



Implementation of Knowledge Management at PT Multi Phi Beta to Prevent Knowledge Loss

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ABSTRACT: PT Multi Phi Beta, as an engineering consultancy, faces challenges in a competitive industry that demands operational efficiency. The company encounters high employee turnover due to the short-term nature of its projects, leading to a significant risk of knowledge loss. This research aims to evaluate the current state of knowledge management readiness at PT Multi Phi Beta, identify gaps in knowledge management implementation, and propose improvements to mitigate these knowledge loss risks and enhance overall efficiency. The primary method used to obtain data is quantitative, collected through questionnaires. To enrich the primary data, qualitative data is gathered through semi-structured interviews. The findings indicate that PT Multi Phi Beta is at the initiation level of KM readiness, recognizing the need for knowledge management but not yet fully integrating KM practices. To mitigate knowledge loss, the company should capture critical knowledge from transitioning employees, enhance its KM vision and mission, and establish a dedicated KM department. Standardized processes for managing knowledge, conducting after-action reviews, knowledge cafés, and formal mentoring programs are essential. Additionally, providing integrated knowledge repositories and implementing a rewards and recognition program will encourage knowledge sharing and strengthen the company's KM efforts.

KEYWORDS: Employee Turnover, Knowledge Management, Knowledge Loss, Knowledge Management Readiness, Knowledge Repositories

INTRODUCTION

The construction sector is crucial for economic development, significantly contributing to infrastructure growth, employment, and housing. Indonesia's construction GDP, starting at 470.444 billion Rupiah in Quarter I of 2022, peaked at 522.247 billion Rupiah in Quarter III of 2023 (Badan Pusat Statistik, 2023). The budget for infrastructure in 2024 will be 422.7 trillion Rupiah, a 5.8% increase from 2023 (CNBC Indonesia, 2023), with the Ministry of Public Works and Public Housing (PUPR) receiving IDR 146.98 trillion (DetikFinance, 2023). This budget allocation presents opportunities for contractors and engineering consultants.

PT Multi Phi Beta, an engineering consultant specializing in road and highway engineering, stands to benefit from this growth. However, the company faces challenges in a competitive industry with fluctuating project acquisition due to economic instability. The membership of INKINDO has grown from 4,837 in 2014 to 6,252 in 2023, intensifying competition. The company recognizes the need to enhance operational efficiency and is considering restructuring operations, and human resources, particularly its knowledge management system.

In 2015, PT Multi Phi Beta initiated a knowledge management system (KMS) alongside transitioning to an ERP infrastructure. However, the KMS has not been evaluated since. Based on discussions with company representatives, key obstacles identified include a lack of designated mentors, low initiative among knowledge owners, non-standardized document categorization, and an absence of measurement and evaluation metrics. Apart from this problem, the company faces the risk of continuous knowledge loss.

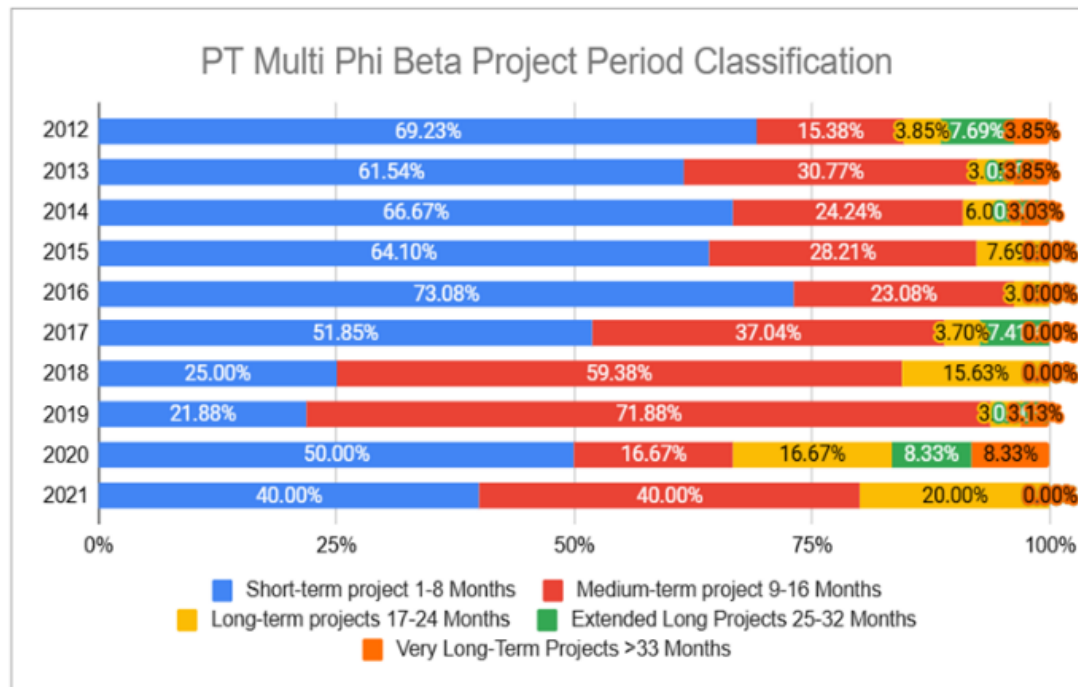


Figure 1. PT Multi Phi Beta Project Period Classification

Based on the blue and red bar in the figure above, over the past decade, the company has largely executed short-term projects followed by medium-term projects. Typically, project execution involves hiring temporary or freelance employees for the project's duration to mitigate wage risks. Consequently, this practice often leads to a relatively high turnover rate as employees come and go with each project cycle. In addition, if the company gets a new project with the same characteristics as the previous one, there is no guarantee that the company can re-recruit former workers with the same project experience. Knowledge loss may occur when experienced professionals leave the organization, taking project-specific insights, lessons learned, and best practices. According to Durst and Wilhelm (2011), when short-term contract employees depart, they often take their acquired expertise with them, which can result in knowledge loss.

LITERATURE REVIEW

Knowledge Definition

Knowledge, an intangible resource, integrates with other firm resources like financial and physical assets to develop capabilities (Grant, 2013). Dalkir (2011) identifies two primary types of knowledge: tacit knowledge, which is hard to express and difficult to convey through words, text, or drawings, and explicit knowledge, which is documented in tangible forms such as text, audio, or images. While tacit knowledge typically resides in individuals' minds, explicit knowledge is usually stored in concrete, tangible formats.

