

A Framework for Designing Knowledge Management Systems: Aggregating the Existing Approaches

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Abstract—To effectively manage organizational knowledge to promote innovative practice and gain sustainable competitive advantage, there is a need for a system called Knowledge Management System (KMS). This system helps to enhance the organizational process of knowledge creation, storage, retrieval, transfer and application. With the explosive growth of interest in knowledge management, different KMS frameworks have been produced by various researchers for successful implementation of knowledge initiatives. However, it was observed that, the existing frameworks do not provide a complete and generalized framework for designing of knowledge management system by defining the key fundamental attributes of KMS and their inter-relationships. This paper reviews the existing frameworks for designing KMS with the view to improving them by developing a more comprehensive integrated framework from a multi-dimensional approach by incorporating, extending and aggregating attributes that are already available either from academic, theoretical approaches as well as from applied practitioner-like approaches in knowledge management efforts. The development of this framework is based on the analysis of five selected KMS frameworks on which an initial integrated framework for designing KMS is proposed.

Keywords-Framework; knowledge management system.

I. INTRODUCTION

Today's economy is generally referred to as a knowledge-based economy, where the economy and the wealth has changed from a world where capital is seen to be a physical thing such as plant, machinery and land to a world where the real capital for creating wealth is less tangible.

Knowledge is a multifaceted concept with multilayered meanings, however, knowledge can be defined as "justified true belief" [1]. According to Alavi and Leidner [2], knowledge is information possessed in the mind of individuals. It is personalized information related to facts, procedures, concepts, interpretations, ideas, observations and judgment.

Organizations need to manage knowledge for enabling their employees to learn and develop their competencies efficiently. Knowledge helps employees to be more creative and innovative and managing it efficiently enables individuals, teams and entire organizations to collectively and systematically create, share and apply knowledge to achieve their objectives.

To effectively manage organizational knowledge to promote innovative practice and competitive advantage, there is a need for a system called Knowledge Management System (KMS). This system helps to enhance the organizational processes of knowledge creation, storage, retrieval, transfer and application [1],[2],[4].

Organizational KMSs, usually, require profound cultural renovations, because, traditionally, organizations norms promote knowledge hoarding rather than knowledge sharing. Hence, a major cultural shift is requiring in changing employees' attitudes and behavior so that they willingly and consistently share their knowledge and insights. These attitude and behavior challenges need to be adequately addressed, so as to ensure successful implementation of KMS in an organization. The challenges can be resolved through the development of a comprehensive KMS framework.

A KMS framework is a conceptual model that provides a broad guideline that facilitates effective and efficient implementation of a KM initiative. KMS is not a technology or a set of methodologies; rather, it is a practice or discipline that involves people, processes and technology [1],[2],[3].

This paper is divided into six sections. Sections 1 and 2 are devoted to the introduction and motivation for development of a framework. Section 3 is devoted to presenting previous work, Section 4 analyses a selected number of existing frameworks and Section 5 presents the proposed framework. Sections 6 and 7 are devoted to conclusion and future work.

II. MOTIVATION

With the explosive growth of interest in knowledge management, various Knowledge management system frameworks have been developed by different researchers based on their background and area of interest for successful implementation of a knowledge management initiative.

However, it was observed that most of the existing frameworks do not adequately fulfill the KMS needs of organizations [3]. That is, the existing frameworks do not provide a complete and generalized framework for designing of the knowledge management system by defining the key fundamental attributes of KMS and their inter-relationship.

Hence, there is a need to improve on the existing KMS frameworks so as to ensure that the framework

comprehensively consists of key fundamental attributes, in order to reduce the level of failure of Knowledge management (KM) projects and loss in revenue incurred by organizations in implementing KM projects.

Therefore, the purpose of this research is to examine the existing frameworks for designing KMS and to improve upon them by developing a more comprehensive integrated KMS framework from a multi-dimensional approach by incorporating, extending and aggregating attributes that are already available from academic, theoretical approaches as well as from applied practitioners, like approaches in knowledge management efforts.

