IMPROVEMENT OF MOBILE COVERAGE ANALYSIS PROCESS IN INFRASTRUCTURE DEVELOPMENT DEPARTMENT THROUGH ADOPTION OF KNOWLEDGE CREATION PROCESS

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DEDICATION

Every difficult task necessitates both self-effort and the guidance of elders, particularly those close to our hearts. My humble effort is dedicated to my loving wife and daughter and the rest of my family members whose support and prayers enable me to continue on this journey.

Along with all of the hardworking and respected lecturers, particularly my supervisor, without whose unending support, guidance, knowledge shared, and motivation, this entire journey would not be possible.

To everyone who shone brightly on this journey,

This study is dedicated to you.

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ABSTRACT

This research focuses on the improvement of mobile coverage analysis process in Malaysian Communications and Multimedia Commission (MCMC) specifically in the Infrastructure Development Department (IDD). The intervention of this research will be through the introduction of the knowledge creation process within IDD. Three research objectives have been identified: to determine the prevalence factors that affect the performance of IDD in performing the mobile coverage analysis, to implement a knowledge creation process that can improve the performance of IDD in performing the mobile coverage analysis and to diagnose the impact of the interventions among the employees in IDD. The data collection for this research involves ten employees for the quantitative (survey) data and two subject matter experts for the qualitative (interview) data. The data was then analysed using SPSS and NVivo to measure the effectiveness of the interventions in this research. From the analysis, it was found out that the factor contributing to this issue is due to lack of sharing and availability of documents to be used as reference. There is no knowledge creation currently being practised in IDD. Therefore based on the input from the data collection, research has adopted the SECI model of the knowledge creation process as the model for the interventions. The first intervention in cycle 1 will be through the Externalization of developing a document for mobile coverage analysis in IDD. The second intervention in cycle 2 will be through Socialization by providing training the increase their knowledge and equip them with the right skills to perform the analysis. Towards the end of the research, both data analyses for cycle 1 and cycle 2 proven that the intervention is significant and giving impact to the employees in IDD.

Keywords: Knowledge Creation, SECI model, Externalization, Socialization

ABSTRAK

Kajian bertujuan untuk menambah baik proses analisa liputan mudah alih di Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM) dan secara spesifiknya pada Jabatan Pembangunan Infrastruktur (IDD). Kaedah penyelesaian yang dicadangkan adalah melalui pengenalan konsep penciptaan pengetahuan (*knowledge creation)* di dalam IDD dan sebanyak tiga objektif kajian telah dikenal pasti. Objektif kajian yang pertama adalah bagi mengenal pasti faktor utama yang menyebabkan kurangnya prestasi IDD dalam menganalisa liputan mudah alih. Dan yang kedua, adalah bagi melaksanakan proses penciptaan pengetahuan bagi meningkatkan lagi prestasi IDD dalam membuat analisa liputan mudah alih. Objektif kajian yang terakhir sekali adalah bagi menilai dan mengukur tahap keberkesanan kaedah penyelesaian yang dilaksanakan. Kaedah pengumpulan data yang digunakan di dalam kajian ini adalah melalui temuramah (kualitatif) dan soalan kaji selidik (kuantitatif). Data yang telah dikumpul kemudianya akan di analisa dengan menggunakan perisian NVivo dan SPSS bagi mengukur tahan keberkesanan penyelesaian yang telah dibuat. Hasil daripada analisa yang telah dibuat mendapati antara faktor yang menurunkan prestasi IDD adalah disebabkan tiada proses penciptaan pengetahuan dilaksanakan di IDD dan juga tiada dokumen berkaitan yang boleh dijadikan rujukan. Hasil daripada analisa ini, penyelidik telah memilih model penciptaan pengetahuan SECI sebagai asas bagi kaedah penyelesaian yang akan dilaksanakan. Pada kitaran kajian yang pertama ini, proses pewujudan dokumen (*Externalization)* akan dilaksanakan bagi aktiviti penganalisaan liputan mudah alih di IDD. Pada kitaran kedua, latihan (Socialization) telah dilaksanakan bagi meningkatkan tahap pengetahuan bagi melaksanakan analisa liputan mudah alih. Berdasarkan hasil analisa data bagi kedua-dua kitaran telah membuktikan kaedah penyelesaian yang dipilih oleh penyelidik adalah berkesan dan berjaya meningkatkan tahap pengetahun staff IDD.

