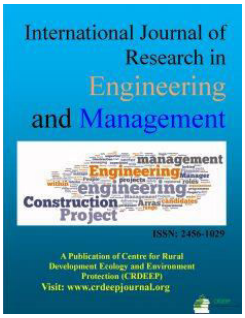
Vol. 3. No. 3. 2019

Contents available at:
www.crdeepjournal.org

International Journal of Research in Engineering & Management (ISSN: 2456-1029)



Full Length Research Paper

Identification of Knowledge Gaps in Applying Knowledge Areas of Project Management

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ARTICLE INFORMATION

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Article history:
Received: 01-10-2019
Accepted: 05-10-2019
Revised: 21-10-2019
Published: 24-10-2019

Key words:
Knowledge gap; decision support system; mathematical models; project management; PMBOK; Project Process Groups; Gap analysis.

ABSTRACT

During the past two decades, structural engineering scenario has changed drastically. At present, there are no universally accepted standards for the identification of issues and knowledge gaps in the applying of knowledge areas of project management both in any phase in project management. It is essential to identify the knowledge gaps in the project management process, so the purpose of this paper is an overview of issues and knowledge gaps in the applying of knowledge areas of project management to stimulate a model for a decision support system, and identification of these issues and knowledge gaps. This identification should further lead to the establishment of information regarding existing issues and knowledge gaps in project management. The results of the study should also provide a foundation for a research project proposal. This research is an exploratory study, so the results are only propositions; hence, an empirical survey should be carried out in the future.

Introduction

In the modern economic era, knowledge is regarded, as a firms' most important strategic resource (Simonin, 1999; Yang, 2008). They develop new technologies and the implementation of such technologies in new applications is a continuous effort to close technological and logistical knowledge gaps. Although the knowledge gaps can be closed by accident like the case of Archimedes who closed a critical knowledge gap about the laws of nature while bathing in most cases, knowledge gaps are closed by a consistent, organized effort, namely by projects. Decision Support System is defined as interactive computer-based systems intended to help decision-makers utilize data and models in order to identify and solve problems to make decisions.

DSS is further classified into four main categories: data, model, process and communication-oriented. How to identify and fill knowledge gaps effectively has been a baffling problem for the knowledge areas of project management to stimulate a model for a decision support system. However, current research has paid scant attention to the approach of filling knowledge gaps. In general, research regarding filling knowledge gaps primarily concentrates on solving two problems. The first problem is how to identify knowledge gaps, and the second is to choose appropriate ways to fill the knowledge gaps.

All knowledge gaps were identified through a detailed literature review. The classification of these issues and knowledge gaps according to inputs data or tools and techniques, the effect of the gaps on the output in the knowledge areas of project management. According to the PMBOK® Guide. Information about the knowledge areas of project management to stimulate a model for a decision support system according to the PMBOK®

Guide together with information about attempts to improve these practices was gathered through a literature review.

Further, the review also enabled the identification of issues and knowledge gaps connected to knowledge areas of project management acknowledged in academic literature. The review targeted the terms "mathematical models," "decision support system," "Gap analysis," "knowledge areas," "project management" and "knowledge gaps" and was limited to literature published around the years of 2000 to 2018. The research limitations and implications defined as this study try to explore the factors associated with issues and knowledge gaps in the knowledge areas of project management for a decision support system.

Literature Review

The term ''knowledge gap'' originates from Tichenor et al.'s (1970) research concerning the knowledge possession and learning problems of people of different economic statuses. Nonaka (1991) suggested four basic patterns for creating knowledge in any organization: socialization, externalization, combination, and internalization. The examination of the problems for issues and knowledge gaps for the decision support system, several studies proposed the so-called "knowledge gap."

Tacit knowledge cannot be codified and can only be observed through the application and acquired through practice (Kogut and Zander, 1992). Vos et al. (1998) noted that there were four types of knowledge gaps that arise in product development, manufacturing, selling, and management. In this paper, we focus on the knowledge gaps appearing in product development, i.e., the technical knowledge gap. Later, Zack (1999) proposed that the substantial knowledge gap is the gap between the knowledge needed in the strategy execution process and the possessed knowledge. Haider (2003) described knowledge gaps as ''types of organizational knowledge which a firm currently lacks but has been identified critically important for its survival and growth, and hence, need to be filled.''This method uses two sets to represent the knowledge needed and the knowledge possessed. Next, knowledge gaps are identified intuitively by matching these two knowledge element sets.

