



Evaluation of Software Project Management Maturity: A Case Study of Single Submission for Quarantine Custom Development at Indonesia National Single Window Agency

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Abstract

This investigation provides a critical assessment of the governance practices in project management within the development of the Single Submission Quarantine Customs (SSM QC) system at the Indonesia National Single Window Agency (LNSW). Employing the Kerzner Project Management Maturity Model (KPM3), the study meticulously compares existing management operations against the established Project Management Body of Knowledge (PMBOK) standards. It uncovers pivotal governance deficiencies that hinder the maturation of project management processes. The research sheds light on the necessity for systematic improvements, particularly in areas of risk assessment, human resources, procurement, and quality control. Recommendations from this study advocate for the adoption of robust governance frameworks and strategic management enhancements. The implementation of these recommendations is projected to significantly uplift LNSW's strategic project alignment, operational efficiency, and overall effectiveness, marking a substantial advancement in the domain of software project management and setting a precedent for future research in this area.

A. Introduction

Human life has undergone dramatic changes due to rapid advancements in science and technology, necessitating continuous development in various sectors, especially in public digital services [1]. This evolution is crucial for improving performance to keep pace with technological advancements. Recognizing the importance of Information Technology (IT) services as a source of competitive advantage, practitioners, governments, and academics widely accept its significance for both large and small-scale organizations [2]. Efficient and effective service management is key to achieving excellence. This is exemplified by the Indonesian government's initiative through Presidential Instruction No. 5 of 2020, which aims to simplify government logistics services using IT, thereby preventing duplication and errors in document submission and physical examination processes.

Lembaga National Single Window (LNSW), one of the institutions under the Ministry of Finance, responsible for implementing the system of Indonesia National Single Window (INSW) initiative. System of INSW streamlines various processes from data submission to permit issuance for cross-border trade. The LNSW was established based on Presidential Regulation No. 44 of 2018, which governs the operation of the INSW in Indonesia. The LNSW implements a Single Submission System (SSM) and joint inspection between Customs and Quarantine. The Single Submission for Quarantine Custom (SSm QC) process integrates the submission of Quarantine Inspection Requests (PPK) and Import Goods Notifications (PIB), streamlining the procedure for importers and reducing bureaucratic steps.

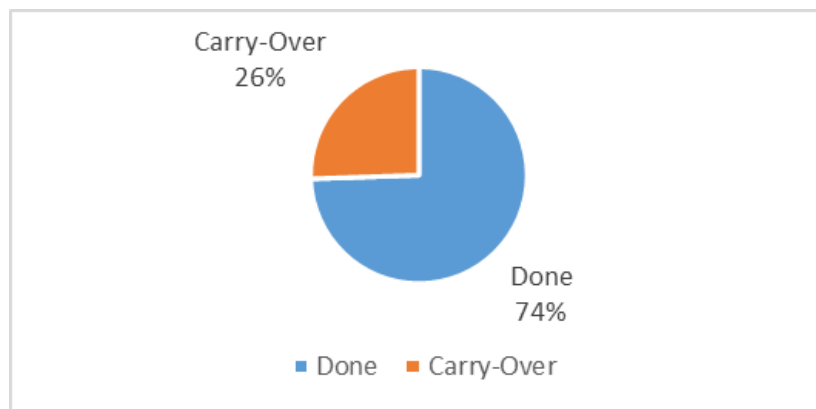


Figure 1. Sprint Development Chart SSm QC

The pie chart in **Error! Reference source not found.** illustrates a problem in the development process, with 26% of the work being carried over from previous phases. This carry-over, which arises from tasks not completed in their intended timeframe, is likely to slow down the overall project development timeline. It's a significant proportion that indicates potential inefficiencies or challenges that need to be addressed to streamline the completion of the project [3]. Concentrating on challenges such as inadequate governance standards, carry-over work development, and dynamic project requirements. Implementing project

management methodologies is a strategic approach to enhance project excellence. It enables organizations to effectively run their operations by offering a suite of project management tools and services, ultimately fulfilling the diverse requirements of their clientele [4] [5].