III. PREVIOUS WORK

In order to implement KMS successfully, a KMS framework is needed [3]. Rusli et al. [4] define the framework of KMS as the guidelines and directions to set up KMS. In this section, we will review the proposed framework and identify limitations on a number of issues related to KMS such as collaboration, cultural issues, knowledge sharing, methodology for implementing the framework, generalization, leadership, communities of practices, information context, learning elements, usability of KMS, copyright and costs of implementing the framework.

Sajeva [5] acknowledges that the changing business environment, characterized by dynamically discontinuous changing, requires a re-conceptualization of Knowledge Management Systems as they have been understood in information system practice and research. It emphasises that in a dynamically and discontinuously changing business environment, there is a need for a paradigm shift from an information processing view to a sense-making view of Knowledge Management.

Malhotra and Galletta [6] explicitly recognized that knowledge resides in the user and not in the collection of information. It states that, the human aspect of knowledge creation and knowledge renewal cannot be replaced by knowledge management technologies especially in the following areas: imagination and creativity latent in human minds, untapped tacit dimensions of knowledge creation, subjective and meaning making basis of knowledge and constructive aspects of knowledge creation and renewal. The proposed framework offers a combination of flexibility and agility while ensuring efficiencies of the current technology architecture. It allows for continuous re-examination of the assumptions under lying best practices, reinterpretation of this information and efficiencies based on propagation and dissemination of the best practices. Despite the fact that the proposed framework acknowledged the human factor, need for sense-making knowledge in a dynamic business environment, the framework fail to address cultural issues that need to be considered when migrating from the traditional to sense-making approach.

Rusli et al. [7] present a Knowledge Management system framework called Active Design Support (ADS). The framework is aimed at providing product designers with critical design knowledge and guide them toward rational design decisions based upon relevant design errors and successful design decisions in the past during product

development processes. They considered the design knowledge obtained by individual designers and experts as a valuable asset to an organization for enhancing the competitiveness of products a company's designs can produce. They stated that insufficient flow of information and shared knowledge in an organization can result in delays, sub-standard product quality and costly errors, due to disregard of previous experiences. Although, the ADS framework enhances and promotes knowledge sharing amongst designers, it is clear that the framework does not stress the importance of collaboration and it undermines the issue of copyright law.

According to Rusli et al. [3], within the general frameworks of KMS, even though accepted, there are some unidentified features that have not been discovered and that the addition of these unidentified features will make the existing framework of KMS more effective. Rusli et al. [7] adopted an earlier KMS framework as a base-line for their research work in investigating the general perception and acceptance of people toward the current KMS implementation in six selected PHLI in Klang Village, Malaysia. From their research, six elements were identified as causes for not successfully implementing KMS in the selected institutions. These elements are: lack of awareness of KMS implementation, unutilized technical component, application and systems, ignorance of advance technology, cost of KMS implementation, lack of incentives and rewards and unaware of KMS audit. Therefore, the KMS framework of Rusli et al. [7] was modified; KMS awareness was defined as individual components for the KMS framework, rather than a part of a component as presented by the earlier work [7] which considered awareness as part of the KMS Psychological component. In addition, the research indicated that KMS Audit gained less attention in KMS implementation. The authors suggested that there should be clear interaction between KMS Awareness and KMS Audit; this will be achieved by implementing the Audit Mechanism as well as feedback mechanism. They also stated that in implementing the KMS framework, the issue of incentives and rewards must be considered, while they neglect the issue of culture as it relates to the individual and the organization.