Kata Kunci: Penciptaan Pengetahuan, Model SECI, *Externalization, Socialization*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

MCMC	-	Malaysian Communications and Multimedia Commission
IDD	-	Infrastructure Development Department
ICD	-	Infrastructure Coordination Department
JENDELA	-	Pelan Jalinan Digital Negara
3G	-	Third generation of wireless mobile network technology
4G	-	Fourth generation of wireless mobile network technology or Long Term Evolution (LTE)

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

The purpose of this research is to improve the performance of the Infrastructure Development Department (IDD) in conducting the mobile coverage analysis through the adoption or application of knowledge creation process. Currently, in Malaysian Communications and Multimedia Commission (MCMC), IDD is the department responsible for generating the report for nationwide mobile coverage at populated areas based on quarterly basis. The process to generate the mobile coverage report is called mobile coverage analysis.

In this chapter, the researcher will give a brief introduction about MCMC and IDD to better understand the organization and the department's role that relate to the problem statement. The second part of this chapter will focus on the problem by diagnosing the problem using fishbone model and assessing the external and internal analysis for IDD. This chapter also will identify the research objectives and towards the end of this chapter, the researcher will discuss the objectives of this research and the researcher’s role and ethics in this study. To end this chapter, the significance of this research together with its theory and practice, will also be discussed.

1.2 Case Company Introduction

The communication and multimedia industry in Malaysia has converged in 1990s which require a new regulation and policy to safeguard the industry. A new converge regulation model had been developed for the industry in November 1998. Two Act has been enacted which are the Communications and Multimedia Act 1998 and the Malaysian Communications and Multimedia Commission Act (1998). The enactment of both Act has come to the establishment of the Malaysian Communications and Multimedia Commission (MCMC).

Since the enactment of the Communications and Multimedia Act (1998) on 1 April 1999, the new act has replaced the previous Telecommunications Act (1950) and the Broadcasting Act (1988). In the establishment of MCMC, the Commission has defined 10 National Policy Objectives as the foundation for MCMC covering economic regulation, technical regulation, consumer protection and social regulation.

Infrastructure Division (INFD) is one of the key division in MCMC which look after the overall implementation and issues related to the telecommunication infrastructure. There are two departments under the INFD: the Infrastructure Development Department (IDD) and Infrastructure Coordination Department (ICD). IDD is responsible for the overall development of telecommunications infrastructure, including the planning and implementation of projects. IDD is also accountable for reporting the Pelan Jalinan Digital Negara (JENDELA). As part of the information required is the report on the mobile coverage at populated areas every quarter.

1.2.1 Internal Environmental Analysis

An organization's internal environmental analysis includes its internal strengths and weaknesses. What happens in the company is an excellent source for internal analysis. Human resources, tangible and intangible assets, management, operational efficiencies etc., are examples of internal factors. The internal strengths and weaknesses of the Infrastructure Development Department can be measured in the findings as shown in the table below.

Table 1. 1 The Internal analysis.

Factors	Strength	Weakness
Marketing Assessment Availability of internal expertise to perform training and documented the mobile coverage analysis. Only IDD could perform the mobile coverage analysis in MCMC.	✓	
Management Assessment No knowledge creation process being practiced in IDD. Currently the process on mobile coverage analysis was not documented for reference.		✓
Financial Assessment Availability of department budget that can be re-purpose for the purchase of tools or software required.	✓	
Operations Assessment Lack of required knowledge for all employees in IDD to perform the mobile coverage analysis.		✓
Management Information System (MIS) Assessment Availability of high-end notebook by most of the		

employees in IDD together with Mapinfo software license. However, there are limited license for Mentum software.	✓	

The strength related to the issue in this research can be seen in terms of the availability of internal expertise to conduct the training and to develop the required documents for reference. The present of the expert contributes significantly to the department's operation especially in conducting the mobile coverage analysis. Their knowledge can be passed on to other employees in IDD.

