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Research paper

Approach for Successful Knowledge Management System Deployment for Organizations

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Abstract

Globalization and rivalries are the fundamental two difficulties confronting firms who are attempting to support their prosperity or even to remain in the market. Subsequently; interests in technology, process and people wind up plainly important for the association to guarantee to have fancied offer in the Marketplace. Vast firms set up cutting edge and complex sites and hello tech innovation to make, keep up and share knowledge inside by gathering and applying picked up information to make financial esteem. Knowledge is an imperative concentration in association's methodology, where information is viewed as essential for organizations. Organizations can turn out to be more productive by exchanging and sharing what specialists know, and after that, they can create learning strategies. The fundamental target of this paper is to distinguish existing knowledge management hone with a specific end goal to enhance it. A reasonable guide will be hypothetically proposed to be actualized and embedded in the corporate operations and business system. The pilot study was performed to validate the research questionnaire. The results were within the prescribed range so the researcher is ready to collect the actual data.

Keywords: *knowledge management; framework; pilot study; Saudi Arabia.*

1. Introduction

Globalization and rivalries are the two fundamental difficulties confronting firms who are attempting to support their prosperity or even to remain in the market [1]; consequently, investment in technology, processes and people end up plainly important to guarantee having required offer in the marketplace. Additionally, this quick changing condition put KM as basic and integral part of what organizations need to manage [2].Huge firms set up cutting edge and complex websites and KM systems to make, keep up and share knowledge internally [1] by collecting and applying picked up knowledge to make monetary esteem [3]. Managers comprehension of how to utilize KM and what apparatuses and helps to utilize is fundamental for fruitful KM [2]. Most organizations don't understand knowledge people have in their organizations [4]. "Knowledge is the source of economic, social and political energy as well as divine enlightenment. An individual or a nation success is measured only by gaining and using beneficial knowledge. Gaining useful knowledge and using for proper cause for the pleasure of Allah SWT is the emphasized in Islam" [5].Organizations can turn out to be more proficient by exchanging what specialists know, and after that, they can create learning procedures [2]. Knowledge is an essential concentration deliberately, where information is viewed as "the most deliberately vital asset which associations have" [6]. This will enhance client service, faster product developments and innovations [1]. The formatter will need to create these components, incorporating the applicable criteria that follow.

2. Problem Statement

Information and Communications Technology (ICT) play a major role in knowledge management in organizations. It is an integral part of retaining existing knowledge and also deploying new ones. ICT and knowledge management help in enhancing production and improving services provided to organizations' valued customers.

Knowledge management upgrades information of the organization, to manage competitive edge. Most organizations don't have an unmistakable vision of KM definition and its parts their organizations. Henceforth, losing expertise, experience and information resources [7].

Big oil and gas industry organizations in Saudi Arabia such as Saudi Aramco and Royal Commission for Jubail and Yanbu are always challenged to keep up with marketplaces and strive to have a competitive edge. Therefore, it is important for these organizations to enhance their performance through employing comprehensive Knowledge Management System (KMS) and knowledge sharing internally and externally to support its business operations such as production lines, day-to-day operations, services, and supply chains.

Saudi Aramco is the Saudi Arabian national oil company. Saudi Aramco generates more than 85% of Saudi exports and more than 90% of government revenue. Saudi Aramco was established in the 1930s as a U.S. concessionaire and now 100% owned by the Saudi government. Since it was founded, it plays a critical agent for the social, economic and infrastructural development of Saudi Arabia [8].

This study is an empirical investigation of Knowledge Management System in one of the leading company in Saudi Arabia in Oil and Gas Industry. The research will investigate how knowledge is practiced in the company, its current state efficiency and effectiveness utilizing Bohn's Stages of Knowledge Growth measurement tool, then; validate the current state using extension and adaptation of well-known Information System success frameworks. A combination of Delone & McLean and Technology Acceptance Models will be adopted in order to build and propose success of Knowledge Management System for a future state. Finally, in light of the result propose a roadmap for future state implementation.

3.1. Research Questions

The research questions are essential and have to be clearly identified. According to [9] research question focuses on the purpose of the study. The main research questions are:

1. How is knowledge practiced in the organization?
a. What is the current state?
b. What is knowledge management maturity level?
2. What are the factors that influence effective and effi cient knowledge management in the organization?
3. What is the organization strategy and context to improve knowledge handling?
4. How to improve knowledge management?