Roberta [8] presented a new approach to KMSs called Distributed Knowledge Management (DKM) and applied it in a case study with Impres a Pizzarotti & C.S.P.A., a complex Italian building industry. The paper views that the common outcome of the traditional KMS is the creation of Enterprise Knowledge Portal (EKP), a web-based interface which provides a common access point to corporate knowledge. Even if users have different profiling systems, the underlying representation of EKP is typically unique, and is meant to represent a common and shared conceptualization of corporate knowledge that enables communication and knowledge sharing across the entire organization. This approach to KMS is incompatible with the very nature of what is to be managed and consequently are often deserted by users. The author based the concept of DKM on two principles: the principle of autonomy, which grants organizational units a high degree of semantic autonomy in managing their local knowledge and the

principle of coordination, which allows each organizational unit to exchange knowledge with other units through processes of double loop learning. According to this approach, complex knowledge-based organizations can be seen as “Constellations” of local organizational units which exhibit some degree of semantic autonomy, with the ability to manage local knowledge and to develop a personal perspective on the world. The resulting KMS aimed at sustaining the creation and management of different conceptual schemes which coexist within a DKM system. The author further explained that within a DKM system, each organizational unit, either formal or informal must be represented and verified by a Knowledge Node (KN), and that each KN should consist of a knowledge owner, a system of artifact and a context. This approach attempts to address why people are led to desert KMS by focusing on the lack of coherence between a privileged, unique and supposedly shared conceptualization of knowledge within KMS and the different ways of thinking of workers, communities, teams and officers that participated in the firm’s activity. While the framework recognized the importance of knowledge nodes in designing KMS, the authors fail to explain the effective way to manage inter KN in knowledge sharing.

Roberta [8] also noted that numerous researchers have proposed several KMS frameworks, many of these frameworks are prescriptive and providing direction on the type of KM procedure without providing specific details on how these procedures should be accomplished. Based on their research work on HLI, they revealed that people mostly concentrate on KMS infrastructure and technology and neglect other very important issues of KMS such as human aspects. Therefore, they proposed a KMS framework that consists of five components. These include: functionality and system architecture as the backbone to support the KMS, psychological and cultural aspects as well as the knowledge strategies and measurement or system auditing. The proposed KMS framework covered both the technological and human aspect of KMS, however key issues like leadership, communities of practices are missing in the framework design, which are very fundamental elements in the success of KMS.

Rusli et al. [9] state that a Learning Organization (LO) still has difficulties in identifying the appropriate KMS architectural framework and KMS technologies for their organizations and that, there is no clear mechanism on how to motivate and encourage a Community of Practice (COP) to share and reuse knowledge, as well as to generate new knowledge in a collaborative environment. The authors proposed a KMS model and architecture for LO that consists of six main components in order to serve a community within a collaborative environment to work together to achieve the desired objectives of an organization. This KMS framework is found to be good for people to share their knowledge in a learning organization, however, it fails to consider the dynamism of the learning environment, information flow and the issue of context of information shared between users of the KMS.

According to Mohd et al. [10], there exist gaps between theory and practice in the current knowledge management

framework. The authors used Shell IT International (SITI) Knowledge Management framework as a case study. The authors identified eight activities that are critical in the knowledge management of an organization. The activities are as follows: initiation, production, modelling, repository, distribution and transfer, technology infrastructure, application and retrospect. The authors presented an alternative framework that addresses the entire processes needed for SITI’s internal and external Knowledge Management usage and development. The framework is cyclic in nature, with multiple feedback loops and iteration which means it can provide queries and receive feedbacks from various departments in the organization. The features of the proposed framework are: strategic, model, use, review, and transfer and technology infrastructure. The framework did not provide methodology for implementing the framework, and the research is based on a single entity and cannot be generalized.

Mostafa et al. [11] observed that early KMS concentrated too much on technical issues and hence fails to produce the desired outcome of KMS. The authors presented an integrated KMS framework, which consists of three main layers. The interior layer is the knowledge architecture, which it is considered as the KM backbone. They defined knowledge architecture as a logical set of principles and standards which guide the engineering (high level) design, selection, construction, implementation, support and management of an organization’s Knowledge Management System Infrastructure.