Knowledge Loss

Organizational knowledge loss, as defined by Angell et al. (2013) and Perrott (2007), refers to the intentional or unintentional disappearance of knowledge accumulated from learning and both individual and collective actions. According to Martins and Meyer (2012), this loss has become a crucial issue, making organizations vulnerable during both economic downturns and periods of intense competition. Previous studies indicate that employee turnover is a significant cause of knowledge loss, with other contributing factors including employees' reluctance to share knowledge and heavy workloads (Winkelen & McDermott, 2008). Meanwhile, knowledge loss can greatly impact an organization's trustworthiness with its clients (Joe et al., 2013). Knowledge sharing and transfer are vital to knowledge management (KM), especially as organizations grapple with knowledge loss due to employee turnover. In addition, critical knowledge loss also occurs through retirement, job transfers, mobility, and alternative work



arrangements (Omotayo, 2015). Besides employee turnover, ineffective KM systems/processes and inadequate IT systems are key drivers of knowledge loss (Daghfous et al., 2023).

Knowledge Retention

According to Karkoulian et al. (2008), when knowledge is poorly retained, current employees with less experience struggle to reach the expertise levels of retired employees. Liebowitz (2011) emphasized the need for organizations to be proactive in developing, applying, and institutionalizing knowledge retention and transfer activities to stay competitive in the future. Angell et al. (2013) found that strategies focusing on retaining tacit knowledge and incorporating it into organizational routines are effective in mitigating knowledge loss. Agarwal and Islam (2015) noted that poor knowledge retention or transfer, coupled with knowledge hoarding, prevents effective knowledge transfer, leaving knowledge tacit. Young (2006) suggested that before implementing a knowledge retention program, companies should identify critical knowledge areas by gathering senior executives to discuss:

- Crucial knowledge areas for future success
- Most valuable knowledge areas
- Knowledge most at risk of loss due to staff turnover
- Knowledge that is easily replaced versus irreplaceable knowledge
- Companies should focus retention efforts on the most irreplaceable, high-risk knowledge areas.

Levy (2011) outlined a three-stage approach to knowledge retention. This process involves:

- Identifying which knowledge is of the highest priority for retention
- Ensuring the transfer of knowledge that has not been documented
- Incorporating the retained knowledge into the organization's business processes for potential reuse

Knowledge Retention Strategy

Retaining knowledgeable employees in key competence areas should be central to the HR retention system. Implementing a remuneration system focused on knowledge is essential to recognize and reward the valuable knowledge, skills, and experience employees bring to the organization (Phaladi & Ngulube, 2024). Paladino (2007) found that another strategy to mitigate knowledge loss is to engage external resources that possess the necessary knowledge: hire outside contractors, bring back retirees as consultants, leverage expertise from employees at other plants or divisions, or seek knowledge through professional associations. Customization is crucial for any knowledge retention solution, and where an organization begins depends on the urgency of the problem (De Long and Davenport, 2003).

Knowledge Management

Knowledge Management is taken as the tools, techniques, and strategies to retain, analyze, organize, improve, and share business expertise (Groff & Jones, 2003). According to North & Kumta (2018), knowledge management is comprised of the following tasks and purposes:

- Acquiring knowledge: Ensuring the availability of necessary information and knowledge for business development and processes.
- Creating knowledge: Developing knowledge in the most suitable locations, inside or outside the company, leading to innovation.
- Sharing and using knowledge: Facilitating the dissemination, learning, and optimal use of knowledge.
- Learning: Enabling the organization and its employees to learn, reflect, and apply what they have learned.
- Protecting knowledge: Treating knowledge as an asset, maintaining its value by keeping it updated through contributions from people.

Asian Productivity Organization (APO) Knowledge Management Assessment Model

The starting point for the APO KM Framework is to understand the organization's vision, mission, business goals, and strategic directions. This understanding helps the organization identify and analyze its core competencies and areas for development. The Four Accelerators help gauge the prevalence of these drivers and enablers within the organization, facilitating a successful KM implementation. The five Core Knowledge Processes provide an initial assessment of existing KM practices that can be leveraged during implementation. Organizations may unknowingly be practicing KM already. The outcomes of KM efforts measure the

effectiveness of knowledge processes supported by critical success factors (Accelerators, Vision, and Mission). These outcomes should demonstrate enhanced learning and innovation, building capabilities at individual, team, organizational, and societal levels, ultimately improving product and service quality, productivity, profitability, and growth (APO, 2020). The APO KM Assessment Tool is based on the APO KM Framework. The questions in the tools are based on seven Framework elements.

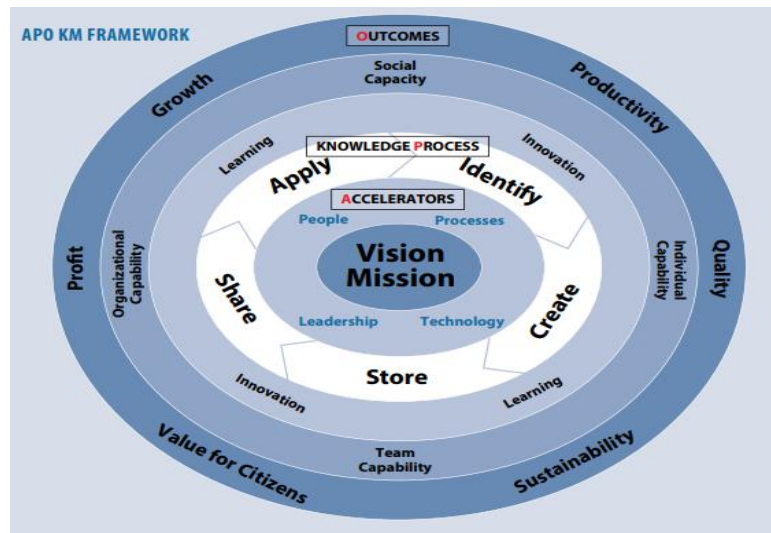


Figure 2. APO KM Framework

The APO KM Assessment Tool evaluates seven audit categories based on the key elements of the Framework:

- **KM Leadership:** This category assesses the organization's leadership capacity to respond to the challenges of a knowledge-based economy. It evaluates KM policies and strategies, as well as the organization's efforts to initiate, guide, and sustain KM practices.
- **Process:** This category evaluates how knowledge is used in managing, implementing, and improving the organization's key work processes. It also assesses the organization's continuous evaluation and improvement of these processes for better performance.
- **People:** This category assesses the organization's ability to create and maintain a knowledge-driven and learning culture. It evaluates efforts to encourage knowledge sharing and collaboration, as well as the development of knowledge workers.
- **Technology:** This category reviews the organization's ability to develop and deliver knowledge-based solutions, such as collaborative tools and content management systems. It also assesses the reliability and accessibility of these tools.
- **Knowledge Processes:** This category evaluates the organization's ability to systematically identify, create, store, share, and apply knowledge. It also assesses the sharing of best practices and lessons learned to minimize work duplication and reinventing the wheel.
- **Learning and Innovation:** This category assesses the organization's ability to foster learning and innovation through systematic knowledge processes. It evaluates management's efforts to instill values of learning and innovation and provides incentives for knowledge sharing.
- **KM Outcomes:** This category measures the organization's ability to enhance value for customers and citizens through new and improved products and services. It evaluates the organization's success in increasing productivity, quality, profitability, and sustainable growth through effective resource use and learning and innovation.