There are also several studies that focused on identifying knowledge gaps from particular domains, such as knowledge gaps in foreign markets (Petersen et al., 2008) and health-knowledge gaps (Lee, 2009), but these researchers did not provide any methods for how to deal with the gaps. In short, most of the existing methods focus on the qualitative level, and specific quantitative methods do not consider the complex hierarchical relationships among the knowledge elements. Therefore, the accuracy and the application range of the existing methods are restricted. Jing and Yang's (2010) research illustrated that the knowledge gaps that formed in earlier stages of new product development are more critical. Recently, the proposed bipartite graph theory-based method (Lu, 2013) considered the relationships within knowledge. However, this method only discussed one-to-one relationships, which cannot demonstrate the complex hierarchical relationships of organizational knowledge. Tiwana (2001) identified gaps existing in the current infrastructure for building knowledge management systems.

Chinho Lin and Shu-Mei Tseng (2005), proposed that a holistic framework for the "Knowledge Management Gap" to illustrate the management gaps that might occur during implementation entirely, but their study not exposed to the various project management processes. Christoph Müller-Bloch and Johann Kranz (2015), studied methodological guidelines for how to identify research gaps in qualitative literature reviews and proposes a framework that should help scholars in this endeavor without stifling creativity. Charlotte Diana et al. (2018), investigated if effectiveness studies of the 11 practice-based implementation components can be identified in the existing scientific literature.

Nihal Ananda Perera et al. (2016) discussed the development and anatomy of the DMM that was explicitly designed to enable the practitioners to choose the optimum MDA on a more objective and tenable basis for delay analysis. Sahar Tahvili (2016), proposed a tool-supported framework using a decision support system, for prioritizing and selecting integration test cases in embedded system development. The framework provides a complete loop for selecting the best candidate test case for execution based on a finite set of criteria. Shahid Hussain et al. (2018), applied the SEM approach and built a model that explained and identified the critical factors affecting quality in social infrastructure projects. Developed a quantitative approach using smart-PLS version 3.2.7., and determined that better planning and monitoring and evaluation should be developed to address better and control the quality defects by decision-makers, project managers as well as contractors.

The knowledge gap was once defined as a quantitative and qualitative difference between the knowledge needed and available in the organization, which needs to be detected and measured by either developing new knowledge, buying knowledge, improving the existing knowledge, or removing out-of-date, irrelevant knowledge. Almost all the studies above focused on the description of the features of knowledge from the point-of-view of the formation of knowledge and its related problems. Negative influences from people, procedures, and competitors may occur in the processes of socialization, externalization, combination, and internalization (SECI) of knowledge and are challenging to diagnose.

Hence, we studied the identification of issues and knowledge gaps in the knowledge areas of project management and developed a model for a decision support system. To the best of our knowledge, no study has explored a general and holistic structure of the knowledge gap based on the aspect of management activities. By socially interact with their alliance partners, individuals can communicate and explain their ideas and put information together to fill their knowledge gaps.

Definition and Concept related to the Knowledge Gaps and decision support system

This section aims to discuss the main definitions and concepts of a particular research. The main concepts analyzed in this section are knowledge, gaps, knowledge gaps, and DSS.As per in the below table (1) that shows these definitions.

Table (1) shows the concept and definition related to knowledge gaps

	Definition	References
Knowledge	Skills, Information, or understanding that we get it from academic and practical experience	Knowledge, 2016
Gap	An incomplete or deficient area a gap in her knowledge	Merriam-Webster, 2016
The Knowledge Gap	A disparity in levels of (primarily technological) knowledge	Oxford University Press, 2016
Process	A set of interrelated actions and activities that performed to achieve a specified set of products, results, or services. The PMBOK® Guide identifies 49 processes that are instrumental in projecting success.	The PMBOK Guide

- **The Knowledge Areas of Project Management:**

Knowledge Area is made up of a set of processes, each with inputs, tools and techniques, and outputs. They form by grouping the 49 project management processes into specialized and focused areas.

- **A Decision Support System:**

Decision Support System is an information system that supports business or organizational decision-making activities and helps the decision-maker to make decisions about problems that may be rapidly changing and not easily specified in advance.

Gap Analysis Approach

Gap analysis consists of defining the present state and the desired or target state, and hence the gap between them. Later, it is a problem-solving phase, which aims at finding ways to fill the gaps in order to reach the desired solutions. The gaps between the degree of importance and actual status level can pinpoint the barriers to successful implementation to select the optimal decision support system. In practice, a questionnaire was the tool typically used to obtain the required data for gap analysis in several studies (Hwang et al., 2003; Chen McCain et al., 2005; Aksu, 2006).

In this study, we describe an approach for dealing with technological projects an approach based on the analysis of knowledge gaps (i.e., the gap between what we should know in order to succeed in the project and what we know). We propose to simulate a model for a decision support system for the ‘‘Issues and Knowledge gap’’ to fully illustrate all gaps that might occur in the knowledge areas of project management to stimulate a model for a decision support system**.**

Parasuraman et al. (1985) proposed that service quality is a function of the differences between expectation and performance along the quality dimensions and developed a service quality model based on gap analysis. Justin Fischgrund and Vincent Omachonu (2014) examined the quality gaps in construction projects by expanding on the previous gap analysis studies by Parasuraman et al., 1985. The Gap Analysis Model is in its turn revisited and extended to embrace seven gaps (knowledge, standards, delivery, internal communications moment or stage in service planning and performance (Lovelock, 1994).