Numerous initiatives have been pursued to bolster project management efficiency, including the adoption of maturity models. These models serve as both benchmarks for measuring progress and as frameworks for enhancing project management capabilities[6]. Companies aiming for excellent outcomes should evaluate their project management's maturity level using a maturity model[7], [8] The maturity model not only guides companies in enhancing their project management practices but also aids in pinpointing potential risks. This allows for the strategic reduction of risk during project execution [9]. So, we are expected to enhance strategic alignment, efficiency, and effectiveness in future projects.

B. Literature Review

a. Project Management Body of Knowledge (PMBOK)

PMBOK serves as a comprehensive knowledge base in project management, encompassing both well-established practices and emerging innovations in the field. This guide encompasses both published material and knowledge that is yet to be documented, outlining a standard of best practices in project management. These practices are widely recognized for their ability to enhance the success rate of various projects by utilizing the right mix of skills, knowledge, tools, and techniques to deliver expected business results and value. PMBOK's approach to project management is cyclical, including phases such as initiation, planning, execution, monitoring, control, and closing [5]. Ten distinct knowledge areas in project management work synergistically to accelerate project progress. Integration management unifies all project elements, ensuring clarity of needs and eliminating unnecessary requirements. Scope management outlines the project's boundaries, while Schedule Management prioritizes timelines and resource allocation. Cost Management handles budgeting and financial forecasting. Quality Management ensures product standards are planned, assured, and controlled. Resource Management optimizes human and material resources to achieve project objectives. Communication Management oversees project discourse, Risk Management identifies and mitigates potential setbacks, Procurement Management manages the acquisition of necessary resources, and Stakeholder Management focuses on engaging all parties for successful project execution [5].

b. Project Management Maturity

The maturity model serves as a structured framework that evaluates the maturity level of a company or organization [10]. Over 30 maturity models exist to gauge project management maturity [11], including Organization Project Management Maturity Model (OPM3), CMMI, P3M3, PRINCE2, BPMM,

and Kerzner's Project Management Maturity Model. There is no one-size-fits-all standard, as each model possesses distinctive characteristics [12]. Utilizing maturity levels offers insights into existing processes and indicates the increasing specialization of the sector [13]. Therefore, organizations need to consider their specific circumstances when selecting a comprehensive maturity model to use. In selecting a project management maturity model based on PMBOK standards, the researcher chose to compare the OPM3 and KPM3 models [12]. Following an analysis, KPM3 was selected for its specificity to IT projects, focus on project management maturity, validated questionnaire for ease of measurement, and clear identification of project management strengths and weaknesses. KPM3's accessibility, supported literature, and step-by-step improvement guidelines also favored its selection, making it the most suitable method for this research on enhancing project management practices within LNSW IT projects.

c. Kerzner Project Management Maturity Model

Harold Kerzner developed the Project Management Maturity Model (PMMM) in 2002 as a tool for organizations to assess and enhance their project management practices. Based on standards and practices from the Project Management Body of Knowledge (PMBOK), PMMM measures an organization's project management process maturity. It guides organizations in progressing from one maturity level to the next, emphasizing the alignment of project management processes with organizational business goals, and enabling self-evaluation in this context [14].

The Project Management Maturity Model (PMMM) includes five levels, each representing an advancement in project management capability :