3.2. Research Objectives

The main aim of this research is to investigate and evaluate knowledge management system in an Oil and Gas firm. The specific objectives are:

1. To determine knowledge practice in the firm; identify and measure the current state.
2. To investigate factors that influence knowledge management in the organization.
3. To validate the construct for knowledge management system success in the organization.
4. To propose knowledge management system roadmap for the organization.

3. Literature Review

Data, Information, knowledge and wisdom are very common words we hear them and use them in our daily lives. It is important to distinguish between them and understand what the specific meaning for each [10]. Table 1 explains each with examples:

Table 1. Example of Data, Information, Knowledge and wisdom

Name	Description	Example
Data	"Strings for symbols or characters that are meaningless by their own. Data is unprocessed, raw material and uncounted facts"	15, abcd, b-27-1
Information	"Processed data. It has meaning and can be manipulated by logical or arithmetic operands. In contrary of data, information can be transferred and communicated more effectively"	5+10=15, The elements of the subset A are {1,2,3,4}
Knowledge	"Digested information that is useful and has value for users. There are two types of knowledge tacit knowledge and explicit"	Troubleshooting problem, Following Work Instruction
Wisdom	"Ability to make the best and most proposer use of knowledge in establishing a basis for decision-making and making the decision itself to achieve the desired goal"	Building Putra Jaya in Malaysia SMART Tunnel in Malaysia

In today's organization's knowledge management is crucial and it is one of the strategic resources that organization must plan carefully. Its role and importance for building organizations' and individual's competencies have dramatically increased recently [11].

3.1 Importance of Knowledge Management

Knowledge management is very crucial for any organization to enable it to have a competitive advantage. It bridges the gap between organization contexts and its strategy [12]. Using technology alone, without employing comprehensive knowledge management system to support knowledge management, and sharing is not sufficient to reach desired goals [13]. Knowledge Management strategy for an organization must be clear and consider people ware and heart ware; human resources loyalty & willingness, prior to Knowledge Management implementation [14].

3.2 Importance of Knowledge Management

According to [15] it is vital for an organization to know the Critical Success Factors (CSF) for Knowledge Management and lesson learned from previous studies. Koening & Srikantaiah classified CSF into five categories: leadership, culture, organizational structure, information technology and measurement. They emphasized that leadership and culture are essential for successful implementation of KMS [16].

3.3 History of Knowledge Management

The root of Knowledge Management goes back to 1960's after the term "knowledge worker" which was invented by Peter Drucker. The first generation of KM was adopted from 1990 to 1995. A new C-level position was created in a number of organizations called Chief Knowledge Officer (CKO) reporting directly to the Chief Executive Officer (CEO). However, there was no clear job description for that CKO level, and it turned out that the position used as fad only. The second generation of KM was adopted between, 1996 and 2001, where KM became clearer as concept and organization managers started believing that KM can be codified to add value in their organizations. Nonaka Knowledge Creation Theory, by Professor Ikujiro Nonaka, in 1995, was the breakthrough in Knowledge Management as it was considered the first theory in KM [4]. Knowledge is created and transferred from one form to another in spiral clockwise order through socialization, externalization, and combination or internalization.

3.4 Information System Frameworks

Many studies were carried out on developing frameworks to address user or technology aspects of Information Systems. Several theories and models were developed and tested such as successful model (D&M), Diffusion Innovation Theory (DOI), Theory of Reason Action (TRA), Theory of Planned Behavior (TPB), Theory of Planned Behavior Extension and Structural Equation Modeling SEM [17]. This research will focus on studying two of the above models which are TAM and D&M.

4.5 Knowledge Management Frameworks

Knowledge Management is a class of Information System (IS) that furnished to support organization process of knowledge in order to enhance operations in the organizations [18]. Several types of research extended IS theories or developed new models to address frameworks for KM. Halawi and others [19] adopting and extended D&M success model to test KMS. Lai, on the other hand, developed completely new model [20]

4. Framework and Research Design

This study was conducted in Oil & Gas industry in Saudi Arabia. Convergent Parallel Mixed Methodology (CPMM) was used. CPMM provide a comprehensive analysis to research problem

[21] where a deeper understanding of organizational issues and practices in regards of handling knowledge was identified to enable drawing a roadmap for the organization and assure quality move from its current state to future state using efficient knowledge management model.