The gaps of issues and knowledge defined as the transfer for knowledge between the different processes, and consider that the different processes shown as arrow diagrams to can illustrate the dependence of processes (Sequential arrangement in the transfer of knowledge and issues). So this transfer from process to others can be affected by the gaps in the inputs or tools and techniques (knowledge and issues) that used in this process.

Classifying and Identifying knowledge gaps

Characterizing knowledge gaps deepens the understanding of how knowledge gaps may be constituted and may thus help to identify knowledge gaps in literature reviews.

Jacobs (2011) identifies six kinds of research problems. While research problems not necessarily researched gaps, they might be synonymous with research gaps in this case, as most researchers do not distinguish between the two terms. Jacobs identifies six forms of research problems:

Provocative exception, contradictory evidence, knowledge void, action-knowledge conflict, methodological conflict, and ideological conflict.

Types of knowledge gaps

Knowledge gaps can be divided into three types according to the relationships between the knowledge needed and the knowledge possessed (Chen et al., 2007), as shown in Figure (1).

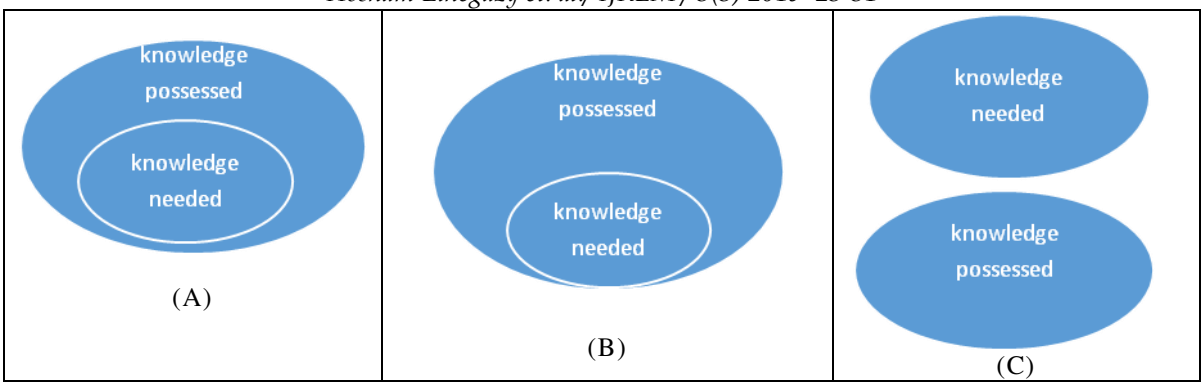

Fig (1). The relationships between the knowledge needed and the knowledge possessed

- **Weighted Average**

The weighted average formula is used to calculate the average value of a particular set of numbers with different levels of relevance. Therefore, all weights should be equal to 100%, or 1. Weighted geometric mean:

In statistics, given a set of data,

$X = \{x_1, x_2, \dots\dots\dots, x_n\}$

Moreover, corresponding weights,

$W = \{w_1, w_2, \dots\dots\dots, w_n\}$

The weighted geometric mean calculated as

$$\bar{X} = \left(\prod_{i=1}^{n} x_i^{w_i}\right)^{1/\sum_{i=1}^{n} w_i} = exp\left(\frac{\sum_{i=1}^{n} w_i \ ln\, x_i}{\sum_{i=1}^{n} w_i}\right)$$

