integration with KMS will thus help the

interaction and develop new opportunities to enhance the quality of support provided by the system [32]. Meanwhile, other authors like Martinsons and Davison [33] are convinced that KMS and IS success in providing DMP support is dependent on the way IT applications are enhanced and adapted to match the users' decision styles. Therefore, KMS and IS global implementation should be flexible enough to satisfy various decision styles and fit DMP [31, 34, 35].

In Bolloju et al.'s [32] related study, the authors mentioned the advantages of DSS-KMS integration. They included improving support quality in real-time, adaptive active decision support, supporting acquisition, exploitation, creation, gathering knowledge in organizations, facilitation of patterns/trends discovery in the gathered knowledge, and supporting the development means and tools in the organizational memory.

Along a similar line of study, Turban et al. [31] demonstrated that DSS employment could facilitate several advantages: provision of support in all DMP phases and managerial levels (individuals, groups, and organization), improvement of DM effectiveness, mitigation of the requirement for training, enhancement of management control, facilitation of communication, saving effort of the user, ease of costs, and enabling DM objectives.

In addition to the above advantages, DSS can also be utilized by management, analysts, and even intermediaries. Bals et al. [36] emphasize technology as a tool that decision-makers and users can use to leverage their knowledge to achieve the work at hand. Nevertheless, most organizations administering KMS initiatives display various success levels. Thus, the perception of decision-makers and users of technology and their interaction play a key role in KMS and DM initiatives' success.

However, decision-making can be defined as evaluating, assessing, and developing human performance in an organization (HLI as an example). Performance evaluation at educational institutions or organizations has been the subject of several studies in the literature. As a result, performance evaluation is critical in both research and instruction. At educational institutions, performance evaluations are commonly undertaken regularly. Universities and research organizations frequently use the outcomes of evaluations in making decisions such as promoting lecturers or funding research. Without reliable performance evaluation tools, good performers may not receive enough positive feedback, feel upset, and depart, resulting in high recruitment expenses for the firm [37].

The input data for a performance can be from multiple periods. Hence, a dynamic decision-making procedure that uses fuzzy logic is required [38]. In such a method, alternative and importance weights of criteria are represented as triangular fuzzy integers in time sequence [39]. Fuzziness is typical in challenges on decision-making as well as fuzzy logic's advantages. Fuzzy decision-making occurs when single or several criteria are used to discover the ideal option [40].

In this context, Tong et al. [41] presented a method for comparison that is notably ambiguous. Using the fuzzy extent analysis method (F-EAM), the relative weight of each parameter was measured.

The steps of the fuzzy extended analysis included in their study are as follows:

Let $Z = \{Z1, Z2, \ldots, Zn\}$ be an object set

let $V = \{V1, V2, \ldots, Vn\}$ be an object set

Following this, the value calculation results for each ith object in each stage are obtained and shown in the following form:

$$M_i^j, \tag{1}$$

where $i = 1, 2, \ldots, n; j = 1, 2, \ldots, m$.

Step 1. Utilize values of fuzzy extended analysis synthesis to acquire priority weights:

$$si = \sum_{i=1}^{m} a, \sum_{i=1}^{m} b, \sum_{i=1}^{m} c \otimes \left\{ \frac{1}{\sum_{1=1}^{m} a}, \frac{1}{\sum_{1=1}^{m} b}, \frac{1}{\sum_{1=1}^{m} c}. \right. \tag{2}$$

Step 2. The following is the expression for comparing degrees of possibility by the degree of probability of $N_2 \geq N_1$:

$V(N_2 \geq N_1)$

$$a \begin{cases} 0, & \text{if } b_2 \leq b_1, \\ 1, & \text{if } b_1 \geq c_1, \qquad \text{otherwise.} \\ \dfrac{a1 - c1}{(b2 - c2) - (b1 - c1)}, \end{cases} \tag{3}$$

Step 3. Assume that you want to obtain the weight vector $d'(B_i) = \min V(T_i \geq T_k)$ for $k = 1, 2, \ldots, n, k \neq i$; then, the weight vector is defined as follows: $W'(d'(B_1), d'(B_2), \ldots, d'(B_n))^T$, where $B_i (i = 1, 2, \ldots, n)$ are n elements.

Step 4. Calculate the vector of normalized weights: $W(d(B_1), d(B_2), \ldots, d(B_n))^T$.

Step 5. After determining the component weights, the components are ranked.

3. Related Works in Knowledge Management System Adoption

Following the adoption of new technology and becoming a trend in organizations, even individuals new to the technology will adopt it for their survival and competitiveness. In other words, adoption is a crucial premise when it comes to technology. According to Shih et al. [42], adoption is a technology diffusion step involving the inclination of the organization and the individual to select and use the technology.

In Arpaci's study [43], the primary objective was to examine the antecedents and outcomes of cloud computing adoption in education to achieve knowledge management.