Others factors considered in the interior layer are: Knowledge Strategy, Knowledge Capturing, Knowledge Storage and Knowledge Sharing. The middle layer consists of factors considered as necessary for the successful implementation of a KMS; these factors are business process reengineering, reward and promotion system, pilot, technology, training and education programs. The outer layer includes factors that are classified as general in comparison with the outer factors. These factors are organizational culture, transparency, CEO support and commitment, and trust. The authors explained the methodologies for the adoption of this KMS framework, which takes into account both the technological and human aspects. The framework presents a holistic approach to KMS, but does not mention anything regarding data management and cost effectiveness of the KMS framework.

Chong and Choi [12] reviewed early studies on KMS and noted that many KMS research has taken a narrow view, overlooking important foundations such as law (Knowledge Privacy and Protection), Politics (Knowledge Control and dominance) and marketing (persuasion and knowledge asymmetries). Also that KMS research seldom considered the “dark side” and how it could be used to suppress or distort knowledge to serve a specific agenda. The authors came up with seventeen most desirable capabilities of KMS. The seventeen capabilities were sorted in order of importance as follows: adaptability, cost effectiveness, first access, ease to use, search and retrieval, security, knowledge creation, content management, quality assurance, collaboration, multimedia, report generation, central

repository, push strategy, customizability, metrics and incentive. Their studies focused on the recent changes in the way that organizations view KM and suggested that there should be stronger integration of KMS with the overall technology in organization. More focus should be given to place KM Support in context and integrating KMS with existing technologies, creating integrated knowledge support systems-business technologies enhanced with KM capabilities. The KMS framework presented an approach from a multidimensional perspective; however, the framework fails to consider learning as a key element of KMS.

Weber [13] observed that among the widely discussed categories of KMS are repository-based and expert locations. Repository-based KMS are typically adopted in support of knowledge sharing and leveraging, based on well-maintained databases that store explicit knowledge. Expert locator KMS are systems that link users with experts on the basis of stored experts' skills and competencies. They noted that despite the fact that both the repository-based and expert locator are important to organizations, they are implemented separately by different systems. They proposed a multifunction framework with a single architecture that performs the role of both systems. That is, a multifunctional framework for designing KMS which adopts a single architecture and performs KM functions that originally required multiple architectures. The architecture lies on two databases: structured knowledge artifacts and the experts, where each artifact is associated with the experts. The principles guarding the framework are highlighted as collaboration, transparency, justification, absorbcency, technology and verification. The framework focuses more on technical aspects of designing KMS; it does not mention anything regarding easy to use and user friendliness of application. Also, the proposed framework was not subjected to thorough evaluation of the different functionalities.

Hanlie et al. [14] proposed an enhanced framework and methodology for KM system implementation. In developing the proposed framework and methodology, the authors take into consideration recommendations regarding the development of a KM framework presented in Rubenstein-Montano et al. [15]. The proposed framework consists of five phases namely: choosing a strategy, evaluation, development, validation and implementation. Each phase of the framework consists of sub-phases describing the methodology applicable to each phase. The proposed methodology describes the procedure and steps to be followed and is aligned with the proposed framework. The authors claimed that the outcome of the proposed framework was successful. As the proof of concept was carried out on a single organization, hence the generalization and validation of the framework across multiple organizations and sectors of the economy is desirable to ascertain the comprehensiveness of the framework and methodology.

According to Alavi and Leidner [2], many of the past frameworks do not take into account the importance of human aspects in knowledge management. The author suggested a new framework; the emphasis is on the provision of training to the employees, providing incentives and

rewards to employees to share tacit knowledge and the importance of information technology. The major constituents of the framework are rewards, technology, culture, training, learning, strategy, structure, system, leadership, personality and attitude. The author claimed that the proposed framework provides a holistic view for KM implementation which earlier frameworks have ignored. Even though, the proposed KMS framework was developed based on practical survey in an Indian organization, there is no evidence of validation of this model in different environments or through case study.

