DLSU RESEARCH CONGRESS 2023
MANILA, PHILIPPINES
JULY 5-7, 2023
Fostering a Humane and Green Future:
Pathways to Inclusive Societies and Sustainable Development

Assessment of the Effectiveness of a Knowledge Management System for the Advanced Analytics Team of Globe Telecom, Inc.

Lissa Andrea K.Magpantay and Joel Andrew B. Cruz, Jr.

De La Salle University

Corresponding Authors: lissa.magpantay@dlsu.edu.ph; joel_cruzjr@dlsu.edu.ph

Abstract: Over time, there has been a steady rise in the use of digital tools and technologies to augment their day-to-day operations. Globe Telecom, one of the major telecommunication service providers in the Philippines, relies on its Advanced Analytics department to create predictive models that can help streamline its marketing efforts and increase the personalization of its customers. Data scientists deal with different types of knowledge in creating predictive models, making the current model development and operationalization process challenging. Thus, the general objective of the research is to pilot a Knowledge Management System (KMS) to make creating, storing, sharing, and retrieving information more accessible and efficient. The study used the success dimensions indicated in DeLone and McLean's model to evaluate the effectiveness of the proposed KMS.

The research utilized a mixed method of qualitative techniques to perform content analysis and quantitative approaches to describe the study results statistically. Tools and technologies used include Jamovi, Confluence and Google Form. Participants were instructed to use Confluence to codify and document their work. The results gathered from the study show a favorable response, especially on metrics related to system quality, knowledge quality, and service quality. The limited exposure of the participants got a neutral rating in terms of usage and user satisfaction. However, the features of the KM software still helped the participants accomplish basic tasks making the net benefit metric also a positive one.

Key Words: Knowledge Management, Knowledge Management System, Data Science, Confluence

1. INTRODUCTION

Knowledge Management (KM) originates in Anglo-American literature from the late 1960s and early 1970s (Zand, 1969; Rickson, 1976). By its formal definition, KM is the deliberate and systematic

coordination of organizational resources to add value. Furthermore, KM's motivation is to connect people to people and people to content.

KM involves activities like creation, storage, sharing, and application of knowledge. Additionally, policies and procedures, technological infrastructure, and organizational environment are the factors to consider in promoting these KM activities. Moreover, at the heart of it, culture also plays a vital role in the success of implementing a KM initiative (Gao et al., 2008).

Meanwhile, the field of data science is considered to be a multifaceted field. It requires domain-specific, computer science, and mathematical knowledge. Through the use of KMS, capturing and documenting the knowledge base is possible. In effect, practitioners can benefit from easier retrieval and discovery of solutions needed for their job.

In general, knowledge management is a holistic approach on managing critical knowledge assets for value to be created and strategic requirements are met. In line with this, KM is traditionally a combination of processes, methods, and systems that support and improve knowledge generation, storage, and sharing. As mentioned by Yee et al. (2019), the cost of data has risen dramatically and is anticipated to continue to rise. Big data is clearly going to change the way businesses are conducted in the near future. Fueling analytics, it entails gathering, storing, and translating information into knowledge. Consequently, this practice has the potential to help firms make better, more strategic decisions. According to Hislop et al. (2018), a knowledge management system is beneficial in the long run. As an enabler, KM system simplifies the identification, production, and measurement of internal knowledge to support tactical goals. Apart from this, proactiveness is also ensured because a robust KM allows the organization to rapidly respond to situations (e.g., changing market trends) without having to wait for a lead time or haggle with a third party for the best information. Having a knowledge management system also creates competitive advantage in ways that it manages effectively the intrinsic organizational knowledge (like process flows, best practices, and standard operating procedures). Nham et al. (2020) investigated the presence of KM in Vietnamese telecommunications. The authors found that telco firms have been saturated for a long time. This means that the competition boils down to coming up with new ways to respond to customers' ever-changing needs. Upon utilizing KM, the study found a direct positive impact in terms of product and managerial innovation. Pragmatic approach shows that within organizations, information sharing methods are encouraged to facilitate employee collaboration. Similarly, socializing increases employee cognitive capacity, and improves the firm's performance in terms of innovation. Another scenario of KM in action is the case of Nigerian telecommunications. Okafor et. al. (2019), discovered a growing dissatisfaction from its subscribers. The presence of too many telecommunication companies in Nigeria led to lack of explicit operating rules for the system and various usage of technology standards were followed. As a result, the service was of poor quality. Because of this, the Nigerian Communications Commission has mandated these firms to address this problem. Key findings on the research showed a strong and significant relationship between knowledge management, dimensions of knowledge creation, and knowledge storage. Acknowledging the need for standardization, KM has been recognized and implemented as a technique for improving corporate performance. Companies will be able to use their hard-won knowledge assets only if they reflect on lessons learned and best practices discovered in a thoughtful and organized manner. To enable the staged processing and transformation of knowledge, like how information products are processed, and to ensure that knowledge objects reach their intended end users and are put to good use, a knowledge architecture must be established and implemented.