The study focused on implementing cloud computing in an actual learning environment to support KM practices and provide training and education to participants. Their research focused on the causal relationship between the KM practices expectations and the perceived usefulness of cloud computing services. Based on the obtained results, there is a significant relationship between the perceived usefulness and the creation/discovery, storage, and sharing knowledge expectations. Among them, knowledge storage and sharing expectations have stronger relationships with perceived usefulness. In addition, innovativeness and training and education were significantly related to the promotion of cloud computing adoption in education by enhancing KM practices awareness.

Furthermore, Al-Rahmi et al. [44] proposed a model for measuring sustainability in the education sector and included big data adoption and knowledge management sharing as variables. Based on their findings, behavioral intention to use big data supported big data adoption sustainability in education, and knowledge management influenced the intention to use big data and educational sustainability. Their study used UTAUT and knowledge management sharing factors to examine behavioral intention towards big data use and adoption for sustainable education. The study contributed to the literature on big data adoption and knowledge management sharing for sustainable education, proposing combining knowledge management sharing and UTAUT model to obtain the overall results.

Along with the same study caliber, Tsai and Hung [45] employed empirical methods to examine KMS adoption determinants based on a national survey. They found KMS adoption to be influenced by the organization's characteristics, enablers of KM, and attributes of KMS. According to them, KMS adoption is rife with complexity as it is highly dependent on KM enablers and characteristics of the organization instead of just system characteristics. Their findings had several implications for theory and practice, with the conclusions supporting a majority of the proposed hypotheses. Overall, the KMS adoption determinants can be considered through the characteristics of the organization, the KM enablers, and the characteristics of KMS.

In a related empirical study, Shrafat [29] examined the differential impact of three contextual variables, organizational readiness, expected benefits, and organizational learning capability, on KMS adoption or decisions for continued use. The author gathered data from 220 senior executives working in major Taiwanese firms and tested various relationships in the research model through PLS analysis. Based on the results, organizational readiness expected benefits and organizational learning capability significantly influence KMS adoption and intention towards continued use. Their study also supported the organizational readiness-KMS adoption or intention towards continued use relationship, which was more significant for potential adopters than for current ones. In theory, the study contributed a model that successfully explained the KMS adoption or inclination towards continued use determinants in light of potential and current adopters. Based on the

managerial viewpoint, the findings obtained establish guidelines for companies willing to adopt KMS by overcoming possible barriers and leveraging the most benefits in the preadoption and postadoption phases. The potential for KMS adoption has been focused on by SMEs, but limited studies dedicated to the little topic information are known [5, 29]. Hence, the present study contributes to explaining and clarifying the factors driving the adoption of KMS among SMEs.

In the same line of study, Rohendi [26] revealed that KMS enables the organization and documentation of the institution's knowledge. The study developed a prototype of KMS to organize and document knowledge in universities and carry out document aggregation based on a total number of subjects and writers. The prototype was developed using SharePoint to collect, store, and publish digital data at the university to make them accessible online. Aggregation is a process that uses the percentage of the number of documents, subjects, and writers. The result of such aggregation among the number of digital files was compared to the number of courses and lecturers, which equated to below 10% each. The university was recommended to boost lecturers to increase the gathering of digital files that could indirectly enhance the quality of educational services. The author highlighted the need to examine and determine various factors to contribute to the enlightenment of the field.

In Nigeria, Salami and Suhaimi [5] focused on the factors relating to KMS adoption among academicians, using an explanatory quantitative survey approach. According to the obtained findings, individual and management support factors have a crucial role in KMS adoption in Nigeria compared to organizational and technological factors. The study results can assist future studies in verifying and exploring these factors, particularly management support and individual factors. The study focused on structure, government support, culture, and organizational infrastructure from the organizational factors. The individual factors, knowledge, personal innovativeness, experience, and attitude were included, and management support, training, management initiatives, and management were included. Lastly, their study focused on trialability, compatibility, visibility, and complexity for the technological factors.

In Libya, Alhaj [46] investigated the effects of organizational factors on innovation among oil firms (public and private) while determining the role of social capital and knowledge sharing using the integrative and comprehensive conceptual model. The focus was on the direct and indirect effects of organizational factors on innovation, using a sample of 418 employees from the public and private oil sectors. Data were analyzed using PLS-SEM, and the author recommended that future authors add factors that could have a mediating role in the effect of organizational factors on innovation. A longitudinal study could improve the information on indirect effects accuracy and evaluate its effectiveness due to the long-term outcomes related to such factors.

Concerning the above studies, Haque et al. [47] looked into the factors influencing knowledge management and

knowledge sharing and their potential benefits to the decision-making process and the overall performance. Their study primarily aimed to examine antecedents of academics' knowledge management and knowledge sharing intention among universities. Further studies were recommended to validate and generalize the findings using a greater sample size in the cross-national university contexts.