Although currently there are limitation in term of the licensable software on the mobile planning, however the department has unutilised budget that can be repurpose to be used to purchase the license if need be. In term of the hardware, most of the employees in IDD has a high end notebook which has just been upgraded recently. With the current notebook, it is capable to perform the mobile coverage analysis using Mapinfo software (analysis software). Both of the weakness will be address through this research and interventions.

1.2.3 SWOT Analysis

Infrastructure Development Department (IDD) plays important role in generating the mobile coverage analysis for the purpose of reporting and tracking of KPI under the JENDELA and as well for the use of planning and addressing public complaints. IDD is the only department in MCMC that has the capability and resources to perform the analysis. However, due to the limitation of resources including the knowledge to perform the mobile coverage analysis, the overall analysis process tend to take longer time. Through SWOT analysis conducted focusing on the mobile coverage analysis in IDD, the strengths and weaknesses has been identified. By leveraging on the strength also, IDD could expand their capability to address the opportunities. By identifying the weaknesses and threats upfront, suitable preventive

measure could be applied to lower the risk of threats. Details of the SWOT analysis as in Table 1.2 below.

Table 1. 2 The SWOT Analysis

Strengths	**Weaknesses**
• Internal expertise available within IDD. • In house training and documentation development • Deep understanding on the technical and regulatory matters.	• Knowledge gaps within IDD • No knowledge creation process adopted in IDD • Lack of documentation for reference and guidance
Opportunities	**Threats**
• To support the implementation and monitoring of JENDELA by MCMC. • To share and train external division and State office to conduct mobile coverage analysis. • Increase reputation and image of IDD and MCMC to external parties.	• Unable to provide requested information in timely manner. • Inaccurate of information and reporting to internal and external parties.

The above SWOT analysis was conducted to measure the strength and weakness (internal factor) as well as the opportunity and threat (external factor), which relates to the mobile coverage analysis activity by the Infrastructure Development Department (IDD) in MCMC. For the internal factor, in term of strength, IDD has its own internal expertise to perform the mobile coverage analysis. The expert could provide training or develop a document to be as a reference for the rest of the staff in

IDD to refer to. Most of the employees in IDD also have a deep understanding of technical and regulatory matters in telecommunications.

However, few weaknesses have been identified which are; there are knowledge gaps between the employees in IDD. This would possibly due to no knowledge creation process currently being implemented within the department. Other than that, lack of knowledge sharing and documents to refer to also limits the other employees to obtain knowledge on how to perform the mobile coverage analysis independently.

For external factors, IDD has the opportunities to play a major role in supporting the implementation and planning of all projects under JENDELA. This is because IDD has all the expertise required for planning and managing the projects. With the availability of the expertise and knowledge within the IDD, there are also potential for the knowledge to be shared across other division in MCMC. IDD could conduct training to the relevant division in MCMC to train them on how to perform the mobile coverage analysis. Other than that, it will also help to increase IDD internal reputation within MCMC, as well as the reputation of MCMC to the external parties.

Through the SWOT analysis, the critical factors impacting IDD in conducting the mobile coverage analysis based on internal and external factors could be identified. Based on the internal strength available within IDD, there is a potential for IDD to leverage available opportunities in MCMC. The mobile coverage analysis is an important process and the knowledge should be extended to other relevant divisions in MCMC to allow them to be more independent in doing planning and also in addressing complaints by internal and external parties. Therefore, the knowledge and skills in performing the mobile coverage analysis can be identified as critical knowledge for MCMC to support its operation.

1.3 Problem Statement

Infrastructure Development Department (IDD) plays an important role in supporting MCMC function and operation as it is the only department that is responsible and has the capability to produce the mobile coverage at populated area

report which is the critical measurement to be used for JENDELA reporting. The report for JENDELA purpose is required to be generated every quarter and for two types of technology which are 3G and 4G (LTE).