In this light, the study's general objective is to empirically test Meyer and Zack's model by piloting the use of a KM software in doing data science-related activities. Part of the specific objectives are to design KM templates in Confluence to effectively support knowledge creation, codification, curation, organization, discovery, negotiation, and retirement; and to deploy the KM software and assess its

effectiveness on each KM process.

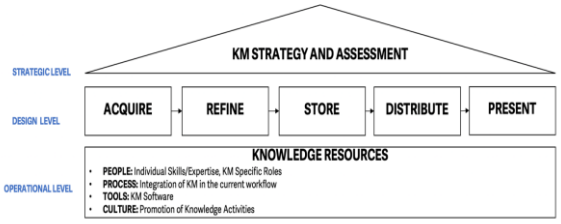

Fig. 1. Conceptual Framework

The first level (Operational Level) serves as the foundation of the framework. Its function is to provide the following knowledge resources identified: 1. People: In this research, people is the most vital component. The skills and expertise of people in the organization is primary source of the knowledge bearing activities. Thus, clearly identifying their roles in the overall KM strategy is determined in this study; 2. Process: The ways to codify knowledge is a crucial step in the proposed KM strategy; 3. Tools: Considering the appropriate technology enables the storage, retrieval, and access to the codified knowledge; and 4. Culture: The success of the KM strategy is strongly dependent on the behavior of both individuals and the organization.

The second level (Design Level) addresses the role of the Meyer and Zack model. The intent of this level is to give an overview on the activities involved in the model.

1. Acquire: Gathering stage of the knowledge that will be codified in the KMS.

2. Refine: Refers to cleansing and organizing the acquired knowledge.

3. Store: Actual storage of knowledge through physical or digital medium for retrieval.

4. Distribute: Stage where knowledge is delivered to users.

5. Present: In this stage, the effectiveness of the previous stages is evaluated to see if value is delivered by KM. Additionally, the relevance of this level is that these identified activities will be the basis for the development of the features of the selected KM software.

The last level (Strategic level) highlights the execution of the KM strategy. In this level, the development of the KM strategy should ensure linkage of people to people and people to content. Afterwards, the effectiveness of the KM strategy to the organization is evaluated by the researcher.

2. METHODOLOGY

KM can be regarded as a complicated task. And like anything else, it cannot offer business impact without a solid plan. In this light, the research design is done into three distinct phases with specific activities per phase.

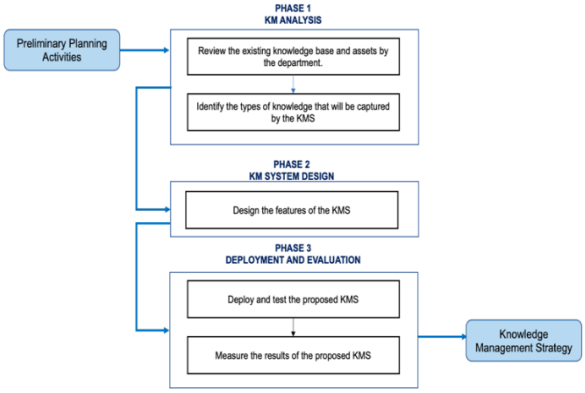

Fig. 2. Research Design

2.1. Preliminary Planning Activities

Prior to the phases in the research, preliminary activities were carried out throughout the course of this research. These activities involved seeking permission from the concerned stakeholders who were involved in the study. Complying with other requirements such as accomplishing a Non-Disclosure Agreement and the University Research Ethics Checklist was also accomplished to ensure the protection of the research proponent, the organization, as well as the university.

2.2. Phase 1: KM Analysis

In the first phase of the KM strategy, it is important to distinguish the different types of knowledge that will flow through the proposed KM software. Additionally, there were two steps included in this phase: (1) thorough review of the existing

knowledge base and assets of the department; (2) identification of knowledge that will be captured by the system.

2.3. Phase 2: KM System Design

During this phase, KM features were designed. These features refer to Confluence by Atlassian, which is the main technology used in the study since Globe is already using the Atlassian suite of products (e.g., Jira and Bitbcuket). Thus, it lessens the learning curve while offering tailored-fit features and functionalities to support KM processes.

