Critical Success Factors of Knowledge Management in Higher Education Institution

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Abstract—**Knowledge Management (KM) has become an integral factor for many organizations to achieve their goals. Currently, Higher Education Institutions (HEI), have also joined the practices of KM, to enhance the institution's quality, boosting the effectiveness, developing human resource, and constructing the knowledge culture within the institution. The aim of this study is to observe the constructed Critical Success Factor (CSF) model affecting the implementation of KM. This study follows Kitchenham's Systematic Literature Review (SLR) procedures from 15 eligible journal articles obtained through KM related literature. The results, analysis, and discussions are elaborated in the paper.**

Index Terms—**critical success factor, higher education institution, knowledge management, systematic literature review**

I. INTRODUCTION

The rapid advancement in Information Technology has improved human knowledge, particularly in developing knowledge through creation, retain, and distribution of information, thereby humans would become better informed. Humans could easily absorb information that they needed, as it all occurs because of the Knowledge Management process formed by several interest institutions. In the present time, humans have realized that Knowledge Management has become an important part for businesses and corporations to accomplish their strategic goals, and thus gaining the competitive advantages over its competitors. Meanwhile, within the Higher Education Institution (HEI) context, some Universities have also begun to implement the Knowledge Management practices for the purpose of fulfilling their institution's business objectives [1].

Knowledge Management (KM) refers to a process to gather, select, access, distribute, and applying the knowledge gathered from the external and internal data sources for the purpose of fulfilling organization objectives [2] [3] In an institution, KM aims to enhance quality and effectiveness, human resource development, and to develop a knowledge base organization to improve investment of knowledge

within the organization [4]. However, it is important to note that the majority of KM project has failed to deliver at the beginning of its stage [5]. Therefore, it is essential to determine the critical success factor of KM in HEI, is so doing such identified factors would be able to increase the chance of successful implementation, as well as to reduce the impact of loss that might occur.

II. LITERATURE REVIEW

A. Knowledge Management Life Cycle

The KM Process consists of steps that should be taken by an organization to gain the purpose of KM practices. Figure 1 below shows the KM process called KM life cycle, as follows: The phase is summarized into KM Life Cycle, as follows [6] [7]:
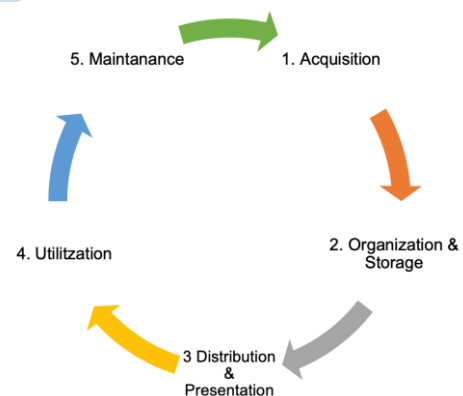

Fig. 1. Knowledge management life cycle

A.1 Acquisition

Phase to collect the data related to the knowledge needed by the institution. The source of data could come in various ways such as relationship, meetings, corporation, communication, forums, surveys, training, regular activities, etc.

A.2 Organization and Storage

Phase to organize and store the data gathered from the data acquisition steps. The data collected is

selected and trimmed before being processed and stored to assist the decision support system.

A.3 Distribution and Presentation

The phase of distribution of knowledge to the related users that would be benefitted with the knowledge product. The knowledge has differed for each group of users depending on their role and level in the knowledge strategy.

A.4 Utilization

The phase of using the knowledge from the distribution phase into a real-life situation. Such as the gained knowledge is used to increase efficiency and enhance the educational knowledge into the environment, it allows the user to respond quickly to a problem and positively to any concern raised in several situations.

A.5 Maintenance

This phase is to maintain and enhance the related Knowledge gained before, by reviewing the previous knowledge to review and improve the cycle of KM Strategy.

B. Knowledge Management in Higher Education

There are no fundamental differences of KM in HEI with the KM incorporate in terms of steps and requirements, there are only a few adjustments that should be made to compensate with the education industry [8] [9]. However, it is difficult for an institution to implement the KM principle immediately as there are some doubts and consideration to the benefits and drawbacks of implementing new concepts within the organization. The Paper of "Applying Corporate Knowledge Management Practices in Higher Education" suggested a few steps to plan and integrate the KM principles in the education industry context [1] namely:

- Strategy, determine the purpose of implementing Knowledge Management.

- Infrastructure Institution, all department from Human Resource, financial measurement of success, and information system should be able to support KM.