Parag [16] acknowledged that today's global managers are facing unprecedented challenges outside their organizations fueled by environmental forces of changes such as globalization, emerging technologies, emerging best business practices, government regulations, competitive global financial markets, limited knowledge workers and higher worker turnover rates. Also the rapid increases in the development of emerging technologies have forced many managers and executives to reinvent their decision-making methodologies. The author noted that the current KMS may have outlined their usefulness due to the rapid rate of change of technological and economic forces occurring in the global economy. The author suggested that emerging Knowledge Management System will include encryption tools, existing client/server applications, new ultra high speed internet, emerging technologies, mobile devices, government regulations and guidelines, financial information system, accounting information system, best business practices, ethical practices and legal guidelines. The proposed KMS framework will allow the knowledge workers to collaborate remotely on projects via high speed Internet bandwidth and web-based tools and applications. However, the author fails to take into consideration the cost implication of implementing such KMS framework, and the reliability of networks especially in the developing countries.

IV. ANALYSIS OF SLECTED KMS FRAMEWORK

Since the objective of this research is to develop a comprehensive integrated KMS framework from a multidimensional approach, taking into consideration the key fundamental attributes of KM initiatives, two approaches were adopted: (1) a critical literature review of the existing literature on KMS frameworks. Based on the review, five KMS frameworks (form a social-technical perspective) were selected, as a benchmark for the research; (2) a comparative study of the five selected KMS frameworks was conducted. In a comparative study like most other studies, there are two different approaches: Descriptive and Normative approach.

Since the research is concerned with developing an improved framework, a normative approach was adopted for the study. This is because the normative approach aims at studying, evaluating and improving the present stage of the object of study. Since the normative approach combines empirical observation with normative assessment, it is particularly useful for the analysis of concepts that have both descriptive and evaluation dimension that cannot be disentangled [18].

Based on this study, a more comprehensive integrated KMS framework from a multidimensional approach was developed by aggregating the critical success attributes from the selected framework. The proposed framework was evaluated through a questionnaire to obtain scientific feedback from Developers, Practitioners and Academics in the domain. The aim of the evaluation was to investigate the acceptability of the proposed framework. The analysis of the five selected frameworks is presented in Table 1 and Table 2.

TABLE I. FIVE SELECTED KMS FRAMEWORKS

Authors	Study Objective	Identified Problem Area	KMS Focus	Industries	KMS Framework	Methodology
MOSTAFA et al. [11]	To investigate the role of Km in aerospace industries and to provide a framework for KM efforts designed for aerospace industries	Loss of Vital knowledge and experiences	Integrated KMS framework	Aerospace Industries	Fourteen Elements	Multi-case Analysis of current KM perspective in aerospace industries
RUSLI et al. [9]	To analyses perception acceptance and implementation of current KMS framework	Approaches used in KMS framework do not adequately fulfill the KMS needs or organizations	modified KMS framework	Learning Institution	Twenty Elements	Literature analysis and field survey
SMUT et al. [19]	To provide a more comprehensive framework and methodology for knowledge management system implementation	Customer experiences of service center	Comprehensive KMS framework and methodology	Mobile telecommunication industries	Eighteen Elements	Proof of concept research approach
PARAG SANGHANI (2009)	To study/survey knowledge management practices in India	Lack of Human aspects in knowledge management system framework	Two perspective approval to knowledge management framework	India Business Industries	Eleven elements	Survey of KM practices in India
SVELLANA [4]	To analyse the key elements of social technical knowledge management system	Different approaches to knowledge management	Social-technical knowledge management system	Generic	Eleven elements	Comparative scientific literature analysis

However, none of the selected frameworks presented the whole spectrum of element as depicted in Table 3. Also, each of the KMS framework focused more on one or two sub system(s) than the other, that is some have emphasis on the Human-Social context and Knowledge context than in Technology context [19]. In order to create an effective KMS in an organization, there is need to ensure that all relevant elements are considered in designing and developing the KMS framework. That is relevant elements from the Human-Social, Technology and Knowledge context need to be integrated and harmonized.