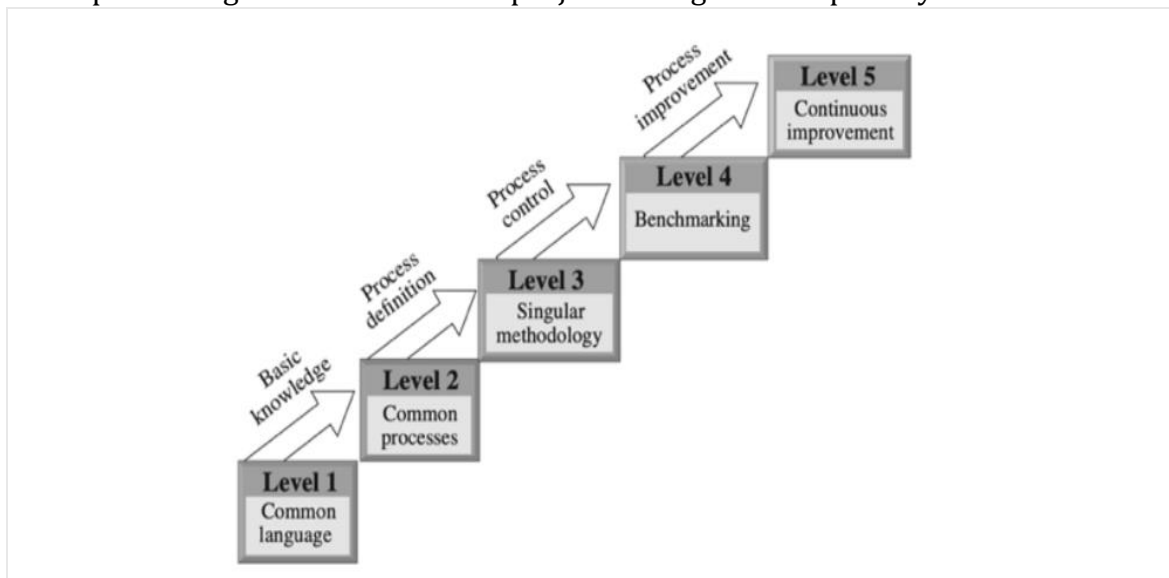


Figure 2. Maturity Level PMMM Kerzner Model

Based on 0 Common Language, where organizations establish a consistent understanding of project management; Common Processes, developing

repeatable and reliable project management processes; Singular Methodology, applying a consistent project management methodology organization-wide; Benchmarking, assessing performance against industry standards; and Continuous Improvement, enhancing project management processes continually based on feedback and performance analysis. This model guides organizations in identifying improvement areas to achieve excellence in project management[14].

C. Methodology

a. Research Stage

This study undertakes an analytical evaluation of project management levels in IT projects by employing the Project Management Maturity Model. A detailed research flow is outlined, which can be reviewed in **Error! Reference source not found.3**.