- Seek a high level of experienced and dedicated people to be the initiator and executor of KM.

- Choosing pilot project KM with high impact and low risk in mind.

- Compile a complete action plan to execute the pilot project, complete with process and role of the project team.

- After finished, access the results and enhance its action plan.

C. Implementation of Knowledge Management in Higher Education

There are a few factors that should be considered as a hindrance to implementing KM in HEI, those difficulties are [9] [10]:

- Characteristic and Infrastructure of Education Industry. The availability of infrastructure that includes technology and information system available in the institution proved to be significant to acquire and process the data.

- Culture of Education industry that consists of several subcultures, such as academic culture, administrative culture, and other subculture available within each function or faculties. Therefore, the benefit of KM principles should be understood completely within the organization for each function to implement those in the best possible way.

- Management Structure, several management structures have their own benefits whenever they decided to implement a new policy. In Education industry, which usually decentralized management, it is more straightforward if all management officials within each department are committed to implementing KM.

D. Critical Success Factor for Higher Education Institution

Processes that are related and have an important factor in developing a better educational system, which usually consists of admission, curriculum establishment, teaching and learning activity. Examination, alumni relation, strategic planning, etc [11]. The overall process identified above summarized into several activities that have a role as the Critical Success Factor Indicator for Education Institution to measure KM, for instance [12]:

- Intellectual Accomplishments

  Intellectual Accomplishment designates to an educational institution in terms of its intellectual and intellectual development, such as scientific paper, intellectual copyright, teaching materials establishment, consultation, industry-ready, preparing the student for higher education, etc. this measurement is possible by investing in the technology and infrastructure to enable data acquisition.

- In-House Process

  In house process designate to other operational support processes within the institution, such as admission, curriculum development, teaching and learning activity, etc. KM enforces and reevaluates each

process within the institution to ensure each step is value-added and eliminate the non-value-added process to enhance effectiveness and efficiency.

- Stakeholders (Culture and Commitment)

Stakeholders within the education institution are every user that influenced the aim, action, and policy of the university, such as staffs, teachers, students, parents, industry, and environment. The Stakeholder's involvement in this area consists of its shared commitment within the organization, which comes from both the management and other parties involved.

- Cerebral Development and Augmentation

Cerebral Development and Augmentation is the activity that has a purpose to develop the internal institution, such as the chance to develop within the organization and the infrastructure support for research purpose. The purpose activity can be obtained by accommodating potential people to develop by their gained experience and continuous learning within the institutional context.

III. RESEARCH METHODOLOGY

This study uses the literature review method as proposed by Kitchenham. According to Kitchenham [13], a systematic literature review is a process for identifying, evaluating, and interpreting research sources that are related systematically [14]. This research uses stages in a systematic literature review, namely planning, implementation, and reporting. The detailed of each stage can be seen in Figure 2 below.
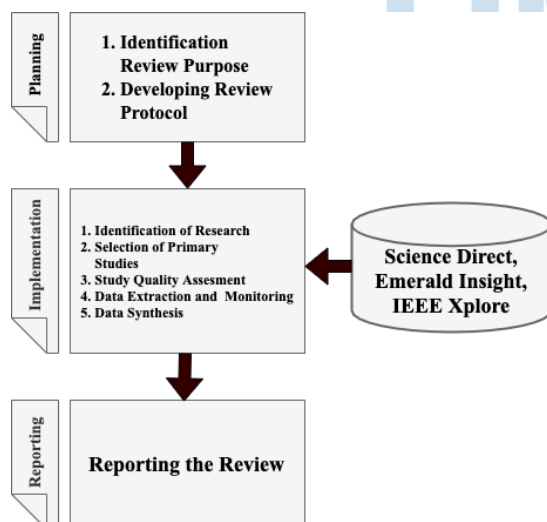

Fig. 2. Research methodology

A. Planning

The planning phase consists of two parts: identifying the purpose of conducting an SLR and developing a review protocol [14]. This study aims to identify the factors that support the successful implementation of KM to have an impact on higher education. The criteria for research questions are using Population, Intervention, Comparison, Results and Context (PICOC) which can be seen in Table 1.

TABLE I. RESEARCH QUESTIONS CRITERIA

Criteria	Description
Population	University, Higher Education, Education
Intervention	Factor, Critical Success Factor, Knowledge Management, Impact, Evaluation
Comparison	N/A
Outcomes	Factor, Impact, Future, State of the Art
Context	Critical Success Factor, Knowledge Management

The criteria in Table 1 will then be used to develop research questions in Table 2.