TABLE II. ATTRIBUTES OF SELECTED KMS FRAMEWORKS

Authors	Mostafa et al. [11]	Rusli et al. [9]	Smut et al. [19]	Parag [16]	Svetlana [4]
KMS Framework Elements					
1	Knowledge Strategy	Strategy	KM Principles and governance	Attitude	Knowledge Identification
2	Knowledge centers	Believe	Organizational structure and sponsorship	Personality	Knowledge acquisition
3	Strategic research center	Value	Requirements Analysis	Leadership	Knowledge creation
4	Knowledge capturing	Experience	Measurement	Structure	Knowledge storage
5	Knowledge identification	Capturing	Knowledge Audit	Strategy	Knowledge dissemination
6	Knowledge organizing	Sharing	Initiative scoping	System	Strategic Leadership
7	Knowledge storage	Dissemination	Prioritization	Technology	Organizational Learning
8	Personnel KM	Using	Technology solution assessment	Rewards	Organizational Infrastructure
9	Knowledge Base	Application	Planning	Culture	Knowledge Culture
10	Knowledge sharing	Functionality	Knowledge Education	Training	Technological Infrastructure
11	Knowledge committee	Technology	Building	Learning	Values and beliefs
12	Network of experts	Infrastructure	Pilot		Collaboration
13	Training program	Repositories	Review and upgrade		Learning
14	Reward and promotions system	Motivation	Knowledge maintenance processes		Vision
15	Re-engineering	Reward	Publish		Promotion
16	Education	Performance	Communication and change Management		Direction
17	Pilot	Security	Maintenance and support		Formal and informal structures
18	Technology	Compatibility	Measurement and reporting		
19	Trust	Broadcast			
20	CEO support	Training and learning			
21	Culture				
22	Transparency				

V. PROPOSED FRAMEWORK FOR DEVELOPING KMS

Rubenstein-Montano et al. [15] make the following recommendations as regard to the development of KMS framework:

- A KMS framework should be both prescriptive and descriptive.
- KMS must be directed by learning as feedback loops both single and double.
- The Cultural aspects of the organization must be acknowledged and the practices must be compatible with the culture.
- Planning should take place before any KM activities are conducted.
- The organizational goals and strategies must be linked to KM.
- A KM framework should be consistent with system thinking.

TABLE III. ANALYSIS OF SELECTED KMS FRAMEWORKS

Components	Elements	Authors				
		Mostafa et al. [11]	Rusli et al. [9]	Smut et al. [19]	Parag [16]	Svetlana [4]
Human-Social Context	Processes					
	Strategy		✓	✓	✓	
	Believe and value		✓			
	Experience		✓			
	Performance		✓			
	Awareness		✓			
	Strategic research center	✓				
	Network of experts	✓				
	Training Program	✓	✓		✓	
	Rewards and Promotion System	✓	✓		✓	✓
	Reengineering	✓				
	Education	✓		✓		
	Pilot	✓		✓		
	Trust	✓				
	CEO Support	✓		✓		
	Collaboration	✓				✓
	Culture	✓			✓	
	Transparency	✓				
	Sponsorship			✓		
	Requirement Analysis			✓		
	Prioritisation			✓		
	Measurement			✓		
	Initiative Scoping			✓		
	Implementation			✓		✓
	Publish			✓		
	Structure			✓		✓
	Motivation			✓		
	Communication and change Management	✓		✓		
Planning			✓			
Review and Updates			✓			
Altitude				✓		
Personality				✓	✓	
Leadership				✓	✓	
Learning		✓		✓	✓	
Organisational Infrastructure		✓	✓	✓	✓	
Vision					✓	
Technology Context	Compatibility		✓		✓	
	Application		✓			
	Systems Functionality					
	Technology Solution Assessment	✓		✓	✓	
	Technology Infrastructure					
Sustainable Layer	Security		✓			
	Repositories	✓	✓		✓	
Knowledge context	Knowledge Strategy	✓				
	Knowledge Center/Base	✓				
	Knowledge Capturing	✓	✓			
	Knowledge Identification	✓			✓	
	Knowledge organizing	✓				
	Knowledge Storage	✓	✓		✓	
	Knowledge Sharing	✓	✓		✓	
	Knowledge Committee	✓				
	Personal Knowledge	✓				
	KM Principle and governance			✓		
	Knowledge Audit			✓		
	Knowledge maintenance processes			✓		
	Knowledge acquisition				✓	
	Knowledge creation				✓	
	Knowledge culture				✓	
Knowledge methodology	✓		✓			

Following the analyses of the selected KMS frameworks and considering what constitutes a KMS framework as described by Rubenstein-Montano et al. [15], a proposed Integrated KMS framework is presented as shown in Table 4.