5.1 Population and Sampling

The population of the study was conducted in the Information Technology Departments at the main office of the organization. Mix methodology was used to conduct the study. Combination of quantitative and qualitative approach produces robust results [22]. Therefore, it was consist of two samples and two separate questionnaires addressing almost same questions; one questionnaire was directed to individual employees in the organization where the quantitative method was used. The other one was for various management levels where the qualitative method was used for author/s of more than two affiliations

5.2 Data collection and instrumentation

This research used a mixed method triangulation approach, the CPMM, which is a combination of quantitative and qualitative methods, as well as case study observations. This enables opportunities of cross-validating of finding and analyzing for the research [23]. By using this new hybrid methodology, which consists of case study observations and quantitative and qualitative methods, clear benefits for the research was realized by taking advantage of the strengths of each of those methods in a combined approach. In addition, these methods complement each other and allow a stronger and more comprehensive analysis [24]

Kaplan and Duchon (1998) emphasized that using a mixed method triangulation approach on data from multiple sources can alert the researcher to potential analytical errors and omissions [25]. Moreover, this approach can lead to new perceptions and means of analysis that a single model may not offer. A quantitative method is a deductive approach. It provides enumerated data results based on the respondents' answers to a survey. Qualitative and current state observations are inductive approaches. They provide evidence collected from interviewees and observations of the current state. The characteristics of this new hybrid mixed methodology can be summarized as follows:

1. Three different methods are used to collect data and information using different perspectives, namely, quantitative, qualitative and case study observation methods, so there are different samples and populations, and separate databases.
2. One database can explain the other databases or explore different question types.
3. One database can lead to a better understanding by building on or relating to the other databases.

Although this research was mainly a survey-based and not a typical case study, the researcher believed that it was necessary to use some of the case study techniques such as observations, interviews and measurement tools to obtain concrete evidence of issues relating to the research problem. Also, it is important to learn how KM is handled in terms of all its aspects, practices, strategies and goals and to identify any gap. For the current state observation, the researcher uses existing company records such as official statistics, KPIs, field observations (covert/overt) and the predesigned Knowledge Management Toolkit tool [26].

All the data was collected in multiple and distinct databases concurrently. These databases were analyzed, interpreted and compared, and then, based on the outcome, it becomes apparent whether the data confirms or disconfirms other data [27]. In fact, one of the following occurs:

- The database was agree with another database
- The database was disagree with another database
- One database was explain the other databases
- One database was the basis of the other database
- There was a positive or a negative relationship between the databases.

Figure 1 shows the observation of the current state, quantitative and qualitative databases and their relationships and interpretations

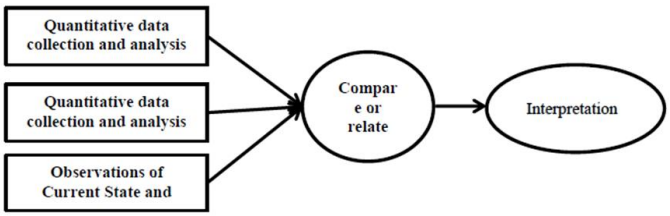

Fig 1. Source: Creswell (2013)

5.3 Pilot study

A pilot study was conducted to examine the validity and reliability of the adopted and adapted research instrument, which is a common practice in quantitative research [28]. Before conducted main scale study a researcher should conduct a pilot study which is described as a small-scale or trial research version of the study that is performed in preparation for the full-scale study [29]. It is preprocess activity where a researcher validates the instrument by doing small scale study and the outcome of pilot study serves as guidelines for the main scale study. The pilot study validates the designed instrument and highlight the flaws and strengths of the instrument from the view of respondents. Thus, the researcher makes changes to the instrument based on the outcome of the small-scale study [30]. The instrument used in this study is not self-constructed, it is a ready-made standardized and approved instrument [31]; however, the researcher modified and added some items in order to contextualize the study as illustrated earlier.

5.3.1 Participants in the pilot study

The purpose of pilot test was to collect information about KM practice from the perspective of end-users and how the end-users practice KM in the oil and gas organization of the Saudi Arabia. It was conducted from 2 November to 31 December 2015. The researcher used an off-the-shelf survey tool named QuestionPro. Since this part of the research was a quantitative questionnaire, the participants were approached remotely through social media such as WhatsApp, Facebook, Viber, and Line, and via email and many other forms of the communication network. The pilot study was in the form of an electronic questionnaire. The questionnaire was sent as a web link to maximum number of individuals in the target organization in Saudi Arabia. total eighty individuals responded to the questionnaire. The questionnaire's outcome was administered using a nonprobability convenient sampling of the above number of the participants.