TABLE II. RESEARCH QUESTIONS MOTIVATION

Research Question	Motivation
What is the critical success factor for implementation of Knowledge Management in higher education?	To know and review the state-of-the-art and future direction of critical success factor Knowledge Management in higher education.

B. Implementation

In the implementation phase, the selection of research was studied from well-known journal publishers or databases such as Science Direct, Emerald Insight, and IEEE Xplore. Studies that have been found in the database of selected journals gained through several criteria based on Table 3.

TABLE III. CRITERIA SELECTION PROCESS

Criteria	Type
Paper has the related keywords to KM and higher education.	Inclusion
Paper can answer the research question and add supplementary information.	Inclusion
Remove the same studies	Exclusion

This study was using Mendeley software to manage the identification and selection process. Keywords to search for relevant literature are arranged using Boolean sentences such as (factors OR critical success factors) AND (Knowledge Management) AND (higher education OR education OR university). The paper used for SLR is a paper in the range of 2009-2018. Boolean search stages find 535.039 sources. The results of selecting each stage can be seen in Table 4.

TABLE IV. LITERATURE IN THE SELECTION PROCESS

Digital Library	Discover	Selected
Science Direct	532.147	10
Emerald Insight	430	1
IEEE Xplore	2.462	4
Total	535.039	15

C. Reporting

At the reporting stage, the main objective is to extract data and synthesize Information retrieval in accordance with the research question which is the data extraction process. Data extraction from each paper was documented through template format. Furthermore, data from the previous studies were summarized and concluded.

IV. RESULT AND ANALYSIS

In this section, the results and analysis of the systematic literature review will be further elaborated.

A. The State of the Art of Knowledge Management in Higher Education

Tables in **appendix** summarized the journal articles used as the reference for this current study to identify the Critical Success Factor (CSF) for KM practices in the HEI. The 15 article references were used to construct the CSF for several relatable institutions that can be applied to the study, by reviewing the finding of the previous study that consists of the framework used, CSF dimension, and CSF description. To facilitate this systematic literature study, we synthesize the CSF model by simplifying the dimensions into five dimensions as shown in table 5, namely: Stakeholders' culture, stakeholders' commitment, in house processes, intellectual and technological accomplishment, and cerebral development and augmentation.

TABLE V. MODEL OF CSF KM WITH FIVE DIMENSIONS

No	Dimension	Description	Reference	
1	Stakeholders Culture	High commitment from management to deploy knowledge sharing culture	[7] [15] [17] [19]	[10] [16] [18]
2	Stakeholders Commitment	People involved are committed and trained to use Knowledge Management	[8] [11] [18] [20]	[10] [16] [19] [21]
3	In House Processes	Re-evaluate process to ensure each step are value-added	[7] [11]	[9] [17]
4	Intellectual and Technological Accomplishment	Invest in Technology to capture information before being processed into Knowledge	[9] [17] [19] [22]	[10] [18] [21]
5	Cerebral Development and Augmentation	Continuous learning and applying gained experience through daily process routine	[1] [17] [23]	[9] [19]

A. Stakeholders Culture

The First CSF is the stakeholder culture which described as the commitment started from the top, which is the motivational push of knowledge sharing culture to realize the benefit of it, proved to have a significant impact to the successful implementation of KM project.

B. Stakeholders Commitment

The Second CSF is Stakeholders commitment which is all the party involved in the Knowledge Management in Higher Education Institution which includes students, parents, staffs, and teachers; which has been coached and committed to comprehending that knowledge management provides crucial benefits for them in the education industry.

C. In House Processes

The Third CSF is the In-house process, which is all the step by step procedure that happens within the daily routine of the organization. The process should be reviewed and measured to ensure that each of them provides a value-added process and remove the unnecessary non-value-added process to enhance effectiveness.

D. Intellectual and Technological Accomplishment

The Fourth CSF is the Intellectual Accomplishment which could be supported by the willingness of the institution to invest on technology that acts as an enabler or infrastructure, to ensure that they collect the right data and information to be used as the Knowledge that would benefit them in the future.

E. Cerebral Development and Augmentation

The Fifth CSF is the Cerebral Development and Augmentation, which is the continuous learning of the users in the organization while also applying the gained experience to meaningful knowledge. This embraces the chance given by the institution to employ them in their daily routine.