$$\boldsymbol{Weight\ Avg = w_1x_1 + w_2x_2 \dots\dots\dots w_nx_n}$$

$Such\ that;\ w = relative\ weight\ (\%)\ ,\quad x = value$

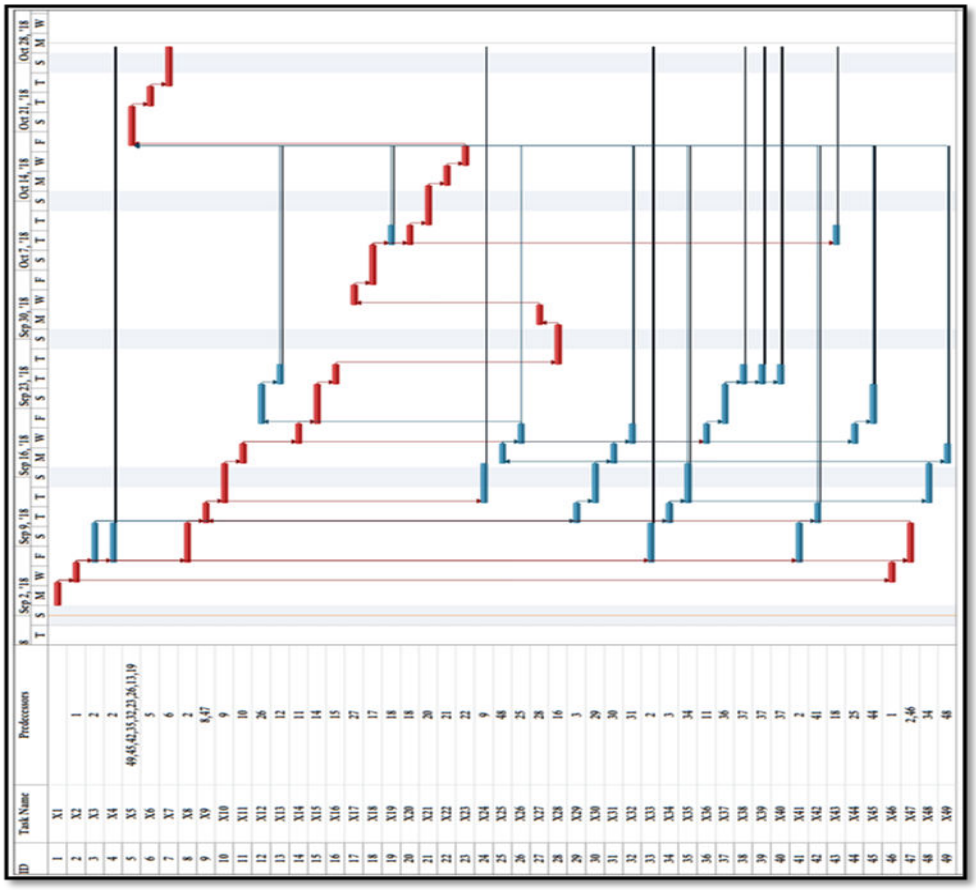

Fig (2) shows the relation between all processes on the Gant chart

According to the Gant Chart, as shown in figure (2); CPM is (X1, X2, X8, X9, X10, X11, X14, X15, X16, X28, X27, X17, X18, X20, X21, X22, X23, X46, X47, X5, X6, and X7). The sum of the 22 processes (CPM) out of 49 processes by total weight is 44.88% out of 100%. Framework for identifying issues and knowledge gaps in the knowledge areas of project management to stimulate a model for a decision support system. For the framework, a distinction made between the identification of issues and knowledge gaps in the broader and the localization of issues and knowledge gaps in the narrower sense. This includes localization, but also characterization, verification, and presentation. The design of the framework based on the findings from our analysis of literature reviews related to decision support systems, issues, and knowledge gaps in the knowledge areas of project management. The framework consists of four components. The initial stage is the localization of issues and knowledge gaps, which is informed by the characterization of issues and

knowledge gaps. After this stage has completed, issues and knowledge gaps may need to verify. Subsequently, scholars might want to present the issues and knowledge gaps that could verify, chart (1), shows the model for the decision support system.

The sequential presentation describes the issues and knowledge gaps after the synthesis, such that the issues and knowledge gaps are presented separately from the synthesis. Hence, readers can quickly locate issues and knowledge gaps in the review, as shown in figure (3). The following table (2) summarizes the identified outstanding knowledge gaps from existing systematic reviews, recent technical consultations, and reviews in progress.