Meanwhile, Alshahrani's study [48] aimed to determine the critical success factors (CSFs) for effective knowledge management in universities, using Nonaka's model and comparing the Western Sydney University (WSU) in Australia and King Fahd Security College (KFSC). The authors extended Nonaka et al. [49] study to include CSFs in proper KM implementation. Such extension provided a significant practical and theoretical foundation for the examination of KM among universities. In addition, the authors conducted a comparison of the two universities' implementation, excluding other factors that may contribute to KM implementation success. The study found knowledge production and distribution in universities of both countries not to be an explicit activity and one that is not limited within one static framework in that it has a contextual and dynamic nature. Added to the prior highlighted CSFs of KM, other major factors were also proved to affect four knowledge conversion modes. Those elements, involving several rational, cognitive, and intuitive processes and practices, have several characteristics and dynamics mutually facilitating knowledge generation and distribution. According to the findings obtained, effective KM practices and initiatives implementation in both countries originate from the complexity of factors and behaviors linked to the knowledge environment. There were 14 internal and six external factors that substantially contributed to Nonaka's knowledge conversion model (i.e., socialization, externalization, combination, and internalization) to manage KM properly. His study's internal factors included leadership, organizational structure, organizational rules, responsibilities of the employees, information technology infrastructure, training, teamwork, and measurement.

4. Methodology

The study methodology comprises four stages (see Figure 1) which are conducting a thorough literature review and identifying the critical factors, consulting the experts' information on the KMS factors, and stressing the most significant of them, which are used to develop the study framework.

In the method, the researchers conducted a literature review. It determined the critical variables to assess behavioral intention towards KMS adoption among the HLIs in Libya, following which the field experts reviewed the factors. The following are the details of all the steps in the methodology.

4.1. Factor Extraction through Literature Review. In this paper, literature was analyzed using KMS adoption factors, factors for technology adoption in education, and KMS and
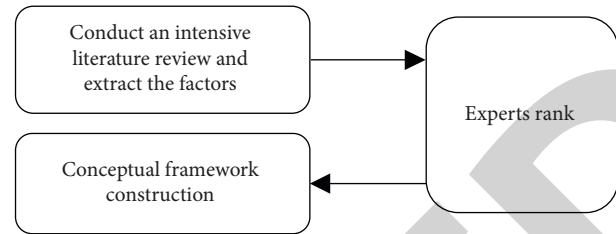

Figure 1: The methodology of the study as adopted from Mukred et al. [50].

education decision-making. A review of relevant studies regarding KMS was conducted to determine the relevant factors highlighted by the authors. The factors were then classified into dimensions and provided to the experts for perusal and review.

The authors selected the libraries and the main keywords related to KMS adoption, so that the searched words and terms remained in the research range. The keywords included KMS adoption, KMS factors, KMS frameworks, KMS adoption, decision-making, and KMS education. The sources provided information based on the keywords typed in, and thus the information was utilized to develop a pathway for developing and validating the keywords themselves. Different publishers were included in this stage.

Moreover, KMS-dedicated studies that were reviewed to determine the general factors used by the authors unearthed 65 factors. Table 1 lists the highlighted factors from which the determination of the top mentioned factors in literature can be discerned.

Frequency refers to the number of citations for each of the extracted factors mentioned in the previous works of literature, and it does not reflect the typical and common characteristics of factors [51].

Though a total of 65 factors were identified, the study was limited to the top-cited factors (24 factors) concerning KMS and technology adoption, specifically in the educational field. Table 2 shows the most cited factors that were extracted from the literature review.

Only 24 factors out of the 65 extracted factors were the most cited ones. The rest of the factors were only cited a few times in literature and, therefore, were not included in the final list of frequencies. The present study defined KMS from technical and nontechnical perspectives. It adopted a categorization type that has its basis on TOE theory, which covers technological, organizational, and environmental factors.

4.2. Experts Consultation and Factors Ranking. As the list of 24 most cited factors that affect KMS adoption was forwarded to the experts (lecturers who use KMS and are familiar with it), interviews were conducted with them to gain their perception of KMS of education. Along with the interviews, the experts also answered different questions in a questionnaire regarding the items of each factor. A total of 10 factors were identified to be the top essential factors regarding behavioral intention towards KMS use and eventually its actual use. Recommendations provided by

Table 1: Extracted factors from the literature review.

Dimension	Factors	No. of factors
Individual	Attitude, gender, education, age, experience, training, subjective norm, self-efficacy, satisfaction, motivation, personal normative belief	12
Technological	Reliability, perceived performance expectancy, service quality, perceived effort expectancy, features used, system quality, perceived ease of use, IT infrastructure, perceived usefulness, self-identity, trust, compatibility, privacy, efficiency, interactivity, information quality, usability, efficiency	18
Organizational	Training, motivation, policy, social influence, perceived financial support, change management, information need, competition, top management support, facilitating conditions, effective communication, organization readiness, standardization, outsourcing	14
Environmental	Clear vision and planning, big data analytics, laws and legislations, cloud computing, policy, competitiveness pressure, security concerns, safety	8
Behavioral intention	Intention to use, intention to adopt, habit, user expectations, extrinsic motivation	5
Use	User satisfaction, decision-making, organizational competency, user involvement, perceived benefits, overall satisfaction, performance, output quality	8
Total		65

Table 2: Frequency of the extracted factors.