This include two stages: (1) system analysis and design of the KMS; and formulation of the KM team who will handle the KM initiative in the long run.

2.4. Phase 3: Deployment and Evaluation

In the last phase, the benefits of the KMS were examined. During this stage, the researcher performed a pilot testing of the KMS. Pilot testing ran for 3 weeks.

The last stage of the study evaluated the KMS. The instrument used was a 29-item questionnaire which include the demographic variables used for profiling and the dimensions used to measure the effectiveness of the KMS. Specifically, the content of the instruments is indicated below:

2.4.1. Demographic Profile: Consisted of profiling variables such as role, tenure with the company, and educational background.

2.4.2. System Quality: Examined whether the proposed KMS has able to provide flexibility, ease of use and reliability to the data scientists.

2.4.3. Knowledge/Information Quality: Pertain to the ability of the KMS to provide a relevant, comprehensive, and up-to-date information to the data scientists.

2.4.4. Usage: Refers to the extent in which the data scientists used the proposed KMS.

2.4.5. User Satisfaction: Examined the level of satisfaction the data scientists experienced upon using the proposed KMS.

2.4.6. Service Quality: related to the quality of service the data scientists received upon using the proposed KMS.

2.4.7. Net Benefits: Pertains to the extent in which it contributed to the successful task accomplishment of the data scientists.

3. RESULTS AND DISCUSSION

Based on the data gathered and interviews, knowledge loss is a pressing problem for the organization. This is evident during the pandemic that most members who resigned from the organization are technical leads. There may be interruptions in working if these people leave the organization. Resolving issues can also take a long time because people who replace those left experience a learning curve.

The proposed system have two major components: (1) Knowledge Capture Templates which is used to capture different types of knowledge encountered by the data scientists, and (2) Built in functions like Page Tree for organization, Search, label, and tags for easier knowledge discovery, and Discussion Threads to track and communicate with other users.

3.1. Knowledge Capture Templates

Diverse type of knowledge is codified using the built-in and customizable templates of Confluence. Each description of the templates used during the pilot test are summarized below:

3.1.1. Basic Model Information Template: This template is used by Model Developers. This template captures the steps data scientists follow when building a predictive model.

3.1.2. Post Mortem Template: Model Developers and Machine Learning Engineers used this template to document any incidents of data source change and what action steps to do to mitigate its impact.

3.1.3. Model Deployment Template: This template includes the step-by-step process of deploying the created model into the production environment.

3.1.4. Learning Logs Template: This template uses the 5 Whys technique to drill down the underlying factors or causes of events.

3.1.5. Decision Planning Template: This template codify the results of the brainstorming sessions of the participants.

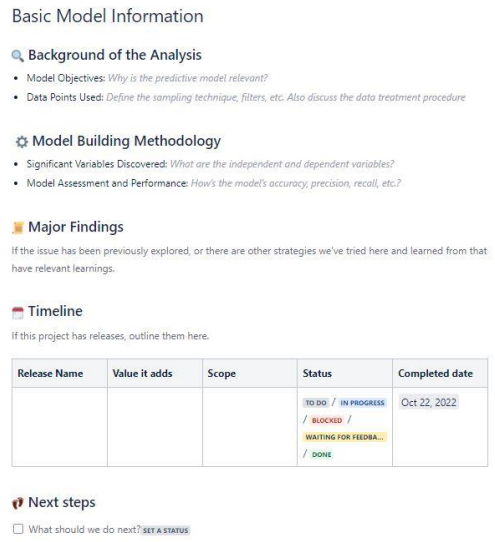

Fig. 3. Sample Screenshot of KM Template

3.2. Built In Functions

This section of the research provides the user interface and brief description of the proposed KMS.

3.2.1. Pages and Spaces: Pages are documents that allow users to write, update, and collaborate on their work. While pages for specific people, teams, and strategic projects may be found in spaces.

3.2.2. Page Tree Structure: Using a page tree can organize the material so that it is simple to find things. Additional features of Confluence include comparing versions, examining the history of revisions made to each page, and undoing changes that were made.

3.2.3. Search, Labels, and Tags: For faster retrieval of codified knowledge, Confluence offers the search function. In addition, putting labels and tags makes organization a lot easier.

3.2.4. Discussion/Question/ Comment Section: Users can create discussion threads, comment on a post, and upvote usable post or comment.

3.2.5. Archived Pages: To maintain page trees neat and filled with useful material, Confluence offers users archive old pages. Users can also access past pages to track historical updates.