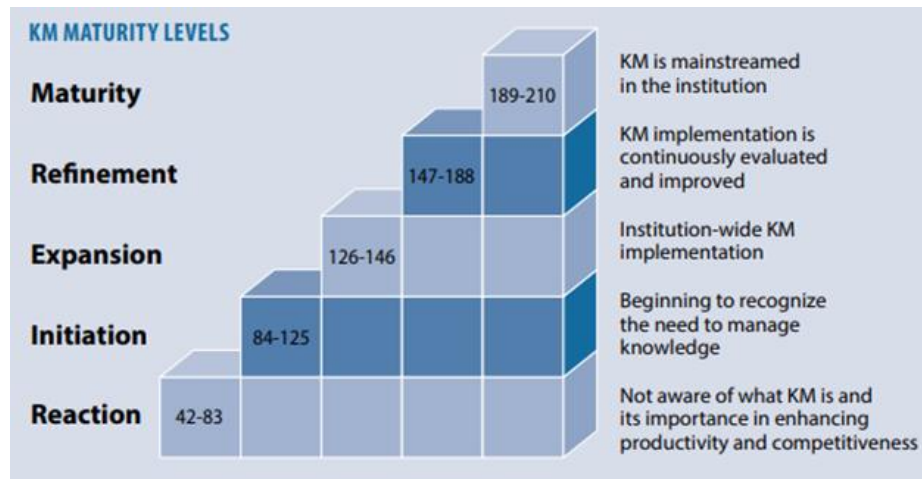


Figure 3. APO KM Maturity Levels

The results of the assessment provide an understanding of the level of KM readiness in an organization. This may range from the “reaction” level at its lowest to the “maturity” level at its highest. The conditions describing each of these levels correlate to the presence, absence, or weakness of the four KM accelerators, learning and innovation, and the KM outcomes in the organization.

Conceptual Framework

The conceptual framework involves a systematic approach to address the identified business issue using the APO Knowledge Management (KM) Framework. This includes exploring various aspects such as accelerators, knowledge processes, and outcomes within the framework. Next, an assessment of KM readiness is carried out, followed by thorough data collection and analysis. The findings are then discussed, leading to the development of a KM implementation plan aimed at improving readiness levels and effectiveness while minimizing knowledge loss.

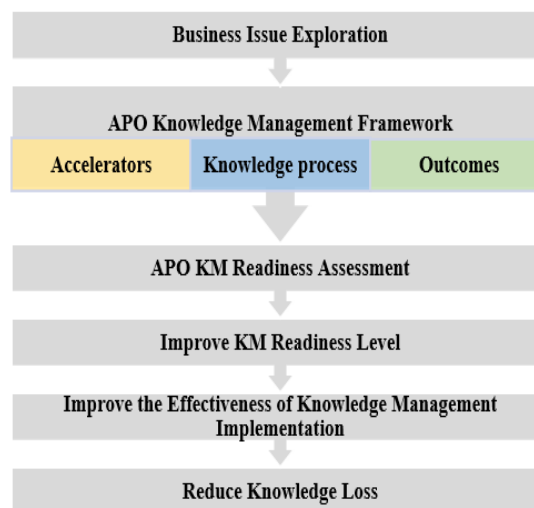


Figure 4. Conceptual Framework

METHODOLOGY

Research Design

The research at PT Multi Phi Beta follows a structured approach, beginning with an introductory phase and progressing through data gathering, analysis, and recommendation. Central to this process is the research design, which serves as a guiding roadmap facilitating research progression from start to finish.

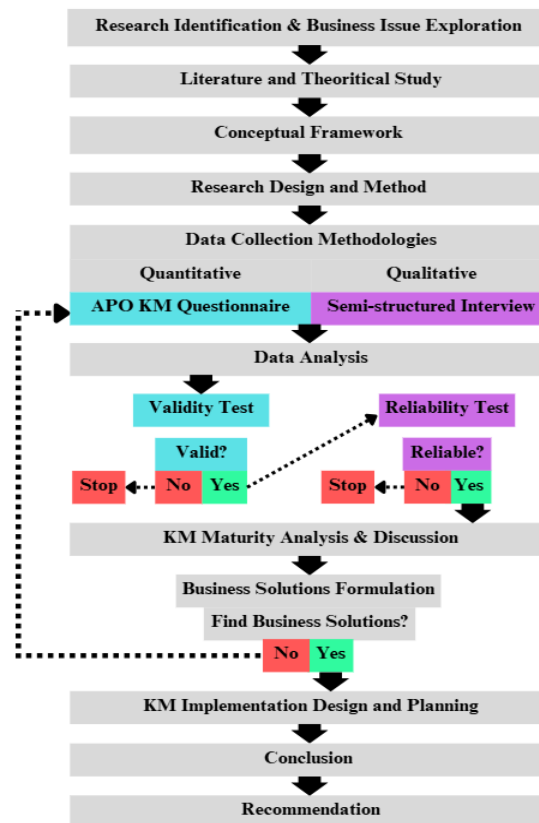


Figure 5. Research Design

Quantitative Data Collection

The data collection process utilizes online tools, specifically Google Forms, which are spread to all divisions within PT Multi Phi Beta. The questionnaire items are structured based on the APO framework for Knowledge Management (KM). Through this method, quantitative data is systematically gathered from employees across various divisions, allowing for a comprehensive analysis of knowledge management practices within the organization.

Qualitative Data Collection

Through qualitative data collection, it can provide deeper insights into the survey findings, offering explanations, examples, and context that may not be captured in quantitative data alone. This research uses a semi-structured interview method. Hence, the semi-structured interview might provide room for researchers to adjust their research questions if there is a possible change yet still maintain its directive sense since the main topics to discuss have been prescribed beforehand (Ruslin et al., 2022). The following is a list of profiles for semi-structured interviews.