However, the footprint or availability of mobile coverage for each of the mobile service providers in the county is different based on the availability of their network or infrastructure (i.e. Mobile towers or rooftop base station). In Malaysia, currently, six service providers provide mobile services which are Celcom, Maxis, Digi, Umobile, YES and Webe. To generate the mobile coverage nationwide, the mobile coverage needs to be generated for each of the service providers individually first before it will be combined as composite nationwide coverage. And for two technologies (3G and 4G) it means, twelve analyses need to be done every quarter to get the nationwide mobile coverage.

Other than for JENDELA reporting, IDD also supporting other departments and divisions by providing the mobile coverage analysis for their planning and monitoring purposes. The information on the mobile coverage will also be used by the State office and the Complaint Bureau department in managing complaints received from the public. Other departments which also frequently use the data are the Parliamentary Department, Universal Service Provision Division, and the Quality of Service Division.

As of now, there are only eight (8) employees in IDD. Each of the employees has different background and field of expertise. Only two (2) of the employees in IDD are capable of performing the mobile coverage analysis as it required specific knowledge and skills in operating the mobile planning software. Breakdown of expertise and responsibilities of employees in IDD as in Table 1.3 below.

Table 1. 3 Breakdown in of Expertise in IDD

No.	Employees	Field of Expertise
1.	Head of Department	General (overall technology)
2.	Officer 1	Fixed network technology
3.	Officer 2	

4.	Officer 3	Fixed network and submarine technology
5.	Officer 4	Mobile network technology
6.	Officer 5	
7.	Officer 6	General technology
8.	Non-executive	Administrative

Figure 1.1 below briefly shown the workflow in performing the mobile coverage analysis. The whole activity can be divided into six main processes. The first process is to extract the mobile network data from the Communication Infrastructure Management System (CIMS). However, the extracted data will need to be cleaned up before it can be converted into the planning tool (Mentum) template for the mobile coverage generation. The data in the template need to be complete and precise to ensure that the mobile coverage generated based on the simulation by the planning tool is accurate and as close as possible to the actual coverage on the ground.

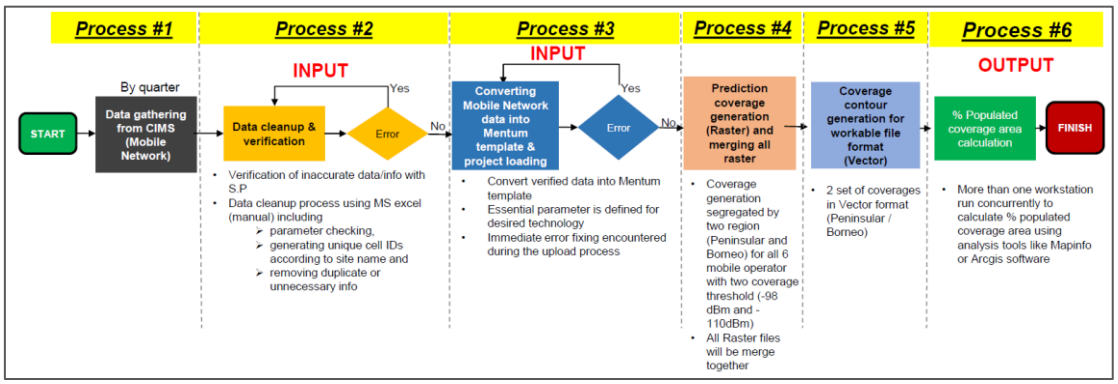

Figure 1. 1 The workflow for Mobile Coverage Analysis.

As mentioned earlier, there are six mobile service providers and the 3G and LTE coverage for each of the provider need to be generated. That mean, the whole process from first process to the sixth process has to be repeated twelve times. Currently, based on the capability of only two staff, the whole process to could take up to a month to complete. Therefore, it is crucial to extend the knowledge to the other employees in IDD so that the workload and task be shared across the department. The main objective is to reduce the time required to generate the coverage.