The Five CSF are gained based on reference that collected from ScienceDirect, ResearchGate, and IEEE, the five of them has enough references that support the idea and each of the studies revealed that CSF has an integral impact to the successful implementation of Knowledge Management, therefore by focusing on the CSF while generating the KM Strategy would improve the chance of success and effectiveness of KM Implementation. Figure 3 below is the summary of the synthesis of the literature review described as the classification dimensions of CSFs of KM in HEI.
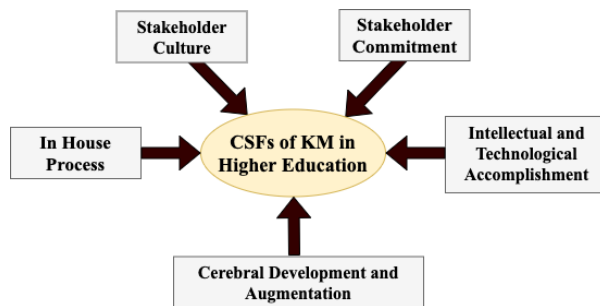
Fig. 3. CSFs model of KM implementation in HEI

B. *Future Direction of Knowledge Management in Higher Education Institution*

For further improvement, KM in HEI should focus on Content Management for better-perceived knowledge, as usually unstructured information gathered is difficult to absorb by the audience if the presentation is not adequate. Therefore, as an educational institution, the university should take attention in knowing their audience and what is best for their interest for better knowledge absorption. The Information gathered during KM phase should be better represented towards the audience to ensure the information is well received and used for the benefits of all parties. The content management includes Enterprise Resource Planning, Customer Relationship Manager, and Human Resource Management application [24].

KM should also consider Big Data, by implementing a data mining process that comprises of structured data and unstructured data. Big data has proven to be very relevant in KM area as it helps with the creation of new knowledge, managing knowledge in the organization, and improve planning of future projects [25]. The abundance of data and information through Big Data must be used in the best way possible to enhance the effectiveness of KM implementation in HEI, for instance, trends in university studies major, effective learning environment for the millennial generation, and how to attract today generation into enrolling universities. Such knowledge is necessary for private higher education institution as they need to compete with other universities.

V. CONCLUSION

This study mainly contributes to the development of KM in HEI, in hopes that KM will be used in a broader way throughout education institution. In order to gain a high chance of successful implementation of KM, focusing on Critical Success Factor identified in this research is required during the strategy formulation which includes stakeholder culture, stakeholder commitment, in house processes, intellectual accomplishment, and central development and augmentation extensively. Indeed, the critical success factor mentioned requiring the commitment from top management to implementing knowledge

sharing culture throughout the institution, the development and training of people involved in KM, process re-evaluation, technology investment, as well as the opportunity to develop and applying knowledge gained.

The rewards of implementing KM principles has proven to exceed the investment required, as more industries over several decades have already implementing KM to improve and compete within the industry. HEI of course should also compel to do the same, as principally they are no different from other corporate institution in terms of their common goal, which is to fulfill their customer/stakeholder satisfaction. This research can become a foundation for further research to make success Knowledge Management System for HEI. KMS in HEI is a new way of managing knowledge to give valuable information for the improvement of HEI quality [8]. Analyze the implementation of KM benefit also can become further research to management to enhance the competitive advantage of HEI. Furthermore, the success KM can be useful to combine with data mining to discover the hidden pattern and solve HEI issue.