Table 1. List of Interviewee

<i>Position</i>	<i>Relevance</i>
Operational Director	The operational director typically oversees the day-to-day operations of the company, including the implementation of various strategies and initiatives
HR & Legal Manager	The human resources manager is responsible for managing personnel-related matters and responsible for KM design and participation.



DATA ANALYSIS METHOD

Sample Size

Slovin's formula is a method used to determine the sample size needed for a survey or research study when the population size is known. It is used in situations where it's not feasible or practical to survey an entire population and if the behavior of a population is not yet known with certainty. The population that will be used as a sample is all employees who work at PT Multi Phi Beta.

The formula:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n : Sample size

N : Population Size

e : Margin of Error (10%)

Validity Test

This research will use Pearson's Correlation to evaluate the relationship between questionnaire variables. This analysis will be conducted following the collection of questionnaire data, aiming to determine the validity and strength of correlations among variables. The test will be performed with Microsoft Excel. Assessing questionnaire validity using the Excel formula "CORREL" involves calculating correlation coefficients (r) between pairs of questions or variables. These coefficients are compared with critical values from a correlation coefficient table or r -table at a specific level of confidence and degree of freedom.

Reliability Test

Cronbach's alpha is a measure of internal consistency or reliability of a scale or set of items within a questionnaire. It assesses the extent to which the items on a scale are correlated with each other, indicating the reliability of the construct being measured. The alpha coefficient ranges from 0 to 1, where higher values indicate greater internal consistency. The criteria for interpreting Cronbach's alpha values vary, but generally, values above 0.7 are considered good for research purposes (Hair et al, 2003).

APO Questionnaire design

According to Young (2020), There are a total of 42 questions covering the seven audit categories, with a maximum score of 210 points. Each category has a maximum score of 30 points. Each of the questions can be rated from 1 (Doing Very Poorly or Nothing at All) to 5 (Doing Very Well).

Data Triangulation

Triangulation refers to the use of multiple methods or data sources in qualitative research to develop a comprehensive understanding of phenomena (Patton, 1999). In social sciences, triangulation is often used to indicate that more than two methods are used in a study with a view to double checking of results (Hussein, 2009). This approach enhances research by providing diverse datasets that shed light on different aspects of the phenomenon under investigation. It helps address inconsistencies by refuting invalid assumptions from one dataset with evidence from another and can support hypothesis confirmation when findings from one set corroborate another. Additionally, triangulation aids in explaining study results (Carvalho & White, 1997).

FINDINGS AND ARGUMENT

Respondent Analysis

The questionnaire was distributed and collected between April 2, 2024, and May 17, 2024. Based on the Slovin formula, with a 90% confidence level and a 10% margin of error, the required sample size is 64 respondents. However, the author managed to collect data from 71 respondents. In this section, the respondent analysis will summarize the age, position, and work tenure of the participants.

- **Work Position Distribution:** The respondent comprises 13% Support Staff (9 people), 32% Sub-Professionals such as Inspectors and Technicians (23 people), 37% Assistant Engineers and Assistant Managers (26 people), and 18% Team



Leaders and senior professionals like Resident Engineers and Chief Inspectors (13 people). This demographic indicates a strong focus on mid-level technical and engineering roles, supported by experienced leadership and streamlined administrative staff.

- **Work Tenure Distribution:** The respondent comprises with varied tenure, including 37% with less than 1 year of experience (26 people), 32% with 1-3 years of experience (23 people), 10% with 3-5 years (7 people), 14% with 5-10 years (10 people), and 7% with over 10 years of experience (5 people). This indicates a relatively young and dynamic workforce with a significant proportion of recent hires.
- **Age Distribution:** The respondent comprises diverse in age, with 8% under 25 years old (6 people), 24% between 25-30 years (17 people), 27% between 30-35 years (19 people), 21% between 35-40 years (15 people), and 20% over 40 years old (14 people). This distribution shows a balanced mix of young professionals and more experienced employees.

Validity & Reliability Test Result

This section summarizes the validity and reliability tests of the questionnaire data. For validity, the correlation coefficient is compared with the r-table value of 0,2335, given a total sample size of 71 and a 5% significance level. The correlation coefficient must exceed this value to be considered valid. For reliability, the Cronbach's alpha value for each category, based on six questions each, must be higher than 0,7. In conclusion, all validity and reliability tests were successfully passed.

Table 2. Validity & Reliability Result

Category	Correlation Coefficient						Result	Cronbach Alpha Value (Result)
	1	2	3	4	5	6		
Leadership	0.96	0.79	0.85	0.88	0.94	0.74	Valid	0.91 (Reliable)
Process	0.89	0.52	0.62	0.55	0.84	0.81	Valid	0.79 (Reliable)
People	0.84	0.58	0.85	0.6	0.8	0.8	Valid	0.83 (Reliable)
Technology	0.82	0.74	0.87	0.75	0.8	0.79	Valid	0.88 (Reliable)
Knowledge Process	0.83	0.7	0.71	0.74	0.85	0.74	Valid	0.85 (Reliable)
Learning and Innovation	0.78	0.76	0.78	0.76	0.88	0.7	Valid	0.86 (Reliable)
KM Outcomes	0.89	0.79	0.85	0.72	0.92	0.78	Valid	0.90 (Reliable)

Knowledge Management Readiness Level Analysis

After confirming the validity and reliability of the questionnaire data, the next step is to interpret the data based on the total scores. The questionnaire comprises seven categories, each containing six questions. Each question is scored on a scale from 1 to 5, resulting in a maximum score of 30 for each category. Therefore, the overall maximum score across all categories is 210. According to the KM readiness levels, the company falls into the "Initiation" level with a score of 100. This indicates that the company is beginning to recognize the need to manage knowledge but has not yet fully integrated KM practices into its operations.

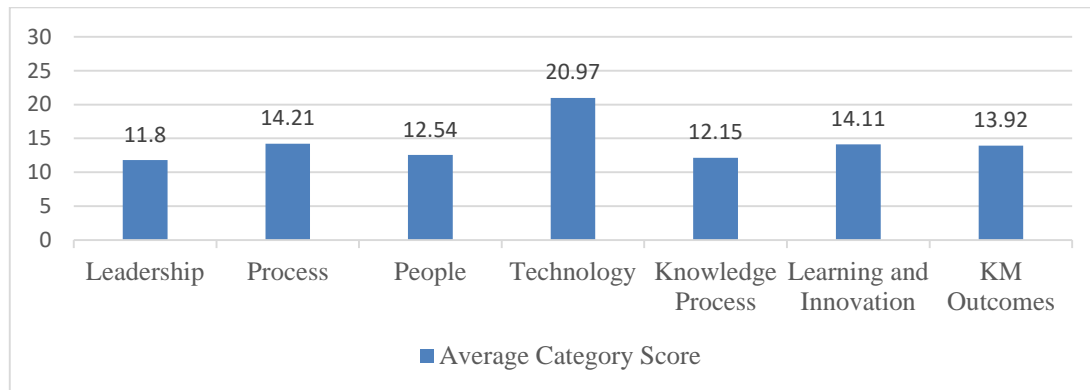


Figure 6. Average Category Score

The average score is 14.24. Categories such as technology, process, and learning and innovation are above this average, showing strengths in these areas. leadership, people, knowledge process, and KM Outcomes fall below the average, indicating areas where the organization can focus on improvements to achieve better KM readiness and overall performance. Based on the analysis of each factor from the respondents, the results indicate that the KM readiness level is also at the same level.