1.3.1 Ishikawa (Fish Bone) Diagram

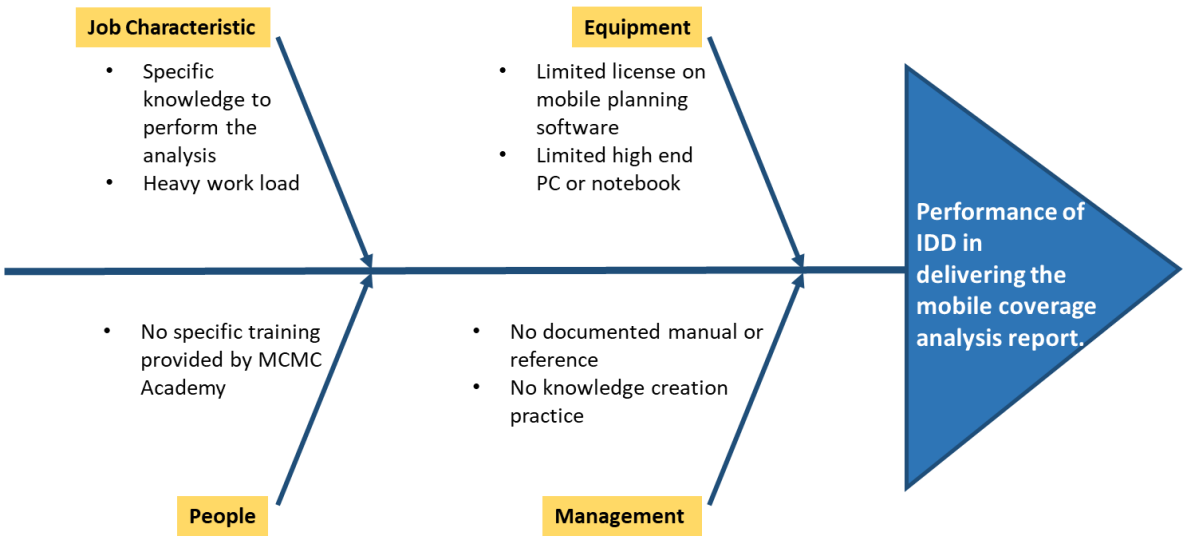

Figure 1. 2 The Fishbone diagram

The factor that is being recognized is in terms of the staff that are involved in mobile coverage analysis is limited. Out of total eight (8) employees in IDD, only two (2) persons are capable to conduct the task. There are also no specific training or sharing session which related to obtain the skill and knowledge related to the mobile coverage analysis offered by the MCMC Academy. The lack of knowledge creation process being practised in IDD seems to be the main factor contributing to this situation. In term of the equipment, most of the employees in IDD has the high end notebook which is capable to perform the task.

To perform the mobile coverage analysis, it requires specific knowledge and skills on mobile and radio planning. However, the knowledge can be developed through training and experiential learning by performing the task. As of now, there are no documentation or manual which can be referred to specifically for the task.

1.4 Research Questions

The research questions were developed to guide the flow of the research to

ensure that it will align with the research objectives. The research question will guide the researcher to identify the root of the problem, developing the right intervention and also to measure the effectiveness of the interventions. The researcher has identified three research questions as below:

Research Question 1:

What is the prevalence factors that affecting the performance of Infrastructure Development Department in performing the mobile coverage analysis?

Research Question 2:

What are the knowledge creation process that can be implement to improve the performance of Infrastructure Development Department in performing the mobile coverage analysis?

Research Question 3:

What are the impact of the interventions to the Infrastructure Development Department (IDD)?

1.5 Research Objective

A close relationship exists between the research questions and the research objectives. The research objectives will summarise the main aims or purpose of the research including identifying and solving the problem. The research objectives also important to provide clarity and to ensure that the scope and progress of this research are towards the goals that the researcher wants to achieve. Hence, the objectives for this research has been identified as below:

a) **Research Objective 1**

   To determine the prevalence factors that affecting the performance of Infrastructure Development Department in performing the mobile coverage

analysis.

b) Research Objective 2

To implement knowledge creation process that can improve the performance of Infrastructure Development Department in performing the mobile coverage analysis.

c) Research Objective 3

To diagnose the impact of the interventions among the employees in Infrastructure Development Department.