No.	Factor	Total
1	Top management support	33
2	Big data	25
3	Perceived usefulness	30
4	Competitive pressure	28
5	Effective communication	28
6	Clear vision and planning	27
7	Training	27
8	Gender	25
9	Change management	25
10	User involvement	25
11	Government role	24
12	Cloud computing	24
13	Social influence	23
14	Perceived effort expectancy	23
15	Usability	23
16	System quality	20
17	Policy	19
18	Service quality	17
19	Perceived performance expectancy	17
20	Financial support	17
21	Information quality	16
22	Intention to adopt	15
23	Teamwork and composition	14
24	Decision-making	13

Table 3: Experts' profiles.

	Gender	Specialist areas	Years of experience
E01	Male	Information science	8
E02	Male	Technology adoption and education	12
E03	Female	Technology adoption and education	8
E04	Male	Technology adoption and education	7
E05	Male	Technology adoption and education	10
E06	Male	Computer science	10
E07	Male	Information science	9
E08	Male	Technology adoption and engineering	11
E09	Male	Technology adoption and engineering	14
E10	Male	Technology adoption and engineering	9

Hawking and Sellitto [52] and Ahmad and Pinedo Cuenca [53] were followed when determining the significant factors. Ten experts, who work in higher educational institutions and are familiar with KMS technology adoption, were consulted for their knowledge. The experts are Ph.D. holders working in different affiliations in Libya, Yemen, Malaysia, and Saudi Arabia. The experts' profile is listed in Table 3.

The experts highlighted 12 of the top factors that might influence the behavioral intention towards adopting and using KMS. The experts dissected the factors based on selection criteria and interviews. The aim was to assess the factors that influence KMS adoption.

Based on the literature, 24 factors were confirmed, but 12 factors were dropped as the experts had mixed feedback about them following further validation. The list of factors ranked by the experts is provided in Table 4.

Table 5 shows the final list of factors that were extracted based on the interviewees. The table also shows the source of each factor with the overall percentage after the analysis.

The calculation of the percentage and validity belonging to all questions is done by the following the equation suggested by Mukred et al. [70]:

$$V_{\text{Total}} = \sum_{i=1}^{10} vi * i, \tag{4}$$

where i is the rank given from 1 to 10 and vi is the number of experts for each rank value.

TABLE 4: The experts ranking for the factors and items.

Factor	No.	Questions	1	2	3	4	5	Rank
		How easy is KMS to use?						
	1	KMS is easy to use			5	2	3	76
	2	KMS can be used without referring to a user manual		1	3	2	4	78
Perceived effort expectancy	3	KMS is flexible to interact with			4	2	4	80
	4	It is easy to get information using KMS to do what I want to do		1	3	2	4	78
	5	It is easy to detect and correct errors in student records using KMS		1	1	4	4	82
		How useful is KMS?						
	1	KMS enhances my work effectiveness			3	2	5	84
Perceived performance expectancy	2	KMS increases my productivity in my work			3	1	6	86
	3	KMS enables me to accomplish tasks more quickly			3	1	6	86
	4	KMS makes my work easier			3	2	5	84
	5	KMS gives me greater control over my work			3	1	6	86
		IT infrastructure for adopting KMS:						
	1	It provides remote users with seamless access to centralized data			2	3	5	86
	2	It captures data that is made available to everyone in our organization in real-time			2	3	5	86
IT infrastructure	3	It can easily incorporate software applications and can be used across multiple platforms			3	3	4	82
	4	It provides interfaces that give transparent access to all platforms and applications			3	3	4	82
	5	It offers multiple interfaces or entry points to external users			3	3	4	82
		Training on KMS:						
	1	It should be developed to meet the requirements of users			2	2	6	88
	2	It should have customized materials for each specific job			2	3	5	86
Training	3	It should have materials for the entire business task of the system			2	2	6	88
	4	It should be tracked to ensure that employees have received the appropriate training			2	1	7	90
	5	It should be adequate for all involved staff			3	1	6	86
		Financial support for adopting KMS is important for:						
	1	Purchasing a system			1	4	5	88
	2	Incentive payments			1	4	5	88
Financial support	3	Securing infrastructure and equipment			1	3	6	90
	4	Technical assistance cost			1	4	5	88
	5	Maintenance cost			1	4	5	88
		How ready is your organization to adopt KMS?						
	1	If we have the system to engage in the knowledge management, we will not hesitate		1	1	1	7	88
	2	We feel comfortable (regarding security, privacy, etc.); thus, we will adopt it		1	1	3	5	84
Organization's readiness	3	We are willing to adopt the KMS completely		1	1	1	7	88
	4	We consider it essential to engage in the system		1	1	1	7	88
	5	We consider it essential to improve coordination and collaboration regarding the use of knowledge		1	1	3	5	84
		Change management in KMS adoption:						
	1	It ensures that employees understand how their work fits into the system		1	2	2	5	82
	2	It receives input from employees about how their jobs will change		1	1	3	5	84
Change management	3	It actively works to alleviate employee concerns		1	2	1	6	84
	4	It makes available a support group to answer concerns about job changes		1	1	2	6	86
	5	The roles of all employees are communicated		1	1	2	6	86
		With KMS adoption:						
	1	My job frequently requires me to rely on the KMS	1		1	3	5	82
	2	My everyday work tasks require me to need the support of the KMS frequently	1		2	2	5	80
Competitiveness pressure	3	I frequently have to use the KMS to meet my work obligations	1		2	3	4	78
	4	I am expected to use the KMS all the time to meet my work obligations	1		2	2	5	80
	5	KMS is vital to ensure competitiveness	1		1	1	6	76