Table 3. KM Readiness Level per Segment

Segment	APO KM Category							Total Score	KM Readiness Level	
	LDS	PRC	PPL	TEC	KWP	LIN	OUT			
Segment by Work Position										
Team Leader or Equivalent	12	15	13	20	12	15	14	101	Initiation	
Assistant Manager or Equivalent	12	14	13	21	13	14	14	101	Initiation	
Sub-Professional or Equivalent	11	14	12	22	11	14	13	97	Initiation	
Support Staff or Equivalent	12	15	13	20	12	15	15	101	Initiation	
Segment by Work Tenure										
<1 Year	12	14	13	21	13	14	14	101	Initiation	
1-3 Year	12	14	13	21	12	15	14	101	Initiation	
3-5 Year	12	15	12	22	11	14	13	100	Initiation	
5-10 Year	12	14	12	20	12	14	13	99	Initiation	
>10 Year	10	14	12	19	11	12	14	93	Initiation	
Segment by Age										
<25 Year	14	16	13	20	13	16	17	106	Initiation	
25-30 Year	11	14	12	22	11	13	12	95	Initiation	



30-35 Year	12	14	12	22	12	14	14	99	Initiation
35-40 Year	13	14	14	21	13	15	15	104	Initiation
>40 Year	12	15	12	20	12	14	14	99	Initiation

This suggests that, across different job positions, age groups, and work tenures, the overall average KM readiness level is in the initiation stage. This indicates that the company is at the early stages of recognizing the importance of managing knowledge, yet it has not fully embedded KM practices into its daily operations. While there is an awareness of the necessity for structured knowledge management, the implementation and integration of these practices are still in their early stages. Consequently, there is significant potential for growth and development in the company's approach to KM, highlighting the need for a more effective strategy to enhance and capitalize on knowledge management across all levels of the organization.

Qualitative Analysis – Interview Result

To further enrich the assessment results, an interview was conducted with sessions lasting 2 hours. The author conducted interviews with the Operational Director and the Human Resource Manager. During these interviews, the author first explained the scheme of the APO Questionnaire and then discussed the survey results. The discussion covered various categories, starting from leadership and extending to KM outcomes. At the end of the APO questionnaire discussion, more detailed information about the KM tools currently used by the company was also explored.

Table 4. Interview Result

Category (Score)	Sub-Category Topic (Score)	Interview Summary Result	
		Operational Director	HR Manager
Leadership (1.97)	L1 Knowledge Vision and Strategy (1.87)	The company lacks a proper knowledge vision directly linked to strategic goals and does not have a formal structure to manage KM initiatives. Financial resources for KM activities are insufficient, and while there are some policies in place for safeguarding knowledge, they are not comprehensive. Support for knowledge sharing and collaboration from management is inconsistent, and there is no system in place to recognize and reward KM activities.	Confirms the absence of a formal knowledge vision and strategy, as well as missing dedicated roles and teams focused on KM. The KM budget was allocated during the ERP system development, which includes KM features. Existing policies cover sensitive corporate information but are not comprehensive. While some managers promote knowledge sharing, it is not consistent, and recognition for KM contributions is sporadic and not part of a formalized system.
	L2 Formalization of KM Initiatives (1.54)		
	L3 Financial Resources for KM (2.06)		
	L4 Knowledge Safeguarding Policies (2.82)		
	L5 Managerial Role-Modeling for KM (1.82)		
	L6 Recognition and Rewards for KM Activities (1.68)		
Process (2.37)	PR1 Core Competencies and Strategic Alignment (2.39)	Highlights the need for better identification and alignment of core competencies with strategic	Acknowledges a connection between the company's core competencies and its mission, with



	<p>PR2 Design of Work Systems and Key Processes (2.35)</p> <p>PR3 Integration of Technology and Knowledge (2.08)</p> <p>PR4 Crisis Management Systems (2.65)</p> <p>PR5 Implementation and Management of Key Processes (2.49)</p> <p>PR6 Continuous Evaluation and Improvement of Processes (2.25)</p>	<p>goals. While the company has systems to ensure project completion meets client standards, there is a gap in effectively integrating new technology and knowledge sharing into process design. The crisis management system, though present, needs to be more robust. The implementation of key work processes to meet customer requirements is adequate, but there is a lack of continuous evaluation and improvement.</p>	<p>current processes supporting client satisfaction. The design of company processes is considered good. However, crisis management procedures need to be more comprehensive and better organized. Key work processes must always be implemented to meet customer requirements. While evaluation is conducted, it is not done periodically.</p>
<p>People (2.09)</p>	<p>PE1 Education, Training, and Career Development Programs (2.31)</p> <p>PE2 KM Induction Process for New Staff (2.06)</p> <p>PE3 Formal Mentoring, Coaching, and Tutoring Processes (1.83)</p> <p>PE4 Database of Staff Competencies (2.49)</p> <p>PE5 Encouragement and Reward for Knowledge Sharing and Collaboration (1.58)</p> <p>PE6 Organization of Employees into Teams/Groups (2.27)</p>	<p>Company's training programs are not comprehensive enough to build the necessary skills and capabilities. There is no systematic induction process for new staff that includes familiarizing them with KM and its benefits. Although mentoring is often carried out by senior engineers or team leaders, the company lacks formal mentoring and coaching programs. The company has a database of staff competencies but does not currently reward knowledge sharing and collaboration. However, organizing employees into small teams for project management and problem-solving is a common practice.</p>	<p>Suggests that the company should invest more in education and career development to enhance employee performance. Improving the induction process to better integrate KM training for new employees is necessary. Introducing structured mentoring and coaching programs would benefit staff development. The company has a database of staff competencies but needs structured incentives to promote knowledge sharing and collaboration. Discussions are regularly held in every department to solve problems in small or large groups.</p>
<p>Technology (3.5)</p>	<p>T1 Capabilities of IT Infrastructure (4.31)</p> <p>T2 Alignment of IT Infrastructure with KM Strategy (3.17)</p> <p>T3 Access to Computers for All Employees (3.96)</p> <p>T4 Access to Internet/Intranet and Email (3.52)</p>	<p>Highlights that the company's IT infrastructure, including the Resplan ERP system, supports KM well. All employees have computer and internet access. However, more frequent updates are needed on the website and intranet, as intensive information exchanges currently happen more through company WhatsApp groups.</p>	<p>The Resplan ERP application, which includes a KM feature, aligns with the company's KM strategy. All employees have computer and internet access. However, more frequent updates are needed on Resplan, and the intranet is rarely used for information sharing.</p>