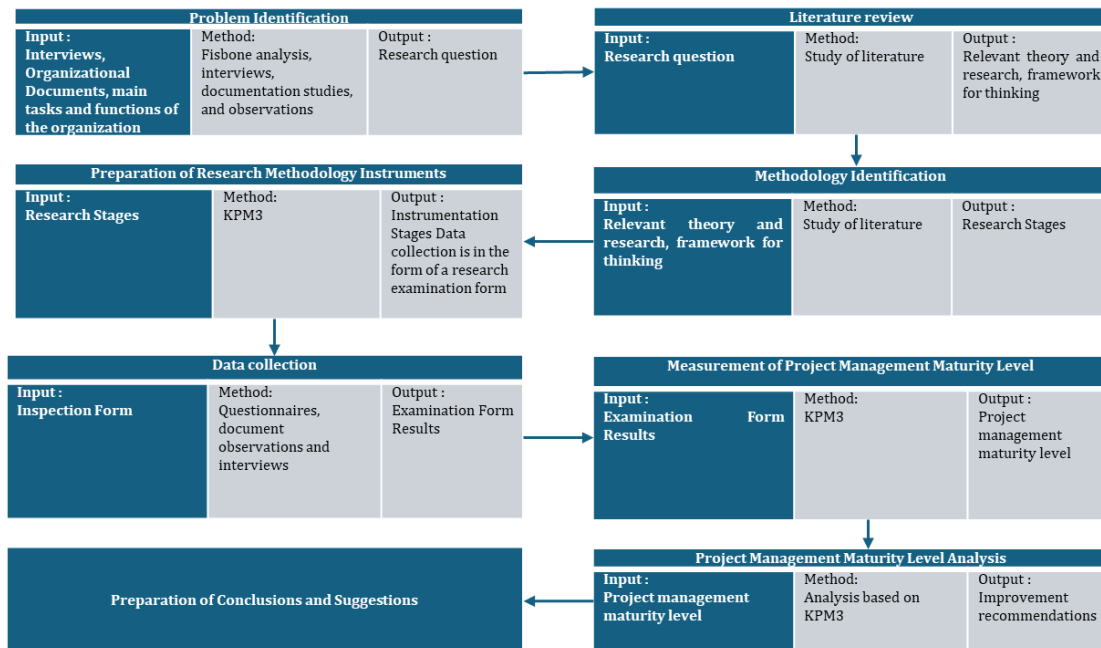


Figure 3. Research Flow

This assessment aims to enhance insights into proficient project management within software development frameworks. Expected results from this study are to provide strategic recommendations for improving project governance at the National Single Window Institution

b. Instrument

In this study, the Kerzner PMMM questionnaire is utilized for data collection, utilize simple web application to distribute the questionnaire. The data gathering process involves distributing the questionnaire to respondents, who are project managers, data analysts, and developers at LNSW, and conducting interviews. Respondents are selected based on their role and reflective knowledge of project management at LNSW, particularly those

managing projects within LNSW's cluster one. The selected project managers then receive the questionnaire to provide comprehensive responses.

c. Data Collection

Data collection was carried out through primary methods like interviews, observations, and Kerzner's questionnaires, and secondary methods involving the analysis of company documents. Primary data was revisited at each research stage, while secondary data was collated at key phases to comprehend the project's context, support primary findings, and verify conclusions. This included previous project reports, meeting minutes, financial analyses, performance evaluations, and policy documents, providing insights for potential improvements in project governance and maturity.

d. Data Processing

In this research, following Kerzner's method, correct answers on the questionnaire are scored at 10 points each, with no points for incorrect answers, as per the KPM3 model key. To achieve Level 1 maturity, an organization needs a minimum score of 600 from 80 questions. Scoring below 600 indicates Level 1 maturity, signaling the need for improvement. To reach Level 2, the score must meet or exceed 600, followed by a new set of 20 questions rated on a -3 to +3 scale. High scores in each category indicate readiness for the next level. The study progresses systematically through Levels 3 to 5, each with a specific set of questions and scoring scales. Thematic analysis is employed for qualitative data, identifying patterns within the data, offering flexibility in data interpretation, and allowing for significant findings to emerge[14].

D. Result and Discussion

The PMMM framework serves as the basis for assessing project management maturity levels detailed in this section. Each maturity level, characterized by its distinct tools, evaluation methods, and respondents, will be discussed along with their respective outcomes.

a. Project management maturity level Common Language (Level 1)

▪ Research Tools

For the study's evaluation, the multiple-choice questionnaire comprised 80 questions, each aligning with a specific knowledge area within the PMBOK guidelines. Eight key knowledge domains were covered, including procurement, quality, risk, communication, scope, time, and cost management. The questions were evenly distributed across these domains to ensure a comprehensive assessment [14].

▪ Assessment Method

In the Common Language (Level 1) assessment method, each correct response from the 80-item questionnaire scores 10 points, with no points awarded for incorrect answers. Achieving all correct answers

results in a maximum score of 800. Each knowledge domain can earn up to 100 points if answered correctly. Averaging more than 600 points across all areas qualifies the company to progress to Level 2. Scores over 60 in each domain indicate sufficient project management understanding, while scores below 60 suggest a need for improvement, particularly if under 30, where targeted training is recommended. The final score for Level 1 is the sum of all results divided by the number of respondents.

▪ Respondent Profiles

This section includes profiles of the respondents, all of whom are project managers within the IT project management division. Four individuals, identified by their initials TS, BN, F, and IK participated by completing the questionnaire designed to evaluate their project management expertise. Detailed profiles of these respondents are presented in Table 1.