Table 4: Continued.

Factor	No.	Questions	1	2	3	4	5	Rank
		The use of big data should have						
Big data analytics	1	Ability to save huge volumes of information				2	3 5	86
	2	Ability to handle real-time data processing				2	3 5	86
	3	Data integration				2	2 6	88
	4	Rapid and interactive analysis				2	3 5	86
	5	Flexibility to consolidate data from various sources into one single place				2	2 6	88
		The cloud feature of KMS:						
Cloud integration	1	It provides a high degree of interconnectivity			1	4	5	88
	2	It is sufficiently flexible to incorporate electronic connections to external parties				2	3 5	86
	3	It is a factor that determines whether or not to choose KMS		1	3	2	4	78
	4	It captures data that is made available to everyone in our organization in real-time				4	1 5	82
	5	It provides remote users with seamless access to centralized data				3	3 4	82
		My intention regarding KMS adoption is:						
Intention to adopt kms	1	Assuming I have the KMS, I intend to adopt it				2	3 5	86
	2	Given that I have the KMS, I predict that I would adopt it				2	2 6	88
	3	In my work, if I have KMS, I want to use it as much as possible				2	3 5	86
	4	I prefer to use electronic records even though I can do my work with other tools				2	3 5	86
	5	KMS is essential to my work, and I need to adopt it				2	2 6	88
		KMS gives decisions that provide the following:						
Decision-making	1	Quality				2	1 7	90
	2	Effectiveness				2	1 7	90
	3	Accuracy				2	1 7	90
	4	Performance				2	1 7	90
	5	Transparency				2	1 7	90
	6	Integrity				2	1 7	90
	7	Accountability				2	1 7	90

4.3. Framework Development. An essential aspect in conducting any study is examining and determining the theories/models underpinning the study topic so that they can be used for guidance in developing a premise of the constructs' relationships during framework development [3]. In a study of KMS adoption, the level of adoption can be enhanced if the determinants of such adoption are determined and examined. Prior literature on the topic has thus proposed several theories and models [71–73] to examine the technology adoption in institutions. The major theories used and reviewed included the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Planned Behavior (TPB), Diffusion of Innovation (DOI) theory, and Technology-Organization-Environment (TOE) framework.

In this study, the KMS framework is developed and proposed by identifying five interrelated variables (technological dimensions, organizational dimensions, environmental dimensions, KMS adoption intention, and educational institutions' decision-making; see Figure 2). The variables are examined and categorized under technology adoption factors in the study framework.

This study reviews the unified theories and models to choose the most appropriate to achieve the study's objectives. Top extensively used models in literature in education included TAM, TOE, UTAUT, and DOI, as Alharbi [71] and Al-Jabri [72] mentioned.

Accordingly, UTAUT was validated in the reviewed literature as a robust model. UTAUT was selected because of its use, suitability, validity, and reliability in examining technology adoption in different contexts [74–77]. The present study used UTAUT to examine the factors that influence KMS adoption consistent with the suggestion by Abdullah et al. in the case of Libyan HLIs. Thus, the main UTAUT features include technological differences, characteristics of the organization, and environmental settings—these are all viewed as determinants of KMS adoption behavior in HLIs in Libya. UTAUT is suitable for the underpinning theory of the present study in light of its objectives and context.

5. Discussion and Interpretation

The interviewed experts agreed that perceived effort expectancy and perceived performance expectancy are significant factors that influence KMS adoption. Regarding the users, the majority of them are inclined to use the system if they are convinced that it can enhance their work quality and is easy to use. Other factors such as financial support and training were also included in the top-listed factors. Furthermore, three experts (E2, E7, and E8) perceived that big data facility and cloud computing ability could potentially influence KMS adoption. In contrast, others proposed financial support for such adoption in the HLI sector of Libya.