The survey consisted of two parts, the first part contained demographic and general information questions which were mainly multiple choices questions and the second part consisted of a series of questions to acquire the respondents' opinion on specific statements which was measured using a five-point Likert scale to ascertain how much he/she agreed or disagreed with a specific argument. The Likert scale ranged from (1) Strongly Disagree to (2) Disagree, (3) Neutral, (4) Agree and (5) Strongly Agree. The pilot study was examined by using three ready-made standard instrument tests: descriptive analysis, Principal Component Analysis (PCA) and a reliability analysis [31].

5.3.2 Descriptive analysis

A total of 80 employees of the organization under study voluntarily chose to respond to the survey. Of these 74 (92.5%) were Sau-

dis and six (7.5%) were foreigners. As regards gender, 74 (92.5%) were male and six (7.5%) were female. Most of the respondents were originally from the Eastern Region of Saudi Arabia and made up more than half of the sample (44; 55%). As for the age of the respondents, two (2.5%) were below 26 years of age, 18 (22.5%) were 26–35 years old, 16 (20%) were 36–45 and 44 (55%) were above 45 years old. The education level of the respondents was as follows: high school graduation certificate holders: 22 (27.5%), Bachelor's degree holders: 36 (45%), Master's degree holders: 18 (22.5%) and PhD holders: four (5%). The respondents were holding a variety of positions in the company at the time of the pilot study. There were two (2.5%) summer students, four (5%) co-op students, 57 (71.25%) regular employees, nine (11.25%) contract employees, nine (11.25%) consultants and two (2.5%) vendors. The number of years in the current position ranged from below 3 years: 25 (22.94%) to 3–5 years: 29 (26.61%), 6–10 years: 13 (19.27%), 11–15 years: 13 (11.93%) and above 15 years: 21 (19.27%). The number of years in the previous position followed: below 3 years: 27 (24.77%), 3–5 years: 34 (31.19%), 6–10 years: 24 (22.02%), 11–15 years: 13 (11.93%) and above 15 years: 11 (10.09%). As for the number of years in a position before the previous position, the number of respondents was as follows below 3 years: 51 (46.97%), 3–5 years: 23 (21.10%), 6–10 years: 25 (22.94%), 11–15 years: five (4.59%) and above 15 years five (4.59%). Finally, the numbers of years of total service in the company was as follows: below 3 years: six (8%), 3–10 years: 17 (21%), 11–20 years: 20 (25%), 21–30 years: 17 (21%) and above 30 years: 20 (25%). The responses reflected a series of misunderstanding about KMS and its role in the organizations routine activates where most of the respondents were directly and indirectly involved in practicing the basics of KM in their assigned responsibilities. The respondents clearly confused KMS with technology enabling tools that provide the KM platform and infrastructure such as web services and share drives and other IT media. Almost half of the analyzed population defined KM as the company intranet (25%) or as the Internet (24%) as shown in Figure 2.

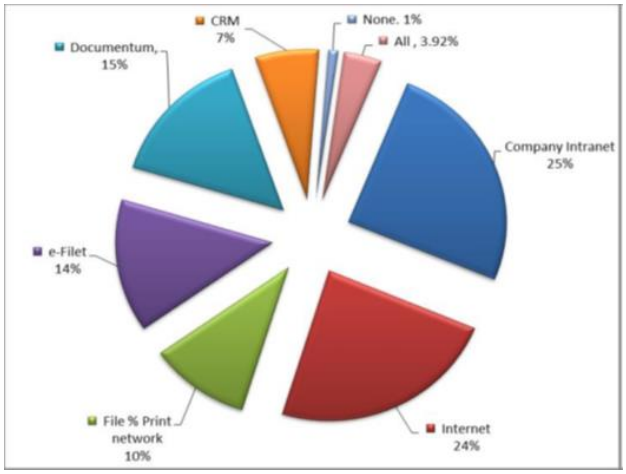

Fig 2. KMS Used by the Company

5.3.3 Principal component analysis

Principal Component Analysis or PCA was carried out as part of the pilot study to inspect the construct validity of the instrument. The outcome of the survey was uploaded as an SAV file to SPSS version 21. The major analyses that were carried out were an inter-items correlation, individual factor loadings tests and an internal reliability test. These tests can help the researcher to modify and refine the items and reduce their number [31].