Table (2) presents the gaps between all processes

No.	Gaps	Definition (Defined as the gap between)		Weight Per Gap
		From	To	
G1	Gap 1	Develop Project Charter	Identify Stakeholders	2.041
G2	Gap 2	Identify Stakeholders	Plan Stakeholder Engagement	2.041
G3	Gap 2`	Develop Project Charter	Develop Project Management Plan	2.041
G4	Gap 3	Develop Project Management Plan	Plan Stakeholder Engagement	2.041
G5	Gap 4	Develop Project Management Plan	Plan Scope Management	2.041
G6	Gap 5	Develop Project Management Plan	Plan Communications Management	2.041
G7	Gap 6	Plan Scope Management	Collect Requirements	2.041
G8	Gap 7	Plan Stakeholder Engagement	Collect Requirements	2.041
G9	Gap 8	Collect Requirements	Define Scope	2.041
G10	Gap 9	Collect Requirements	Plan Quality Management	2.041
G11	Gap 10	Define Scope	Create WBS	2.041
G12	Gap 11	Create WBS	Plan Risk Management	2.041
G13	Gap 12	Create WBS	Plan Schedule Management	2.041
G14	Gap 13	Plan Schedule Management	Define Activities	2.041
G15	Gap 14	Define Activities	Sequence Activities	2.041
G16	Gap 15	Sequence Activities	Estimate Activity Resources	2.041
G17	Gap 16	Plan Risk Management	Identify Risks	2.041
G18	Gap 17	Develop Project Management Plan	Implement Risk Responses	2.041
G19	Gap 18	Estimate Activity Resources	Plan Resource Management	2.041
G20	Gap 19	Plan Resource Management	Estimate Activity Durations	2.041
G21	Gap 20	Estimate Activity Durations	Develop Schedule	2.041
G22	Gap 21	Develop Schedule	Plan Procurement Management	2.041
G23	Gap 22	Develop Schedule	Plan Cost Management	2.041
G24	Gap 23	Plan Cost Management	Estimate Costs	2.041
G25	Gap 24	Estimate Costs	Determine Budget	2.041
G26	Gap 25	Identify Risks	Perform Qualitative Risk Analysis	2.041
G27	Gap 26	Identify Risks	Perform Quantitative Risk Analysis	2.041
G28	Gap 27	Identify Risks	Plan Risk Responses	2.041
G29	Gap 28	Develop Project Management Plan	Direct and Manage Project Work	2.041
G30	Gap 28`	Develop Project Management Plan	Manage Project Knowledge	2.041
G31	Gap 29	Direct and Manage Project Work	Acquired Resources	2.041
G32	Gap 30	Acquired Resources	Develop Team	2.041
G33	Gap 31	Develop Team	Manage Team	2.041
G34	Gap 32	Direct and Manage Project Work	Manage Communications	2.041
G35	Gap 33	Manage Communications	Manage Stakeholder Engagement	2.041
G36	Gap 34	Manage Stakeholder Engagement	Manage Quality	2.041
G37	Gap 35	Manage Quality	Conduct Procurements	2.041
G38	Gap 36	Control Scope	Monitor and Control Project Work	2.041
G39	Gap 37	Control Schedule	Monitor and Control Project Work	2.041
G40	Gap 38	Control Costs	Monitor and Control Project Work	2.041
G41	Gap 39	Control Quality	Monitor and Control Project Work	2.041
G42	Gap 40	Control Quality	Validate Scope	2.041
G43	Gap 41	Control Resources	Monitor and Control Project Work	2.041
G44	Gap 42	Monitor Communications	Monitor and Control Project Work	2.041
G45	Gap 43	Monitor Risks	Monitor and Control Project Work	2.041
G46	Gap 44	Monitor Stakeholder Engagement	Monitor and Control Project Work	2.041
G47	Gap 45	Control Procurements	Monitor and Control Project Work	2.041
G48	Gap 46	Monitor and Control Project Work	Perform Integrated Change Control	2.041
G49	Gap 47	Perform Integrated Change Control	Close Project or Phase	2.041
		Sum		**100**

Localization strategy depends on the type of knowledge gap

Localization ← → **Characterization**

After locating a knowledge gap, characterizing its type can help to specify what kind of research is required to address the knowledge gap

Verification
Substantiating the existence of the knowledge gap for DSS

Presentation
Adequately presenting the knowledge gap in DSS from a literature review.