	<p>T5 Regular Updates of Information on Website/Intranet (2.83)</p> <p>T6 Use of Intranet for Organization-Wide Communication (3.18)</p>				
Knowledge Process (2.03)	<p>KP1 Systematic Processes for Knowledge Management (1.61)</p> <p>KP2 Knowledge Inventory Maintenance (2.06)</p> <p>KP3 Documentation and Sharing of Knowledge from Completed Tasks/Projects (1.94)</p> <p>KP4 Retention of Critical Knowledge from Departing Employees (1.68)</p> <p>KP5 Sharing of Best Practices and Lessons Learned (2.52)</p> <p>KP6 Benchmarking Activities (2.35)</p>	<p>Points out that the organization lacks systematic processes for managing knowledge. Documents are often stored in Google Drive rather than Resplan, and there are no consistent standards for documenting knowledge from completed projects. Critical knowledge is frequently lost when employees leave, though senior engineers occasionally share insights. Benchmarking activities are conducted effectively.</p>	<p>The absence of a structured KM approach and highlights that the Resplan KM feature has not been maintained. Documentation and knowledge sharing from projects need improvement, and there is no system to retain knowledge when employees leave. However, experienced staff are encouraged to share best practices, and regular benchmarking is recommended to remain competitive and innovative.</p>		
	Learning & Innovation (2.35)	<p>LI1 Reinforcement of Learning and Innovation Values (2.30)</p> <p>LI2 Risk-Taking and Learning from Mistakes (2.25)</p> <p>LI3 Utilization of Cross-Functional Teams (2.80)</p> <p>LI4 Empowerment of Employee Ideas and Contributions (2.46)</p> <p>LI5 Management's Willingness to Try New Tools and Methods (2.48)</p> <p>LI6 Incentives for Collaboration and Information Sharing (1.82)</p>	<p>Highlights the need to better communicate the importance of learning and innovation. While the organization appreciates employee initiatives and ideas, it avoids risky methods for high-cost projects, favoring proven approaches. Cross-functional teams are used but require better structuring, and there are no incentives for knowledge sharing. Management is open to trying new tools and methods, provided they are not risky.</p>	<p>Emphasizes the importance of reinforcing a commitment to learning and innovation. Efficient methods are encouraged if logical, and cross-functional teams are seen as beneficial for problem-solving. Employee contributions are valued, and experimenting with new methods is promoted. However, the organization lacks incentives for sharing and collaboration.</p>	
		KM Outcome (2.32)	<p>O1 History of KM Implementation and Change Initiatives (2.42)</p> <p>O2</p>	<p>Smooth project execution often results from effective collaboration among engineers and employees. However, the</p>	<p>Recognizes the impact of KM implementation but emphasizes the need for clear metrics to evaluate initiatives effectively.</p>



Assessment of Knowledge Contributions and Initiatives (2.06)	organization lacks measures to assess KM impact, and productivity gains from KM are not evident. KM has not significantly improved profitability or sustained growth, though collaboration has enhanced project quality.	While the benefits of KM on productivity and quality are noted, the direct correlation with profitability and sustained growth is not yet apparent. Applying KM practices is seen as a potential avenue for improving service and product quality in the long term.
O3 Productivity and Efficiency Gains (2.01)		
O4 Profitability Improvements (2.55)		
O5 Quality Improvements in Products/Services (2.54)		
O6 Sustained Growth (2.34)		

Data Triangulation

The goal of data triangulation is to achieve comprehensive results from the combined data to confirm its credibility. In this research, the triangulation validity will cover all categories due to the low assessment scores across the board. By examining these low scores in each category, a thorough triangulation analysis will be conducted to verify the findings. The following analysis outlines the triangulation process and its application to the assessment results across all categories.

Table 5. Data Triangulation

Category (Average)	Quantitative Data		Qualitative Data	Data Triangulation
	Strength	Weakness	Interview Result	
Leadership (1.97)	Established knowledge safeguarding policies	There is a lack of a clear KM vision and strategy, no formalization of KM initiatives, insufficient managerial role modeling for KM practices, lack of financial allocation and an absence of recognition and rewards	The company lacks a unified KM vision, formal structures, and consistent managerial support for knowledge sharing. Even though a budget has been allocated for KM, it is only limited to creating KM features in company ERP, Resplan. Since then, there has been no budget for KM. Additionally, there is no strong system to recognize and reward KM activities.	Convergence The company has not planned a budget for the formation of a KM team and a KM reward program. In addition, the company also has issues related to KM vision discussions and communication to team leaders or managers related to consistency in promoting KM
Process (2.37)	The company has a crisis management system and utilizes its key work processes to ensure customer requirements are met.	Lack of Technology Integration into work processes and lack of continuous evaluation	Evaluation of the work process is carried out, but it is not done periodically, in addition the technology update and knowledge sharing are not taken into account in the design process.	Convergence There's a need for integration of new technology and knowledge sharing into process design, and a design continuous evaluation of work processes.