1.6 Researcher's Role

The researcher is responsible for the whole process of conducting this research and also in implementing the interventions. Since this is an action research, during the research, the researcher will design and implement both interventions in both cycle of the research. A quantitative method will be used to collect and measure the data before and after the interventions. This to align with the third research objective to measure the effectiveness of the interventions.

As part of the action research process, the researcher also responsible to come up with a solution (interventions) based on the problem identified in IDD. The identification of the problem and information gathering for the development of the intervention was done through qualitative method (interview) with the subject matter expert who responsible in conducting the mobile coverage analysis in IDD. Their input is crucial and will be as the key for the success of the interventions.

The researcher will then formulate all the input from qualitative and quantitative methods to form the framework for this research. Since the researcher did not have much knowledge on the mobile coverage analysis, the full cooperation received from the expert in IDD has making this research runs smoothly. As part of the IDD team, the researcher hopes that through this research, it will help IDD to improve its performance and also to start to adopt the practice of knowledge creating within the department and to be expand to the division in the future.

1.7 Research Ethics

There are numbers of ethical criteria that should be considered. According to Deborah (2003), there are five main principle of ethics in conducting research, which are:

i. Discuss intellectual property of the research frankly;
ii. Be conscious of multiple roles;
iii. Follow informed-consent rules;
iv. Respect confidentiality and privacy; and
v. Tap into ethics resources.

Following to the principles, researcher has getting consent from the participants in the interview as well as explaining to them on the purpose of this research and the expected outcome from the interventions. The researcher also discuss on the limit of confidentiality on how their data will be used for the research. From the understanding of both parties, the researcher and the participants, there are no risk involved on the sharing of information about the mobile coverage analysis process.

In addition, the researcher also maintain the privacy and confidentiality of the respondents during the data collection. All sensitive data of the respondent will be kept confidential. It is also noted that the practical reason to adhere to the ethical principles would practically protect the researcher and to ensure the findings from the research is reliable.

1.8 Significance of the Research

This research is critical for the improvement of mobile coverage analysis activity which currently conducted by IDD. This research will analyse and evaluate the root problem and to implement the interventions to address the gap for the benefit of the department and MCMC as a whole.

1.8.1 Significance to Theory

Based on the keyword search of Knowledge Creation and SECI model in Web of Science based on the topic of study within the past five years (2017 – 2021), there are total of 51 related studies found from 10 research areas. The breakdown by the research areas can be seen as in Figure 1.5 below.

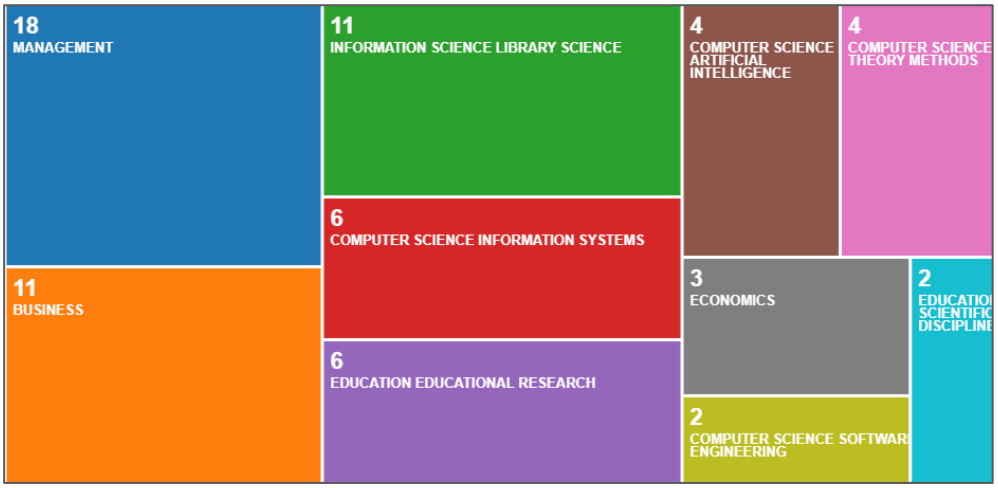

Figure 1. 3 The Treemap analysis from Web of science browser.