Chart (1) shows the model for the decision support system

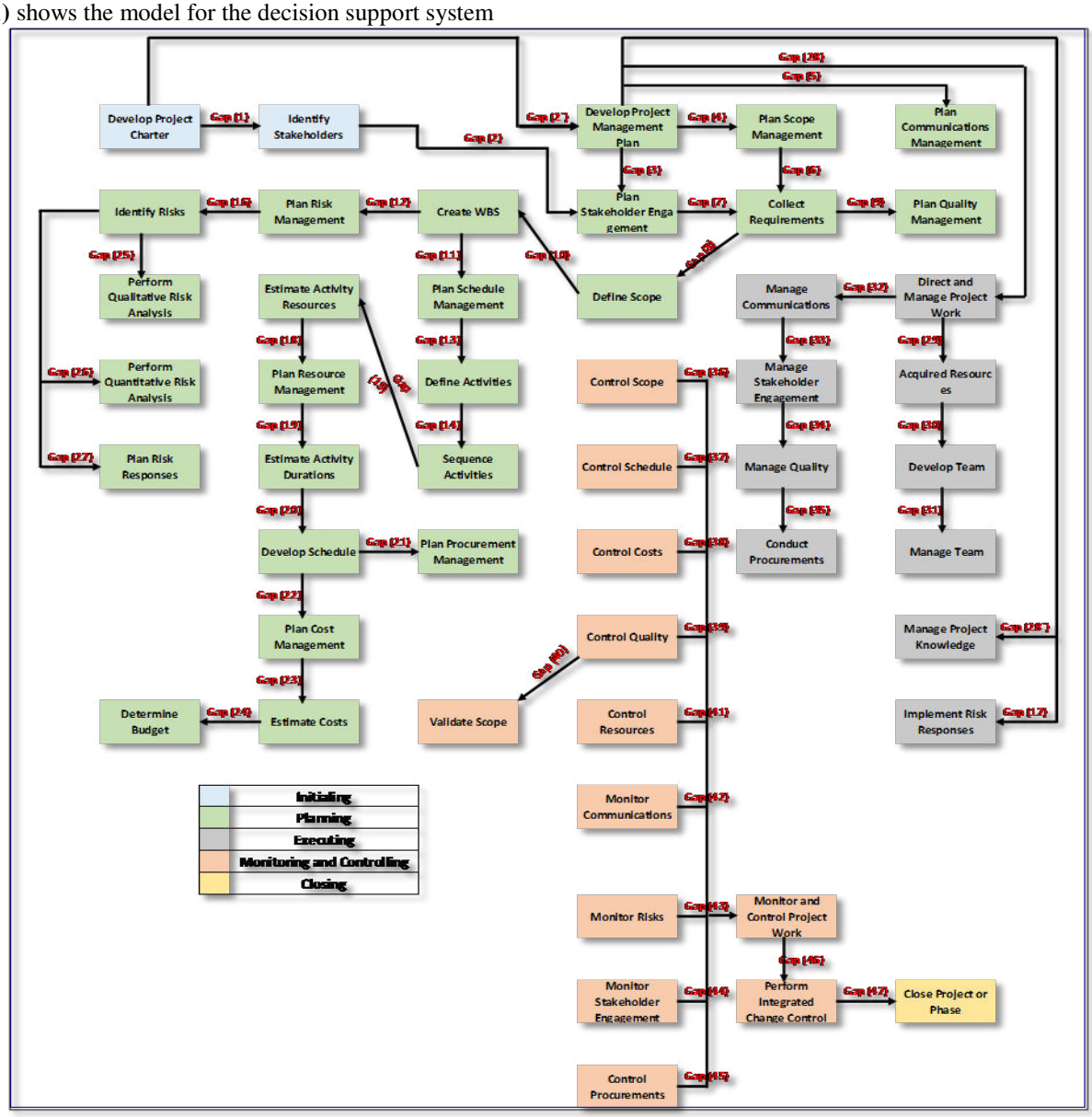

Fig (3) shows the gaps between the processes in all groups

Analytical Model

Using the CodeBlocks 17.12 Program for modeling to study the applying knowledge areas of project management, as shown in figure (4)