<p>People (2.09)</p>	<p>There is a database of staff competencies and small team to handle problems.</p>	<p>No reward for knowledge sharing, no formal mentoring and KM induction process</p>	<p>There is a mentoring activity but it is still informal based on the employee or engineer own initiative to tackle problem. and because the company's KM system is inadequate, the introduction of the company's KM to new staff is not effective</p>	<p>Convergence There is an absence of formal mentoring and coaching programs. Although team-based problem-solving is common, these efforts need to be better supported by formalized processes and rewards systems.</p>
<p>Technology (3.5)</p>	<p>Proper IT infrastructure for KM, accessibility to computer and internet</p>	<p>Regular Updates of information on website or intranet</p>	<p>Company ERP, Resplan, is packed with KM feature that facilitate the storing of knowledge. In the other hand, there is rarely any information exchange activity on the company website or intranet (Resplan). Whatsapp is the most common way to share information related to work and company information.</p>	<p>Convergence While WhatsApp groups or private WhatsApp can be an effective communication tool for quick conversations and simple knowledge sharing, it cannot replace the functionality and benefits of a more structured, secure and integrated corporate intranet.</p>
<p>Knowledge Process (2.03)</p>	<p>The organization shares best practices and lessons learned across the organization. There is a benchmarking activities.</p>	<p>There is no systematic processes for KM, no documentation of completed projects and poor retention of critical knowledge from departing employees</p>	<p>Even though benchmarking activities have been carried out and team leaders have implemented best practices, the company does not have a proper procedure for managing knowledge circulating within the company, so there is no standard for documenting valuable knowledge from experienced employees or engineers who have left the company.</p>	<p>Convergence The absence of systematic processes for KM affects the organization's ability to maintain a cohesive knowledge inventory, document and share project learnings, retain critical knowledge and consistently share best practices</p>
<p>Learning & Innovation (2.35)</p>	<p>Proper utilization of Cross-Functional teams, empowerment of employee Ideas and management willingness to try new tools</p>	<p>No incentives for collaboration, poor risk-taking and learning from mistakes and reinforcement of learning values</p>	<p>Because there is no reward system, employees are not given incentives for collaboration. In addition, although management is open to taking risks, there are exceptions for high-cost projects.</p>	<p>Convergence The company recognizes the importance of learning but needs stronger commitment in these areas. There is an openness to new methods, though risk-taking is approached cautiously. However, formal incentives for collaboration are lacking, which hinders the full potential of innovative practices.</p>
<p>KM Outcomes</p>	<p>The organization has</p>	<p>No formal measures are in place for</p>	<p>There are significant gaps in measuring and demonstrating</p>	<p>Convergence</p>



(2.32)	improved the quality of its products and/or services as a result of applying knowledge to improve business processes	assessing the impact of knowledge contributions and initiatives.	outcomes. While there's recognition of enhanced collaboration and project success, metrics for assessing KM impact, such as productivity gains, profitability, and sustained growth, are not established. This suggests a need for clearer evaluation frameworks to align KM efforts more directly with organizational goals and demonstrate tangible benefits more effectively.	Company sees lack of effective measures to assess the impact of KM efforts as an issues to develop proper metrics.
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Business Solution

Based on the assessment, Multi Phi Beta is currently in the initiation phase of knowledge management. This indicates that the company is beginning to recognize the need to manage knowledge but has not yet fully integrated KM practices into its operations. To support the growth of knowledge management, this research suggests focusing on all categories for improvement while leveraging existing strengths. Below are business recommendations to enhance the company's knowledge management system.

Table 6. List of KM Solutions

<i>KM Solutions</i>	<i>Issues</i>	<i>Sub-Category (Category)</i>	<i>Points</i>
Implement standardized KM processes, including guidelines and tools	Lack of systematic processes for identifying, creating, storing, sharing, and applying knowledge.	KP1 (Knowledge Process)	1.61
	Inconsistent documentation and sharing of knowledge from completed tasks or projects.	KP3 (Knowledge Process)	1.94
	Valuable knowledge is lost when employees leave the organization	KP4 (Knowledge Process)	1.68
Formal rewards and recognition program for knowledge sharing	Lack of a proper system for recognizing and rewarding KM activities	L6 (Leadership)	1.68
	No structured incentives to promote knowledge sharing and collaboration	PE5 (People)	1.58
	Individuals are not given incentives to work together and share information.	LI6 (Learning & Innovation)	1.82
KM workshops for managers and senior leadership	Lack of a unified knowledge vision tied to strategic goals	L1 (Leadership)	1.87
	Inconsistent emphasis on knowledge sharing and collaboration by managers	L5 (Leadership)	1.85
	The importance of learning and innovation is not clearly communicated	LI1 (Learning & Innovation)	2.30



	Lack of systematic induction process for KM introduction	PE2 (People)	2.06
Develop and implement a comprehensive set of metrics	Lack of effective measures to assess the impact of KM efforts	O2 (Outcomes)	2.06
	Productivity gains from KM are not yet evident	O3 (Outcomes)	2.01
Establish a KM Department	No formal structure to manage KM initiatives	L2 (Leadership)	1.54
Regularly update and maintain the KM feature in Resplan	Information delivered on the website/intranet is not updated on a regular basis.	T5 (Technology)	2.83
	Knowledge inventory is not maintained or utilized effectively	KP2 (Knowledge Process)	2.06
Include KM funding in the annual budget	Insufficient budget allocation for KM activities	L3 (Leadership)	2.06
Establish a Continuous Improvement Program	No Integration of new technology and knowledge sharing into process design	PR3 (Process)	2.08
	lack of continuous evaluation of work process	PR6 (Process)	2.25
Establish a formal mentoring and coaching program	Absence of formal mentoring, coaching, and tutoring processes	PE3 (People)	1.83
Create a 'Safe to Fail' environment	Risk-taking and committing mistakes are not widely regarded as learning opportunities	LI2 (Learning & Innovation)	2.25

1. Implement standardized KM processes, including guidelines and tools

Multi Phi Beta lacks systematic processes for identifying, creating, storing, sharing, and applying knowledge. As a result, knowledge from completed tasks or projects is often not documented or shared, and critical knowledge from departing employees is lost.

Action Plan

- **Develop KM Guidelines:** Create comprehensive guidelines for knowledge management processes and define clear processes and procedures for each KM activity.
- **Implement KM tools such as After-Action Reviews (AARs):** Conduct AARs after project completion to capture lessons learned and document them systematically. According to Young (2020), the After Action Review (AAR) serves as a foundation for learning from both project successes and failures. It provides a starting point for enhancing future projects. By concentrating on the desired outcomes and detailing specific observations, team members can pinpoint strengths and weaknesses and figure out ways to boost performance going forward. The project team can then document these lessons learned and share them with the rest of the organization to aid in better decision-making.
- **Implement knowledge café:** According to Young (2020), a knowledge café is a method for group discussion, reflection, and the sharing of thoughts and insights in a non-confrontational manner. Regular knowledge cafés offer a chance for people to engage in deeper discussions and reflection. Participants typically leave feeling more motivated and inspired, often gaining valuable insights in the process.
- Integrate KM processes with existing knowledge repositories and systems, such as Resplan ERP.

Goals

- Enhanced Documentation: Systematic and comprehensive documentation of knowledge from projects and tasks.
- Standardized KM Processes: Consistent and efficient KM practices integrated into the organization’s operations.