Table 1. Respondent Profiles

<i>Name</i>	<i>Age</i>	<i>Gender</i>	<i>Experience (Month)</i>	<i>Position</i>
TS	30	Male	12	Project Manager
BN	27	Male	15	Project Manager Officer
F	26	Male	36	IT
IK	36	Female	17	Project Manager Officer

The average age of the survey respondents was approximately 29.75 years, with ages ranging from 26 to 36 years. In terms of experience at their respective company, the average duration was 20 months, varying from a minimum of 12 months to a maximum of 36 months.

▪ Result of Common Language Mature Level (Level 1)

Following the collection of questionnaire responses, an evaluation was conducted. Analysis of the scoring table is detailed in Table 2

Table 2. Respondent Profiles

<i>Name</i>	<i>Score</i>
TS	330
BN	370
F	340
IK	500

where the highest and lowest possible scores at this maturity level are 800 and 0, respectively. To progress to stage 2 (Common Process), a minimum score of 600 is needed. Scores of individual respondents were TS - 330, BN - 370, F - 340, and FM - 500. For a comprehensive statistical breakdown, including mean, median, maximum, and minimum values of the common language maturity level assessment, refer to Table 2.

Table 3. Statistic Table

<i>Statistic</i>	<i>Score</i>
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Mean	385
Median	355
Min Score	500
Max Score	330

Given the average score of below 600, it's evident that the results do not meet the standards for Common Language Level 2. Details on the evaluation outcome for each knowledge area are provided in Table 4

Table 4. Score Knowledge Area Respondent

NO	Knowledge Area	Minimum Score	Average Score Respondent
1	Scope Management	60	68
2	Time Management	60	50
3	Cost Management	60	50
4	Human Resource Management	60	40
5	Procurement Management	60	43
6	Quality Management	60	40
7	Risk Management	60	25
8	Communication Management	60	70

Analysis of the Kerzner Level 1 project management maturity scores indicate competencies in Scope and Communication Management, as these areas surpass the minimum score of 60. Conversely, Time, Cost, Human Resource, Procurement, and Quality Management areas fall short of the benchmark, highlighting the need for focused improvements. The most significant gap is observed in Risk Management, which warrants immediate attention to elevate the overall maturity level in project management.

▪ Recommendation of Common Language (Level 1)

Based on the scores from the Kerzner project management maturity evaluation, the following recommendations can be considered to enhance the overall project management capabilities:

1. Risk Management: Develop comprehensive risk management training programs and establish robust risk identification and mitigation processes to address the low maturity in this area [14]. This can be satisfied by create plan risk management, identify risk, perform qualitative risk analysis, perform quantitative risk analysis, plan risk responses, implement risk response, and monitor risk [5].
2. Human Resource Management: To strengthen its project management capabilities, LNSW is advised to prioritize skill enhancement and team management through specialized workshops [14]. Moreover, the adoption of effective tools for resource allocation and personnel management is recommended. In alignment with PMBOK guidelines, LNSW can systematically develop a resource management plan, estimate, and acquire resources, and oversee both team development

and management, ensuring resources are utilized effectively and efficiently [5].

3. Procurement and Quality Management: LNSW is encouraged to establish standardized protocols and quality control measures, as well as to pursue relevant certifications that align their operations with best practices outlined in industry standards [14]. For procurement, LNSW should devise a management plan, oversee procurement activities, and maintain procurement control. Similarly, in quality management, LNSW ought to formulate a quality management plan, ensure active quality management, and implement quality control processes to sustain high standards[5].
4. Cost and Time Management: LNSW should implement stringent budgeting methods and enhance time monitoring mechanisms[14]. In cost management, this involves formulating a comprehensive cost management plan, refining cost estimation techniques, defining the budget carefully, and exercising rigorous cost control. For time management, LNSW should develop a detailed schedule management plan, clearly define and sequence activities, accurately estimate their durations, construct a well-considered schedule, and maintain strict control over the schedule[5].
5. Continuous Learning and Improvement: Foster a culture of continuous learning by regularly updating training materials and offering ongoing education opportunities aligned with PMBOK guidelines [14].

It's crucial to address these areas with targeted strategies to improve the project management maturity level, thus positioning the organization for successful project execution and delivery.