Based on the previous study, almost half of the studies on knowledge creation are focusing on the business economics areas. This is because knowledge creation plays important role in promoting knowledge sharing and organizational learning. In other way, it has a direct correlation to the performance and efficiency of the organization.

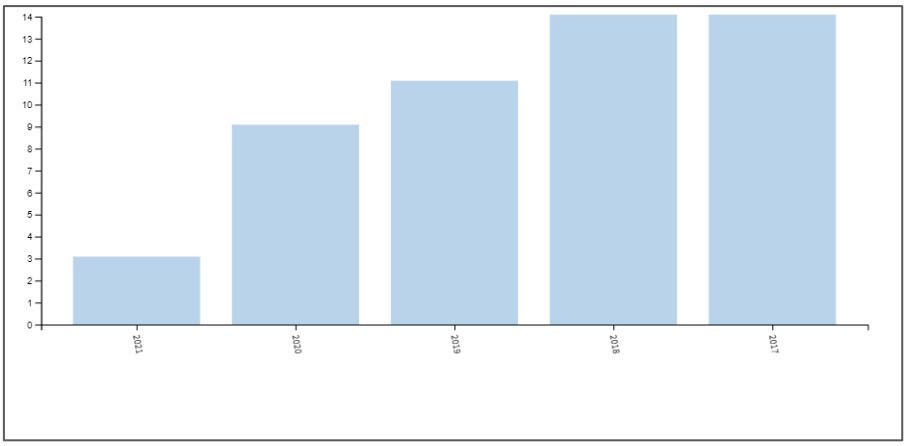

Figure 1. 4 The Trend Analysis from Web of science browser.

From the Web of Science also, the trend of research on knowledge creation has decreased over the past five years where 2016 and 2017 recorded the highest studies with 14 for each year. It is also confirmed that the knowledge creation level in most of organisation in Malaysia is relatively low (Lee, 2012). Therefore, this research is relevant to provide more contribution to the knowledge creation study especially on the public sector in Malaysia.

1.8.2 Significance to Practice

The selected topic for the research are based on the actual problem faced by the Infrastructure Development Department (IDD) in conducting the mobile coverage analysis. IDD plays a key role in both for the reporting of JENDELA as well as in supporting the operation of MCMC and other departments. Through this research, the researcher will identify the problem and to design the potential solution to solve the problem.

Under this research, there will be two cycle of intervention that will be implemented. There will be assessment to measure the effectiveness of the first intervention and further improvement will be done in the second intervention to ensure that the problem can be solved. Thus, in overall, this research will contribute to a better outcome and performance of IDD to support JENDELA and MCMC.

1.9 Definition of Terms

The term used in this research will be defined to ensure for correct understanding in the research process.

Knowledge Management

Knowledge management is the systematic management of an organization's knowledge assets for the purpose of creating value and meeting tactical & strategic requirements; it consists of the initiatives, processes, strategies, and systems that sustain and enhance the storage, assessment, sharing, refinement, and creation of knowledge.

Knowledge Creation

Knowledge creation is the process of combined, converted and sharing of knowledge in the organization. The most well-known model for knowledge creation is SECI Model introduce by Ikujiro Nonaka by defining the knowledge in tacit and explicit knowledge. Based on the two concept of knowledge, it the process of converting the knowledge can be summarised into four main modes which are the Socialization, Externalization, Combination and Internalization.

Mobile Coverage Analysis

Mobile coverage analysis is a process perform by the IDD to generate the mobile coverage at populated areas. The coverage was generated using the mobile site information and the coverage will be simulate using a planning tool to simulate the coverage based on few network and geographical parameters. The mobile coverage information will then be used for reporting and project planning purpose to identify the areas with still lack of mobile coverage.