The proposed framework consists of three layers namely: foundation layer, core layer and outcome layer. The foundation layer is considering being a strategy sustainable layer which consists of two components: the organizational philosophy and learning. Organizational philosophy contains the following attributes: vision, plan, policies, procedures, processes and culture while learning components have system thinking, human creativity and actionable information as attributes. Each of these attributes is considered as necessary critical factors for the successful implementation of knowledge management system.

The core layer consists of three components: technological system, social-human system and knowledge system. The technological system has sixteen attributes namely: Infrastructure, Data Management, Inter-operability, Cost Effectiveness, Technological Solution, System Functionality, System Integration, Scalability, User Friendly, Information Flow, Architecture, Accessibility, Security, Multi-media, Web-based solution and Agent-based system.

TABLE IV. PROPOSED FRAMEWORK

Technology System	Human-Social System	Knowledge System			
<ul style="list-style-type: none"> - Infrastructure - Technology Solutions - Accessibility - Data Management - System Functionality - Interoperability - System Integration - Scalability - Cost Effectiveness - User Friendly - Security - Architecture - Information flow - Multi Media - Web-based Solution - Agent-based System 	<ul style="list-style-type: none"> - Experimentation - Diversity - Alignment - Environmental Analysis - Adaptability - Change Management - Education and Training - Stakeholder Forum - Government Policy - Collaboration - Communication - Self-Leadership - Re-engineering - Content and Context - Network of Experts - Psychology 	<ul style="list-style-type: none"> - Intuitionism - Motivation - Mission - Strategy - Budget - Integration - Trust - Sponsorship - Functionality/Task - Documentation - Knowledge Template - Leadership - Organizational Structure - Data protection and Privacy - Measurement - Awareness - Taxonomy 			
Core Layer					
Learning					
Human Creativity	Systems Thinking	Actionable Information			
Organizational Philosophy and Culture					
Vision	Plan	Policies	Procedures	Processes	Culture
Efficiency and Effectiveness		Innovation		Competitive advantage	
Outcome Layer					

The social-human system has eighteen attributes namely: Psychology, Environmental Analysis, Collaboration, Communication, Re-engineering, Experimentation, Adaptability, Self-Leadership, Education and training, Network of Experts, Alignment, Diversity, Content and Context, Change management, Stakeholder forum, and Government policy .

The knowledge system has also eighteen attributes namely: Mission, Functionality, Strategy, Integration, Institutionalization, Sponsorship, Motivation, Organizational

Structure, Trust, leadership, Budget, Documentation, Knowledge template, Data protection and privacy, Measurement and Awareness.

The outcome layer has three attributes namely: efficiency and effectiveness, innovative practice and competitive advantage. The presence of the outcome layer in the framework is to ensure that organization really identify the benefits that they intend to derive from implementing KMS. Without a clear understanding of the benefits of implementing a KMS, it will be difficult to measure the success of KMS.

When an organization has a clear mind set of what they want to achieve from implementing KMS, then Human, cultural and organizational issues need to be addressed to ensure that they support, promote and encourage knowledge management practice. These issues will be addressed in the sustainable layer.

The last phase for implementing KMS is the core layer; here the issue of technological, knowledge and Human-Social system are addressed.

As for implementing this proposed KMS framework, a methodology is proposed in table 5 below. It describes the procedures and steps to be followed in implementing this framework in which detail attributes and activities are contained.