E. Conclusion

In conclusion, this study has provided valuable insights into the project management practices within LNSW, identifying specific strengths and areas in need of improvement. Through the application of the Kerzner Project Management Maturity Model, we have established a baseline for current practices and highlighted the critical areas of Risk, Human Resource, Procurement, and Quality Management that require strategic enhancements. The recommendations provided aim to align LNSW with PMBOK best practices and prepare the groundwork for advancing to higher maturity levels. This research paves the way for future studies to explore the long-term impacts of these improvements on organizational efficiency and project success.

F. References

- [1] M. Daub, A. Domeyer, A. Lamaa, and F. Renz, "Digital public services: How to achieve fast transformation at scale," 2020.

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- [2] A. Shrestha, A. Cater-Steel, M. Toleman, S. Behari, and M. M. Rajaeian, "Development and evaluation of a software-mediated process assessment method for IT service management," *Information and Management*, vol. 57, no. 4, 2020, doi: 10.1016/j.im.2019.103213.
- [3] N. Panjaitan and B. Hardian, "Maturity Level Analysis in Software Development Using Scrum Methodology : XYZ Startup Case Study," vol. 1, no. 10, pp. 713–720, 2023.
- [4] O. P. Sanchez, M. A. Terlizzi, and H. R. de O. C. de Moraes, "Cost and time project management success factors for information systems development projects," *International Journal of Project Management*, vol. 35, no. 8, pp. 1608–1626, Nov. 2017, doi: 10.1016/j.ijproman.2017.09.007.
- [5] *A Guide to The Project Management Body of Knowledge (PMBOK)*, 6th ed. Project Management Institute, Inc., 2017.
- [6] T. F. de Souza and C. F. S. Gomes, "Assessment of Maturity in Project Management: A Bibliometric Study of Main Models," *Procedia Comput Sci*, vol. 55, pp. 92–101, 2015, doi: 10.1016/j.procs.2015.07.012.
- [7] L. Domingues and P. Ribeiro, "Project management maturity models: Proposal of a framework for models comparison," *Procedia Comput Sci*, vol. 219, pp. 2011–2018, 2023, doi: 10.1016/j.procs.2023.01.502.
- [8] F. Backlund, D. Chron er, and E. Sundqvist, "Project Management Maturity Models – A Critical Review," *Procedia Soc Behav Sci*, vol. 119, pp. 837–846, Mar. 2014, doi: 10.1016/j.sbspro.2014.03.094.
- [9] A. J. Christoph and S. Konrad, "Project Complexity as an Influence Factor on the Balance of Costs and Benefits in Project Management Maturity Modeling," *Procedia Soc Behav Sci*, vol. 119, pp. 162–171, Mar. 2014, doi: 10.1016/j.sbspro.2014.03.020.
- [10] M. Niazi, A. M. Saeed, M. Alshayeb, S. Mahmood, and S. Zafar, "A maturity model for secure requirements engineering," *Comput Secur*, vol. 95, p. 101852, Aug. 2020, doi: 10.1016/j.cose.2020.101852.
- [11] J. Wang, P. Dong, G. Qu, and X. Zhang, "Research on port project management maturity model," in *2013 6th International Conference on Information Management, Innovation Management and Industrial Engineering*, IEEE, Nov. 2013, pp. 234–238. doi: 10.1109/ICIII.2013.6702917.
- [12] M. Khoshgoftar and O. Osman, "Comparison of maturity models," *Proceedings - 2009 2nd IEEE International Conference on Computer Science and Information Technology, ICCSIT 2009*, pp. 297–301, 2009, doi: 10.1109/ICCSIT.2009.5234402.
- [13] J. Schuldt, R. Hofmann, and S. Gr oger, "Introduction of a maturity model for the assessment of the integration of the GPS system in companies," *Procedia CIRP*, vol. 92, pp. 129–133, 2020, doi: 10.1016/j.procir.2020.05.188.
- [14] K. Harold, *Using the Project Management Maturity Model: Strategic Planning for Project Management*, 3rd ed. Wiley, 2019.