In addition, experts E1 and E6 suggested that the environmental dimension factors may also be considered new factors to be included in the conceptual framework based on which successful and timely adoption can occur. Experts E3,

Table 5: List of factors recommended by experts.

No.	Factor		Percentage %
1	Perceived effort expectancy	[54–56]	79.00
2	Perceived performance expectancy	[54–56]	82.2
3	IT infrastructure	[57–59]	83.6
4	Training	[60]	87.6
5	Financial support	[61, 62]	88.4
6	Organization readiness	[63]	86.4
7	Change management	[2, 64]	84.4
8	Competitive pressure	[65–67]	79.2
9	Big data analytics	[59]	86.8
10	Cloud integration	[68]	83.2
11	Behavioral intention (intention to adopt)	[54–56]	86.8
12	Decision-making	[69]	90.00

E4, and E5 also agreed that competitiveness pressure is one of the top influencing factors of KMS adoption in the HLIs of Libya to get expected exceptional outcomes. Thus, this factor was included in the present study. The experts agreed on the importance of perceived effort expectancy, perceived performance expectancy, and IT infrastructure as essential determinants of KMS adoption. Thus, they were included in the study framework. Moreover, E9 and E10 stressed the importance of testing the influence of the identified factors on behavioral intention towards adopting KMS as the role of system adoption in improving decision-making has yet to be confirmed.

The proposed study's conceptual framework is displayed in Figure 2. The framework was developed using ten identified factors validated and ranked by experts in the field, and the factors are arranged based on underlying theories.

The proposed framework was examined in light of the influence of the factors on KMS adoption, and the factors include those adopted from the UTAUT framework (perceived effort expectancy and perceived performance expectancy), which directly determine behavioral intention to adopt KMS. Other factors include IT infrastructure, training, financial support, organization readiness, change management, cloud computing, and big data analytics.

The propositions and description of each factor included in the proposed conceptual framework are detailed in the following sections.

5.1. Technological Variables.

In any sector, technology use provides the potential for enhancing service quality provided and the workforce efficiency and effectiveness and minimizing the organization's costs. Thus, technology adoption is essential in institutions as it has been evidenced and highlighted as a critical issue [78]. Although several studies in the literature revealed that technology adoption positively influences organizations, empirical works presented barriers and challenges to technology adoption in educational institutions. Therefore, it is pertinent to examine factors that influence technology adoption for successful technology implementation and use [69, 79].

In this study, the technology dimension factor refers to the level to which the user believes that using a specific system would enhance his/her job performance [54].

In the line of this study, Ahmed and Ward [80] adopted UTAUT in their measurement of KMS acceptance among academic and professional development department's employees. Based on their findings, perceived performance expectancy has a significant effect on the intention of the users. Meanwhile, performance expectancy and effort expectancy are the two main predictors of behavioral intention towards IS adoption, as evidenced by Venkatesh et al. [81].

In this study, perceived performance expectancy is referred to as the perception of managers and employees of the usefulness of KMS. This variable has been examined in light of the system's ability to enhance productivity, effectiveness, and performance at work. Empirical findings also showed that perceived effort expectancy is a determinant of intention towards system use and adoption [82, 83].

In a similar line of study, Tarcan et al. [84] concentrated on the factors that affect intention to use IT among academicians. They found effort expectancy to be one of the top factors. Elkaseh et al. [85] also found that intention towards IT use and adoption among users is affected by the users' perceptions and beliefs, including effort expectancy and performance expectancy. These are the two significant IS adoption antecedents [74].

IT infrastructure, which is another factor in the technological dimension, is significant [2, 69]. It includes the IT plans, business aims, IT architecture, and IT workforce skills consistency. In this regard, Broadbent and Weill [86] revealed that the capabilities of IT infrastructure enable various applications to reinforce the present and potential organization's objectives and its competitive status in the business market.

Based on the above definition and discussion of IT infrastructure, it is clear that there are two components of the variable: technical IT infrastructure and human IT infrastructure. The first one is made up of data, technology, and application. The second one is made up of knowledge and capabilities for IT resources management [86].

KMS has been studied in several empirical works [5, 26, 27, 29], each with its objectives and conclusions, but the general trend among the studies is that technological factors of perceived performance expectancy, perceived effort expectancy, and IT infrastructure have the potential to influence KMS adoption. Based on the above discussion and the importance of the factors in boosting KMS adoption, this study proposes the following proposition for testing:

(P1) Technological factors have a positive influence on the intention to adopt KMS in HLIs in Libya.