TABLE V. DESCRIPTION OF PROPOSED KMS FRAMEWORK METHODOLOGY

KMS Framework layer	KMS Methodology procedure	KMS Methodology Procedure Description
Outcome	Identify business problem	Defining clearly organization business problem to be solved and what, why and how KM can be used to solve the problem
	Identify expected results to be achieved	Defining clearly the expected result from KM implementation. Stating the benefit to all stakeholders: the organization, employees, customers, shareholders, etc. properly developing a ROI plan.
Sustainable	Organizational Philosophy and Culture	Review organizational philosophy and culture to support these initiatives. Review and develop organizational policies, procedures, vision and plans to reflect and promote knowledge management.
	Learning	Build up learning culture: learning before, learning during and learning after. A culture where employees are willing to share their experiences and are willing to learn from others. Build a culture of systematic thinking and creativity supported with incentives.
Core	Knowledge	Align these initiatives with overall business objectives. Obtaining management built-in and sponsorship. Create KM awareness in the organization. Establishing perform knowledge audit and draw up strategy for implementation.
	Human- social	Develop a change management plan that helps changing to a knowledge sharing culture. Establish clear communication channels, set-up strong knowledge management team, re-engineering of business processes, etc.
	Technology	Employ suitable user friendly KM solution that will solve the key business problems. Deploy IT infrastructure that is scalable, cost effective, secure and interpolative

VI. CONCLUSION AND FUTURE WORK

As earlier stated, KMS is not a technology or a set of methodologies; rather, it is a practice or discipline that involves people, processes and technology [1],[2],[3]. Every organization needs a KMS framework to enable it derive the desired benefits of implementing KM initiative. The proposed framework attempts to build a framework that is comprehensive, integrated and multidimensional in approach into a single framework. Initial analysis of questionnaires and surveys responses on the proposed framework has been very encouraging. The results has shown that most of the issues raised during surevys have been addressed in this proposed framework in particular:

- (1) Integration of learning and knowledge management: The need for organizations to become learning organizations requires knowledge management, which in turn is dependent on learning organizations. However, these concepts are addressed separately in most KMS framework. From the research, it is clear that the two concepts are interrelated and dependent. Hence, to enhance organizational creativeness and innovation, the two concepts need to be integrated into a single framework.
- (2) Systematic approach to KMS implementation: An Integrated framework that is holistic needs to adopt a number of guiding principles for KM implementation. These principles should include; organizational policies, plan, procedures, philosophy, structure and methods. These principles should present the organizational KM vision and link it to the overall organizational business goals. All these guiding principles are integral of a KMS framework and should be the foundation layer of KM initiative as presented in the proposed KMS framework.
- (3) Framework comprehensiveness: The proposed framework presents a fully integrated framework from a multi- dimensional approach by incorporating and aggregating the KMS attributes that are already available from academic, theoretical approaches and as well as from applied practitioner-like approaches in KM efforts.
- (4) Human-centric approach in designing KMS: The research work revealed that KM success highly depends on human-social system of KM efforts. That is, Human-centric is the best approach to KM initiative since people are considered as the most critical element in KMS implementation. Hence, frameworks should focus on the importance of people in relation to KMS, and the need to put in place appropriate cultural value that will encourage KMS practice.
- (5) Integrating the outcome layer in the KMS framework: A clear understanding of the expected result of implementing KMS by an organization is very critical to the success of the project. Hence organizations need to identify what they want to

achieve in implementing KMS before commencing the implementation.

So, the next stage of this research work will be to get a scientific feedback from the experts and the perceptions on the components, attributes, approach and design of the proposed KMS framework from stakeholders. Practitioners, Academics and Developers are the main stakeholders in the knowledge management domain which could be usefully surveyed with an Internet-based questionnaire.

More questionnaires and surveys will be administered to a breadth of industrial sectors to consolidate the initial results. The findings of the investigation will be interpreted and used to review the proposed KMS framework. This enhanced framework will then be practically tried and tested in a large public-sector organisation like Nigerian Post Office.

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