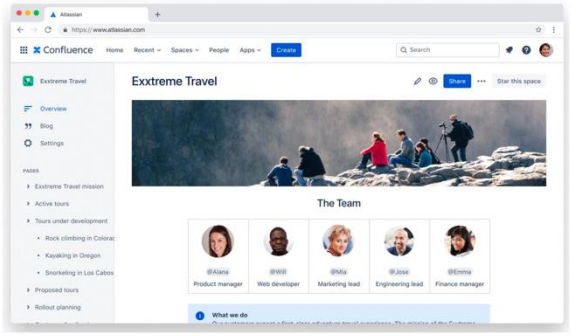

Fig. 4. Sample Screen of Confluence

After implementing the KM tool, the researcher administered a survey to confirm the system's effectiveness in helping the 26 data scientists with their work. The instrument utilized a Likert scale of 1-5 to gauge responses (for measuring the responses (1 - Strongly Disagree to 5 - Strongly Agree).

Table 1. Effectiveness of KMS Results

Success Indicator	Mean	Description
System Quality	4.4	Strongly Agree
Knowledge Quality	4.5	Strongly Agree
Usage	3.8	Agree
User Satisfaction	3.3	Neutral
Service Quality	3.7	Agree
Net Benefits	3.8	Agree
Overall Evaluation	**3.9**	**Agree**

The study only explored a pilot implementation. In effect, the limited exposure of the participants with the software expected. However, data scientists still reported that Confluence has basic components which are both responsive and easy to use. Generally, data scientist indicated an interest on

sharing their knowledge through Confluence. However, it is also important to take note that other platforms like Google Drive and documentation tools (e.g., Microsoft Word) are also available to them as a means of storing and codifying knowledge.

Participants believe that Confluence contribute positively to the Advanced Analytics department. Using the KMS can be a good investment to the organization. Empirical findings of the study recognizes that the KMS is effective since it was able to help data scientists on doing basic tasks such as documenting their work, sharing knowledge, and storing key information.

4. CONCLUSIONS

A thoroughly comprehensive knowledge management system is not easy to implement. It requires a symbiosis between an organization's policies and procedures, technological infrastructure, and organizational environment. However, the long-term benefits can outweigh the tedious efforts to start one. To address knowledge management gaps, information technology plays a crucial role in enabling organizations to perform the KM processes. Thus, finding the right tool with the right features to capture tacit knowledge is necessary to capitalize on the different knowledge within the organization entirely. Lastly, factors that encourage people to contribute, manage, and use technology are equally vital to the features of the KM tool. Aligning the company culture and ensuring commitment amongst stakeholders proves viable for a KM initiative to work.

To sharpen more the idea of knowledge management, future investigators should also investigate case studies for the real-life application of KM in an organization. In existing literature, general ontology of knowledge management often provides a broad and theoretical perspective. Thus, to better understand how the conduct of KM is performed, it is recommended to characterize the KM processes in and quantify its effect to each step in the existing data science workflow.

5. ACKNOWLEDGMENTS

The researchers would like to acknowledge the Advanced Analytics department of Globe for their insights and support to this research endeavor.

6. REFERENCES

Atlassian. (n.d.). *Confluence: Your remote-friendly team workspace*. Atlassian. Retrieved March 17, 2023, from https://www.atlassian.com/software/confluence

Gao, F., Meng, M., & Clarke, S. (2008). Knowledge, management, and knowledge management in business operations. *Journal of Knowledge Management, 12*(2), 3–17. https://doi.org/10.1108/13673270810859479

Globe Telecom, Inc. *Model Development Handbook v2.0*. [Operating Manual] Globe Telecom, Inc.

Delone WH, McLean ER. The DeLone and McLean model of information systems success: a ten-year update. J Manag Inf Syst. 2003;19(4):9–30.

Nham, T. P., Tran, N. H., & Nguyen, H. A. (2020). Knowledge sharing and innovation capability at both individual and organizational levels: An empirical study from Vietnam's telecommunication companies. Management and Marketing, 15(2), 275–301. https://doi.org/10.2478/mmcks-2020-0017

Okafor, L., Owate Olaka, L., & Okorie, E. F. (2019). Knowledge Management Strategies and Firm Performance: A Survey of Telecommunication Companies in Port Harcourt. 21, 1–10. https://doi.org/10.9790/487X-2106040110

Polanyi, M. (1966), The Tacit Dimension, Routledge & Kegan Paul, London.

Yee, Y. M., Tan, C. L., & Thurasamy, R. (2019). Back to basics: building a knowledge management system. Strategic Direction, 35(2), 1–3. https://doi.org/10.1108/SD07-2018-0163

Zand, D. (1969). Managing Knowledge Organization. Preparing Tomorrow's Business Leaders Today, Englewood Cliffs, 112-136.