5.2. Organizational Variables.

Generally speaking, the successful adoption of KMS depends on the engagement of the whole organization. Therefore, senior management needs to promote new records management system as part of the change management initiative. In addition, organizational implementation methods of further KMS vary, but the focus should not be on IT alone. According to Binyamin et al. [87],
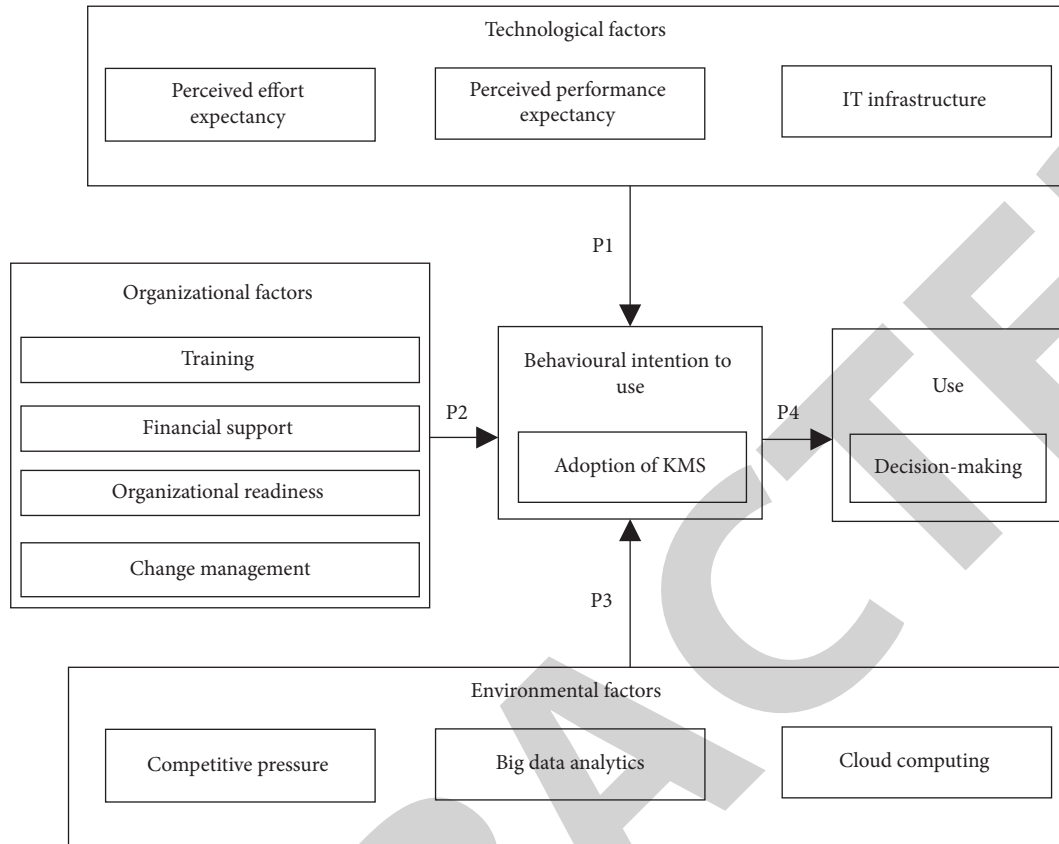
Figure 2: The proposed framework for KMS adoption in HLIs.

organizational factors are as significant as their technological counterparts when it comes to adopting technology in the institutions of higher learning. The authors found that organizational support plays a crucial role in successful IS adoption and use.

In this regard, [3] adopted a mixed explanatory approach to continuously explore the experienced education staff who managed to transition beyond adopting the technology stage in their practices. Based on this study, some factors prevent the adoption of technology in the form of challenges, including learning to use a computer. Technology optimal usage could be enabled by assessing and enhancing the user's computer skills, working towards data entry and system use consistently via training [88].

Staff training ensures that risks that crop up are overcome. Otherwise, such risks could prevent the successful KMS implementation and adoption [89]. Moreover, the lack or absence of training and support could cause a barrier to system adoption among users [90]. Insufficient training could also lead to discomfort at dealing with system and computer, and eventually it may lead to implementation failure [89, 90].

Another organizational factor that has a crucial role in technology adoption is financial support [91]. Technology adoption has become increasingly dependent on financial support, and therefore financial aid has a positive effect on the successful adoption of technology towards enhancing future efforts in information [92]. Thus, in the present study,

financial support is examined in terms of its influence on KMS adoption in educational institutions.

Readiness is another crucial factor for KMS adoption. It refers to the level of inclination of a country to be a part of the networked global village by evaluating its development in different aspects of ICT adoption [50]. Readiness is described as the capacity to meet the organization's required institutional, legal framework and ICT infrastructure. Additionally, according to Griffiths et al. [93], readiness is one of the factors with which progress is measured in contrast to the overall ability of organizations to adopt or use the systems. It is therefore a vital driver for assessing the behavioral intention to adopt the KMS among HLIs.

On top of that, researchers commonly acknowledged change management as a necessary factor, and in the case of KMS application, the organization is faced with several changes. In this situation, change management is a method/strategy adopted for the proper management of the transition from traditional frameworks to newer ones. Thus, in using the KMS aspect, the organization and the employees need to be ready for any eventual change that needs to happen. This is particularly true when it comes to the need of the organization to develop such management as early as possible to tackle issues (e.g., employee resistance, redundancies and confusion, and the errors that crop up during the implementation of the framework [79, 94]).