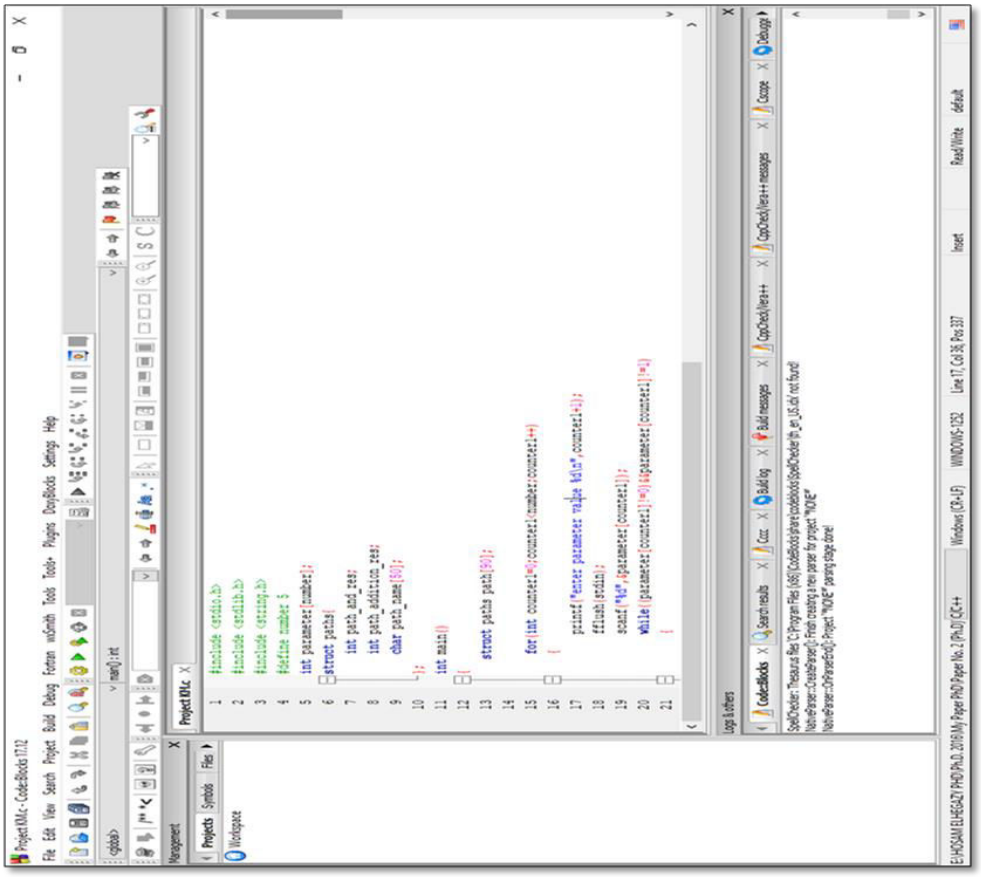

Fig (4) Shows Using the Code Blocks 17.12 Program for modeling

Table (3) Calculations of the distribution and weights for the knowledge area

No.	PMBOK Knowledge Areas	Project Initiation	Project Planning	Project Execution	Project Monitoring and	Project Closing	Weight Scale	Total Weight/Area	Weight/Gap	No.	Distribution
1	Project Integration Management	1	1	2	2	1	7.00	14.29	2.04	7.00	0.14
2	Project Scope Management		4		2		6.00	12.24	2.04	6.00	0.12
3	Project Schedule Management		5		1		6.00	12.24	2.04	6.00	0.12
4	Project Cost Management		3		1		4.00	8.16	2.04	4.00	0.08
5	Project Quality Management		1	1	1		3.00	6.12	2.04	3.00	0.06
6	Project Resource Management		2	3	1		6.00	12.24	2.04	6.00	0.12
7	Project Communications Management		1	1	1		3.00	6.12	2.04	3.00	0.06
8	Project Risk Management		5	1	1		7.00	14.29	2.04	7.00	0.14
9	Project Procurement Management		1	1	1		3.00	6.12	2.04	3.00	0.06
10	Project Stakeholder Management	1	1	1	1		4.00	8.16	2.04	4.00	0.08
	Sum of Processes	2	24	10	12	1	49.00	100%	20.41	49.00	1.00

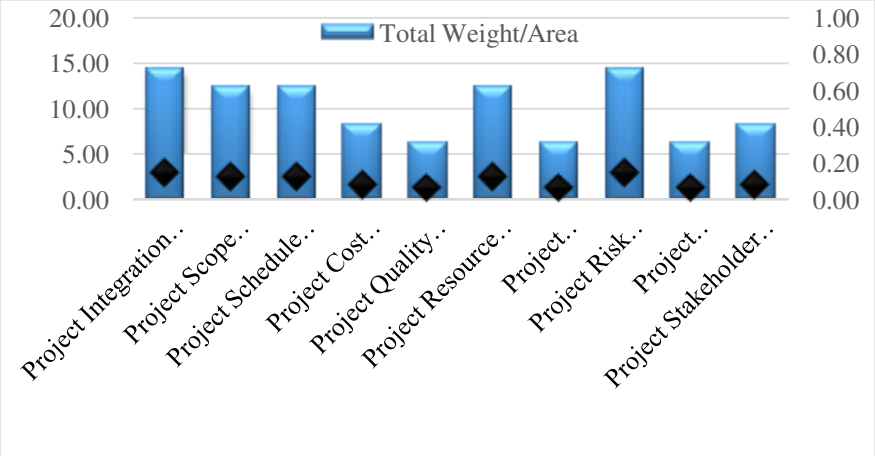

Fig 5: Total weight and distribution for knowledge area

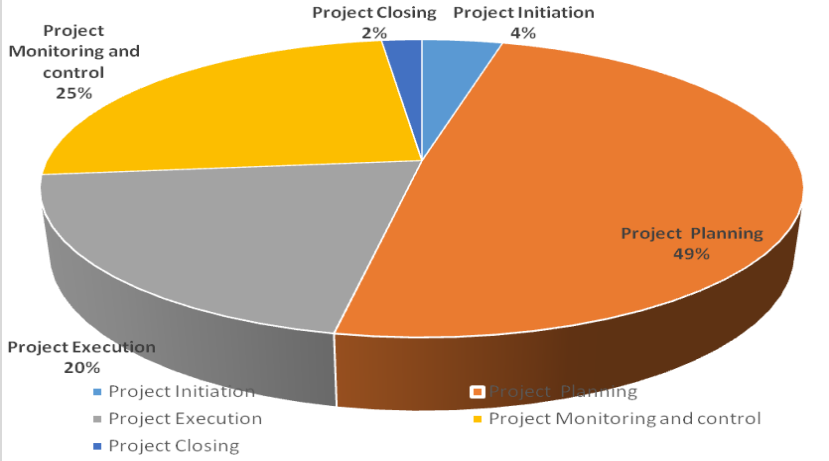

Figure 6: Percentage of the knowledge area

Conclusion

Identified key issues and knowledge gaps are the requirements to include wider spatial and temporal scales, consider cumulative impacts and indirect effects and more effective incorporation of stakeholders. Other highlighted issues were the insufficient linkages between procedural stages in the knowledge areas of project management, inadequate monitoring and that knowledge from other fields should be utilized further. Issues and knowledge gaps identified as in need of being further assessed by research provided in the below Tables, Table 3 that show the summarized for the results. Also, Figure (5), and Figure (6) are shown the charts for the final results. As a result, there will be issues and knowledge gaps in the Knowledge areas listed in the sixth Edition PMBOK during project management process groups. A detailed description of the 49 types of gaps is given in the following.