APPENDIX

Reference	Context Domain	Framework	Dimension	CSF
[1]	Applying Corporate Knowledge Management Practices in Higher Education	Build their own	Culture	Human Resources support knowledge management
			Technology	Information technology enable to measure KM's financial impact, such as cost reductions, customer satisfaction, and speed to market
[7]	Functional approach of knowledge management system applied to institutions of higher education	Organization, information, decision, knowledge (OIDK) Model	Company goal	Improve relationship with existing and new customer
			Process	Evaluate and improve critical internal process that drive stakeholder satisfaction
			Commitment	Working environment that enable KM in workplace
[8]	Knowledge Management in Higher Education	Stankosky pillar of KM	Leadership	Enable opportunity to apply knowledge management practices
			Organization	Focus on process that enhance individual ability, organization ability, motivations, and opportunity to learn
[9]	Knowledge Management in Higher Education in Chiang Mai: A Comparative Review	Duffy KM Functionality	Technology	Become enabler for supporting KM Infrastructure
			Learning	Enable gradual improvement in sharing explicit and tacit knowledge
			Technology	1. Technology infrastructure act as a pipeline for knowledge conversion process from explicit and tacit knowledge 2. Technology enable capture, define, store, categorize, indexing, and linking objects to knowledge unit
[17]	The Critical Success Factors for Knowledge Management Adoption – A review Study	Build by itself model	Process	Continuous Identification of relatable opinions, comments, feedback, and expectation of user to mapped new possible architecture to answer the problem and challenge faced by the company
			Organizational	Management support, Technology support, Organization structure, Training, Reward, Leadership
			Individual	Learning attitude, Openness, Incentive, Trust, Adaptability, People related issue
			Knowledge	Knowledge structure, Knowledge source, Creation, sharing, application
			Performance	Organizational performance, Management index
[10]	Knowledge Management in Higher Education: A UK Case Study	Stankosky KM Pillar	Staff Characteristic	1. Staff should act as a unit to build team concept of KM. 2. KM concept should be perceived and demonstrate benefits to academic staff at individual level
			Culture	Knowledge sharing culture is different in every department within an institution, which impacted KM environment
[11]	Identifying knowledge indicators in Higher Education Organization	Knowledge Centric Higher Education Organization	Management Structure	University organizational structure impacted decision making process and rate of change
			Technology	21st century management tools and technology should be prioritized to assist KM Implementation within HEI
			Intellectual accomplishment	Research taken
			In house process	1. Administrative process 2. Teaching learning process
[15]	The Presentation of Suitable Model for Creating Knowledge Management in Educational Institutes (Higher Education)	Build own model	Stakeholder	Students, parents, industry, society
			Central development and augmentation	Initiative taken by faculty development to provide aids to facilitate research
			Human Resources	Levels of how capable an individual within the organization dealing with Knowledge Management
			Organization Structure	Formal and informal organization structure and trust system can lead to creativity and ability of compatibility in the organization
			Information Technology	Technology and communication system will benefits Knowledge sharing
			Organization Culture	Viewpoint of organizational value towards learning and knowledge transformation

Reference	Context Domain	Framework	Dimension	CSF
[19]	A Model for linking Knowledge Management Strategies, Critical Success Factors, Knowledge Management Practices and Organizational Performance; the Case of Iranian Universities	Build own model	Leadership and top management	Support from top management in terms of communication, creativity, culture, people, incentives, and evaluation
			Culture	Sharing culture provide efficiency and effectiveness in Knowledge creation
			Technology	Technology support provides positive effect on innovativeness
			People	Human strategy on socialization and system strategy is appropriate for KM
			Structure	KM mediates relationship between Organization strategy and organizational culture and effectiveness
			Performance Management	KM has direct relationship with financial and nonfinancial performance of organization
[16]	Data mining for exploring hidden patterns between KM and its performance	Martensson CSF Factor	Top Management Support	Support from top management resulted in higher KM performance
			Communication	
			Creativity	
			Culture and people	
[20]	Assessing the impact of knowledge management strategies announcements on the market value of firms	Build own model		Stakeholder commitment in developing KM strategies would result in positive number with company's financial performance
[21]	A Four-factor model on the Success of Knowledge Management	Build own model	Technical	Design and application of KMS using Information technology-based tools
			External environment	Factors that are uncontrollable by organization directly such as market, technology, competitor, customer preference; to be used as an opportunity for KM practices
			Internal resources	Refer to how organization manipulate internal resources factor in order to adapt to change of external environment and improve KM effectiveness
			Managerial	Factors that should be controlled and adjusted by the organization to achieve KM Goals, that includes: coordination, motivation, monitor, and measurement
[22]	Knowledge Management technologies and applications: a literature review	Strategy based ontology of KM Technologies	Technologies	Facilitate organizational Knowledge process by providing basic infrastructure, enable knowledge workers and organization to access knowledge resources
[23]	An integrated view of Knowledge Management for performance	Build own model	Culture	Collaboration between people to support and help others task
			Structure	Learning culture to encourage opportunities of development and learning
			Management	Top management understands and support KM practices
			Technology	Collaboration, communication, search, access, decision making, and storage of information supported by IT
[18]	Knowledge Management: An organizational capabilities perspective	Build their own	Infrastructure	Technology act as a linkage of information and communication systems in an organization to eliminate barriers and creating organizational knowledge
			Structural	Structures should forbid the hoarding of information that could restrict KM practices In organization, such as internal organizational boundaries/structures across the supply chain
			Cultural	Sharing corporate culture where employee interaction is encouraged to transmit knowledge between individual

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