Two tests were performed in the PCA. The first test was consist of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to the measure sampling significance and validity of the sample.

This first test was performed to verify whether there is adequate information about the construct measure as well as supporting the factorability of the correlation matrix, it is recommended that KMO should be ≥.6 or and Bartlett's test of sphericity significance should be p <.05. If exploration of the correlation matrix shows the presence of a lot of coefficients above 0.3 but below 0.5 and the Eigenvalues are >1, then this indicates that the data has fulfilled the requirement of the assumptions and the data is accepted [31]. All the results were within the range.

The second test involves analyzing data using the appropriate PCA. Items were analyzed using Varimax rotation where factor loadings above 0.3 suppressed. If items load above 0.3, then the instrument is adequate to be adopted for the full study [31].

5.3.3 Reliability statistics analysis

A reliability analysis was performed to measure the internal consistency of the items using the Cronbach's alpha coefficient as an indicator. If the Cronbach's alpha coefficient is greater than 0.7, then the reliability of the instrument for the study is confirmed [31]. Table 2 shows the case processing summary and there were total 80 respondent for the pilot study. Overall cronbach's alpha was .955 as shown in table 3. The reliability analysis of pilot study is given in Table 2. The value for cronbach's alpha is greater than 0.7 that indicates that there is strong binding between the items of the variables.

Table 3. Case Processing Summary

		No.	%
Cases	Valid	80	100.0
	Excluded	0	0
	Total	80	100.0

Table 4. Overall reliability statistics

Cronbach's Alpha	Cronbach's Alpha based on standardised item	No. of items
.952	.955	69

Table 5: Individual Reliability of Variables

Construct	No.of items	Cronbach's Alpha	Result
Organizational Support	9	. .934	Preferable
IT Infrastructure	5	.849	Preferable
KM Content Quality	7	.860	Acceptable
KM System Quality	4	.787	Acceptable
KM Service Quality	5	.869	Preferable
Society Cture	8	.869	Preferable
Individual Culture	5	.814	Preferable
Perceived Ease of Use:	5	.857	Preferable
Perceived Usefulness	9	.911	Preferable
Use/Intention to Use	8	.905	Preferable
User Satisfaction:	4	.897	Preferable

The following summarizes the findings regarding the pilot study of the organization:

1. The PCA and KMO test confirmed the adequacy and validity of the sample.
2. The PCA Varimax rotation test results show that there is a good factor loading for the research items; however, a few items that were not good enough for the research were deleted.
3. The PCA Cronbach's alpha test confirms that the reliability of the research items is good.

4. The descriptive analysis shows that there are misconceptions about KMS in the organization.
5. The company intranet and Internet are used as sources of knowledge by most users.
6. The participant's current role item was removed from the final study as per the organization's request.
7. The majority of employees are Saudi Arabian and from eastern province.
8. The majority of employees are 45 years old.
9. The sample size was big enough to trust its result and move to the full study phase.
10. The result of the pilot study proved that the instrumenta tion is valid, reliable and fit for the full study after deleting the unneeded items.

5. Future work

The actual quantitative and qualitative data for the study will be collected into two distant datasets simultaneously. The next step would be that interpretation, analysis, and comparison of the collected data and the affirmation and disconfirmation of data will be decided based on the findings and the results of the quantitative and qualitative; data ought to be the same, else clarify each other. [23].

In many cases, there is no clear convergence or divergence, few discrepancies always there. Differences in concepts, themes or scales may arise. Further investigations are required to see the root of these issues by collecting additional information to resolve the conflicts or explore the databases further to see if there is possible limitation on one of the databases [23].

6. Conclusion

The significance of Knowledge management system in the organization is vital, especially in current era, where there is a lot of data in our surroundings. In order to properly utilize and make of benefit of it, organizations should have proper and robust knowledge management system. The motivation of this study is to advance in understanding of knowledge management system existence, and implementation of a robust comprehensive knowledge management system to enhance the performance of individuals and organizations in the competitive. Also, maintaining and reusing in-house data and on-the-job training to reduce consultation and operations costs. Researchers perform the pilot study for the reliability of the questionnaire. The results validated the questionnaire and the researcher is ready to collect the actual data.

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