As a result, if we have issues and knowledge gaps in the applying of knowledge areas during project management process groups that will be the effect on the performance of the project. Therefore, we should be to study all knowledge areas in the conceptual stage to can avoid any issues and knowledge gaps, as shown in table (3).

References

A. Parasuraman et al. (1985), "A Conceptual Model of Service Quality and Its Implications for Future Research," Journal of Marketing, Vol. 49, No. 4 (Autumn, 1985), pp. 41-50

Amanda Harlan and Dhanushka Samarakoon (2016), "Bridging the Communication Gap Successfully for Library/IT Projects," Nebraska Library Association Conferences

Bruce Kogut and Udo Zander (1992), "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology," Organization Science, Vol. 3, Issue 3, p. 383-397 1992. Available at SSRN: https://ssrn.com/abstract=1505912

C. Müller-Bloch and J. Kranz (2015), "A Framework for Rigorously Identifying Research Gaps in Qualitative Literature Reviews," Proc.of the International Conference on Information Systems (ICIS15),AISeL

Charlotte Diana et al. (2018), "Identifying knowledge gaps between practice and research for implementation components of sustainable interventions to improve the working environment - A rapid review," Applied Ergonomics 67 (2018) 178-192

Chinho Lin, Shu-Mei Tseng, (2005), "The implementation gaps for the knowledge management system," Industrial Management & Data Systems, Vol. 105 Issue: 2, pp.208-222, https://doi.org/10.1108/02635570510583334

Christoph Müller-Bloch and Johann Kranz (2015), "A Framework for Rigorously Identifying Research Gaps in

Qualitative Literature Reviews," Thirty Sixth International Conference on Information Systems, Fort Worth 2015

Hussain, S., Fangwei, Z., Siddiqi, A., Ali, Z., & Shabbir, M. (2018), "Structural Equation Model for Evaluating Factors Affecting Quality of Social Infrastructure Projects," Sustainability, 10(5), 1415. DOI:10.3390/su10051415

Jacobs, R. L. (2011), "Developing a Research Problem and Purpose Statement," in The Handbook of Scholarly Writing and Publishing, T. S. Rocco and T. Hatcher (eds.), San Francisco: Jossey-Bass, pp. 125–141.

Justin Fischgrund and Vincent Omachonu (2014), "Quality in Construction: Identifying the Gaps," International Journal of Construction Engineering and Management 2014, 3(2): 65-73

Lee (2009), "treatment-effect bounds for non-random sample selection," Stata Journal, Stata Corp LP, vol. 14(4), pages 884-894, December

Lovelock, C. (2001), "Services Marketing: People, Technology, Strategy," 4th ed., Prentice-Hall, Sydney.

Lovelock, C.H. (1994), "Product Plus: How Product + Service = Competitive Advantage," McGraw-Hill, New York, NY.

Nihal Ananda Perera et al. (2016), "Decision-Making Model for Selecting the Optimum Method of Delay Analysis in Construction Projects," Journal of Management in Engineering, © ASCE, ISSN 0742-597X.

Nonaka, I. (1991), "The Knowledge-Creating Company," Harvard Business Review, 69, 96-104

Perera, N. A., Sutrisna, M., & Yiu, T. W. (2016), "Decision-Making Model for Selecting the Optimum Method of Delay Analysis in Construction Projects," Journal of Management in Engineering, 32(5), 04016009.

Petersen, K., Feldt, R., Mujtaba, S. and Mattsson, M, (2008), "Systematic mapping studies in software engineering," In 12th International Conference on Evaluation and Assessment in Software Engineering, Vol. 17, No. 1, 2008.

Rasmussen, C. D. N. et al. (2018), "Identifying knowledge gaps between practice and research for implementation components of sustainable interventions to improve the working environment - a rapid review," *Appl. Ergon.* 67:178–192, 2018.Shahid Hussain et al. (2018), "Structural Equation Model for Evaluating Factors Affecting Quality of Social Infrastructure Projects," Sustainability 2018, 10, 1415; DOI:10.3390/su10051415
www.mdpi.com/journal/sustainability

Simonin, B.L.(1999), "Transfer of marketing know-how in international strategic alliances: An empirical investigation of the role and antecedents of knowledge ambiguity," Journal of International Business Studies, 30, 463–490.

Tahvili, Sahar and Bohlin, Markus (2016), "Test Case Prioritization Using Multi-Criteria Decision Making Methods," Danish Society for Operations Research (26). Pp. 9-11.

Yang, Q., Mudambi, R., and Meyer, K. E. (2008), "Convention and reverse knowledge flows in multinational corporations," Journal of Management, 34(5), 882–903

Zack, M. (1999), "Developing a knowledge strategy," California Management Review, 41, 125- 144.