In the same line of argument, administrators may be the basis of change management initiatives but not IT initiatives

[95]. In addition, in cases where individuals are work involved, they acquire a more extensive view of the advantages, leading to more acceptance of the novel technology framework [2].

As a whole, factors related to the organization were the most often cited reasons for the limited KMS usage. These factors include organization readiness, financial support, training, and change management. Thus, this study proposes the following proposition:

(P2) Organizational factors have a positive influence on the adoption of KMS in HLIs in Libya.

5.3. Environmental Factors. Prior literature dedicated to KMS adoption mainly studied organizational and technological factors and human and individual factors [5]. In the field of education, KMS adoption should also focus on the environmental dimension. Thus, the present study considers such dimensions and factors: competitive pressure, big data analytics, and cloud computing.

To this end, competitive pressure is a significant factor under the environmental dimension at the local and global levels. This pressure forces the organization to search for ways to enhance its efficiency and effectiveness through technology adoption [96]. Both dynamic competition and digital technology advancement have left governments worldwide wide open to leveraging new methods for developmental progress. Awareness of such technology adoption has resulted in the transition of government services from outdated approaches to e-methods in the current decade [97].

Other environmental factors that influence KMS adoption are cloud computing and big data analytics, as mentioned and illustrated by Mohamad et al. [98], Medvedeva et al. [99], and Dening et al. [100]. Prior studies also indicated that the used software and hardware when implementing KMS are among the factors. This issue has more to do with developing KMS software with a user interface that could be customized for cloud computing capability. Cloud computing is an alternative solution to help keep data and help HLIs use KMS at any time. In other words, an effective KMS system should be compatible with any platform and database and maintenance-friendly. This is because an inefficient hanging system could minimize users as they refuse to waste their time and effort to achieve their goals. As a result, it is critical to select an appropriate and efficient technology compatible with the application and hardware to facilitate the institution's implementation [101, 102].

In sum, environmental factors are crucial for successful KMS adoption [103]. Based on the above discussion, this study proposes the following proposition for testing:

P3. Environmental factors have a positive influence on the adoption of KMS in HLIs in Libya.

5.4. Intention to Adopt KMS Factors. Behavioral intention indicates the readiness of the individual to perform a specific behavior, and it is proposed to be an antecedent of behavior [104]. In the present study, intention is defined as the willingness of the individual to try or the effort they are willing to exert to perform a future behavior.

According to Venkatesh et al. [81], behavioral intention towards technology is the primary determinant of actual behavior. The three factors predicting intention to use are attitude, subjective norms, and perceived behavioral control.

In the same study, Ahmed and Ward [105] compared competing technology acceptance frameworks to examine personal, academic, and professional portfolio acceptance behavior. The authors revealed a positive direct effect of perceived ease of use on perceived usefulness. Furthermore, perceived ease of use was found to have an immediate positive impact on intention.

Overall, the identification of content and context dimensions offers a suitable method to shed light on the current adoption state of KMS in educational institutions and the barriers that prevent such adoption [43, 106].

Therefore, there is a need to examine intention to adopt based on technological, organizational, and environmental factors in KMS adoption. This study thus proposes the following proposition for testing:

P4. Behavioral intention to adopt KMS has a significant relationship with the decision-making process in HLIs in Libya.

6. Conclusion

In the present work, the lack of studies dedicated to examining KMS adoption and its key role in supporting and enhancing the performance of educational institutions by improving the decision-making process is highlighted. The study also highlighted the limitations of the existing studies when it comes to such examination, and thus it developed and proposed a conceptual framework. KMS adoption in HLIs requires a robust framework. Accordingly, the present work reviewed the literature concerning KMS use, adoption, and implementation and the factors included in the study framework. The study conducted a thorough review of KMS factors' literature, extracted them, and forwarded them to experts for validation. The factors were categorized into three dimensions: technological, organizational, and environmental dimensions. The panel of experts perused the factors and recognized the significance of KMS initiatives in educational institutions. Based on the highlighted factors, the study developed a conceptual framework that is appropriate to examine the factors influencing the adoption of KMS in educational institutions. However, the framework was based on the reviewed literature, which had its limitations. According to the confirmation of experts, ten factors were found to influence the adoption of KMS in the Libyan HLIs, with two adopted from UTAUT and eight adopted from a literature review. The examined factors included perceived effort expectancy, perceived performance expectancy, IT infrastructure, training, financial support, organization readiness, change management, competitiveness pressure, cloud computing, and big data analytics—all these factors were tested for their significant influence on KMS adoption in HLIs in Libya. The study revealed the role of KMS in enhancing the decision-making process. The present

study contributes to the literature by identifying the factors influencing behavioral intention to adopt and use KMS. Moreover, it contributes to practice by directing limited management resources to the significant areas that would make successful and smooth system adoption.

Data Availability

The qualitative data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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