Mobile Coverage

Mobile coverage refers to the mobile cellular service availability based on certain geographical location. The mobile cellular service was provided by the mobile service providers such as Celcom, Maxis, Digi and Umobile. Other smaller service provider such as Webe and YES also providing the mobile services. Mobile cellular service involves providing of voice and data services to the customer by using either 3G or 4G (LTE) technology.

REFERENCES

AL, A. (2019). Quality Management Visiton of Future Early Career Operation Manager. 162-185.

Carneiro, A. (2001). The role of intelligent resources in knowledge management. *Journal of Knowledge Management*.

D. C. Collatto, A. D. (2017). Is Action Design Research Indeed Necessary? Analysis and Synergies Between Action Research and Design Science Research.

Dalkir, K. (2005). *Knowledge Management In theory and Practice.* McGrill University.

Davenport, T. H. (2000). *Working Knowledge: How Organizations Manage What They Know.* Boston: Harvard Business School Press.

Deborah, S. (2003, January). *Five principles for research ethics.* Retrieved from American Psychological Association (APA): https://www.apa.org/monitor/jan03/principles

Dudovskiy, J. (2018). The Ultimate Guide to Writing a Dissertation in Business Studies: A Step-by-Step Assistance.

Ganesh, D. B. (2001). Knowledge management in organizations: examining the interaction between technologies, techniques, and people. *Journal of Knowledge Management*, 68-75.

Gill, K. S. (2008). Methods of data collection in qualitative research: interviews and focus groups. *British Dental Journal*.

Gold, A. M. (2001). Knowledge management: an organizational capabilities perspective. *Journal of Management Information Systems*, 4-31.

Gooijer, d. (2000). Designing a knowledge management performance framework. *Journal of Knowledge Management*, 303-310.

Hicks, s. (2016). Theory and social work: conceptual review of the literature. *International journal of social welfare*.

Hosseini, M. &. (2020). Adaptation and Validation of the Research Motivation Scale for Language Teachers.

James Hoffman, M. L. (2005). Social capital, knowledge management, and sustained superior performance. *JOURNAL OF KNOWLEDGE MANAGEMENT*, 93-100.

John W. Creswell, V. L. (2017). *Designing and Conducting Mixed Methods Research.* thousand oaks: SAGE publications.

K. S. M. Kumaraswamy, C. C. (2011). Collaborative knowledge sharing strategy to enhance organizational learning.

Kemmis, S. &. (2000). Participatory action research. In *Handbook of qualitative research* (pp. 567 - 607). Thousand Oaks.

Kumaraswamy, K. S. (2012). Collaborative knowledge sharing. *Journal of Management Development*.

Lee & Choi. (2003). Knowledge management enablers, processes, & organizational performance : An integrative view & empirical examination. *Journal of Management Information systems*, 179-228.

Lee, W. y. (2012). Factors Driving Knowledge Creation among Private Sector Organisation: Empirical Evidence from Malaysia. *Journal of Oganizational Knowledge Management*.

M. Shahnawaz, Z. H. (2020). Peer knowledge sharing and organizational performance: the role of leadership support and knowledge management success.

Mostafa, S. (2013). A framework for lean manufacturing implementation. *Production and Manufacturing Research*, 44-64.

Mostafa, S. (2013). A Framework for Lean Manufacturing Implementation. *Production and Manufacturing Research*, 44-64.

Nejatian M., N. M. (2013). Critical Enablers for Knowledge Creation Process: Synthesizing the Literature. *Global Business and Management Research: An International Journal*, 105-119.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 14-37.

Nonaka, I. a. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation.* Oxford University Press.

Onwuegbuzie, A. J. (2004). Enhancing the Interpretation of Significant Findings: The Role. *The Qualitative Report*.

Ramezani, M. F. (2013). Investigating critical success factors of knowledge management in research organizations: A case study concerning one of the research organizations of Iran.

Varsha, A. (2019). Selection of appropriate statistical methods for data analysis. 1-5.