2. Formal Rewards and Recognition Program for Knowledge Sharing



Incentives play a significant role in motivating employees to share knowledge, as they provide positive reinforcement for desired behaviors. As Dalkir (2011) stated, knowledge workers need to have a climate in which knowledge sharing is encouraged and they need a reason for sharing the knowledge. Incentives remain one of the more important challenges facing KM today.

Action Plan

- Conduct a needs assessment to understand what types of rewards and recognition would be most motivating for employees.
- Define clear criteria for recognizing KM contributions, such as quality and impact of shared knowledge.
- Develop different types of rewards (e.g., monetary bonuses, gift cards, extra vacation days) and recognition methods (e.g., certificates, public acknowledgments, awards).
- Align the framework with the organization's strategic goals and values.

Goals

- Enhanced KM Engagement: Increased employee participation in KM activities.
- Recognition and Reward Alignment: A clear and fair system for recognizing and rewarding KM contributions, aligned with organizational goals and values.

3. KM Workshops for Managers and Senior Leadership

Handzic (2011) emphasized that organizational leadership is a crucial knowledge enabler, impacting knowledge processes both directly and indirectly through organizational culture, measurement, and technology. Angell et al. (2013) added that without strong managerial commitment and drive, knowledge management (KM) efforts would be restricted to merely codifying knowledge and acquiring technological tools and solutions. Managers need to lead by example and actively support the organization's knowledge-focused initiatives.

Action Plan

Develop a Workshop Curriculum Focused on KM Vision and Strategic Goals

- Collaborate with key stakeholders to define the KM vision and its alignment with strategic goals.
- Design workshop modules that cover the importance of KM, its benefits, and how it supports organizational objectives.
- Develop guidelines and tools for managers to facilitate and encourage knowledge sharing within their teams.
- Ensure the curriculum emphasizes the role of managers and senior leaders in promoting and sustaining KM.

Goals

- Unified KM Vision: A clearly articulated KM vision that is understood and embraced by managers and senior leaders, directly tied to strategic goals.
- Consistent KM Practices: A consistent and strong emphasis on knowledge sharing and collaboration across all managerial levels, fostering a culture of continuous learning and innovation.

4. Develop and Implement a Comprehensive Set of Metrics

Implementing a comprehensive set of metrics is essential for organizations to achieve higher productivity, cost savings, and enhanced effectiveness. The Balanced Scorecard (BSC) method provides a framework to translate vision and strategy into measurable goals, ensuring continuous improvement in strategic performance and results.

Action Plan

Dalkir (2011) outlines the major steps for implementing the balanced scorecard metric as follows:

- Translate the knowledge management (KM) vision and strategy into specific, measurable goals.
- Confirm these goals by reaching a consensus on clear, short-term, and concrete objectives.
- Communicate and link: continuously measure progress against objectives and evaluate how well the reward system aligns with these objectives. Ensure that employees are trained, motivated, and rewarded for integrating KM into their daily work.
- Conduct a reality check to ensure that the details are sufficient for measuring progress and assessing how well the objectives are being achieved.
- Integrate learning and feedback into your metrics by performing both formative and summative evaluations.

Goals:

- Effective Measurement of KM Impact: A comprehensive set of metrics that provide clear, actionable insights into the effectiveness of KM initiatives, enabling the organization to assess their impact accurately.

5. Established KM Departement

According to Angell et al. (2013), a thorough strategy for guiding knowledge management (KM) efforts and managing knowledge resources should be developed and applied throughout the network. Creating dedicated roles, such as a KM officer or director, could enhance strategic coordination and alignment among different units. Young (2020) suggests that a fundamental KM structure should include the following components:

1. KM Steering Committee:

Comprising top and middle management, this committee provides strategic oversight, direction, and resources. It serves as the policymaking and decision-making body for KM.

2. KM Center or Central Support Office:

This entity coordinates the KM efforts and offers technical support to various knowledge teams as they execute their KM projects. It also assists with KM training and education, promotes KM initiatives, and evaluates KM implementation within the organization.

3. Knowledge Team:

A cross-functional or multi-disciplinary team focused on a KM project within a specific business area.

Action Plan

- Identify key roles within the KM department (e.g., KM Director, KM Specialists, Knowledge Analysts, KM steering committee, KM central support office, Knowledge Team).
- Define the responsibilities and reporting lines for each role.
- Develop job descriptions and required competencies for each position.
- Implement modified KM structure based on the person in charge.

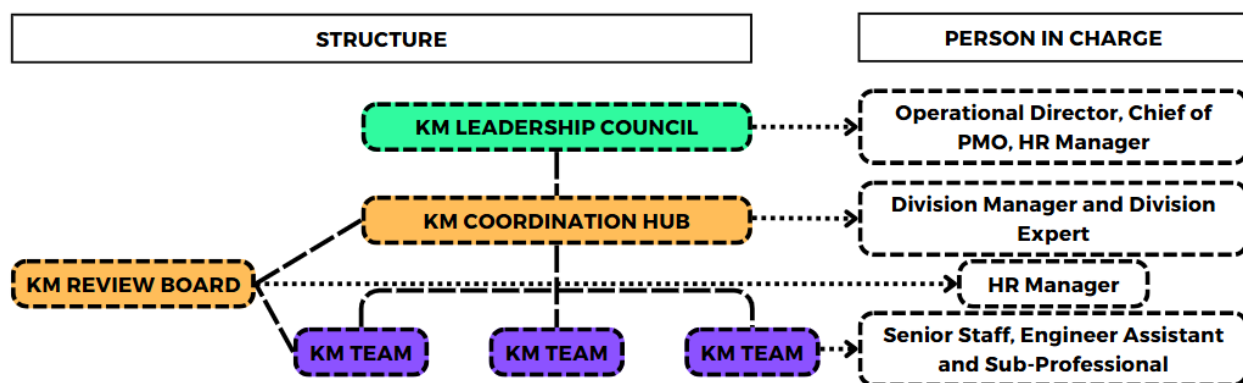


Figure 7. KM Structure for Multi Phi Beta

Goals

- Formal KM Structure: A dedicated KM department with clear roles, responsibilities, and a strategic mission aligned with organizational goals.
- Enhanced Knowledge Management: Improved management of knowledge resources, leading to better knowledge creation, storage, sharing, and application.

6. Regularly update and maintain the KM feature in Resplan

Resplan, the company's primary ERP system, was completed in 2015 and includes a range of management functions, including a dedicated Knowledge Management (KM) feature. According to the Operational Director, Resplan's KM feature has the potential to serve as an effective knowledge repository for the organization. The system's categorization and feature set are designed to support comprehensive KM activities.

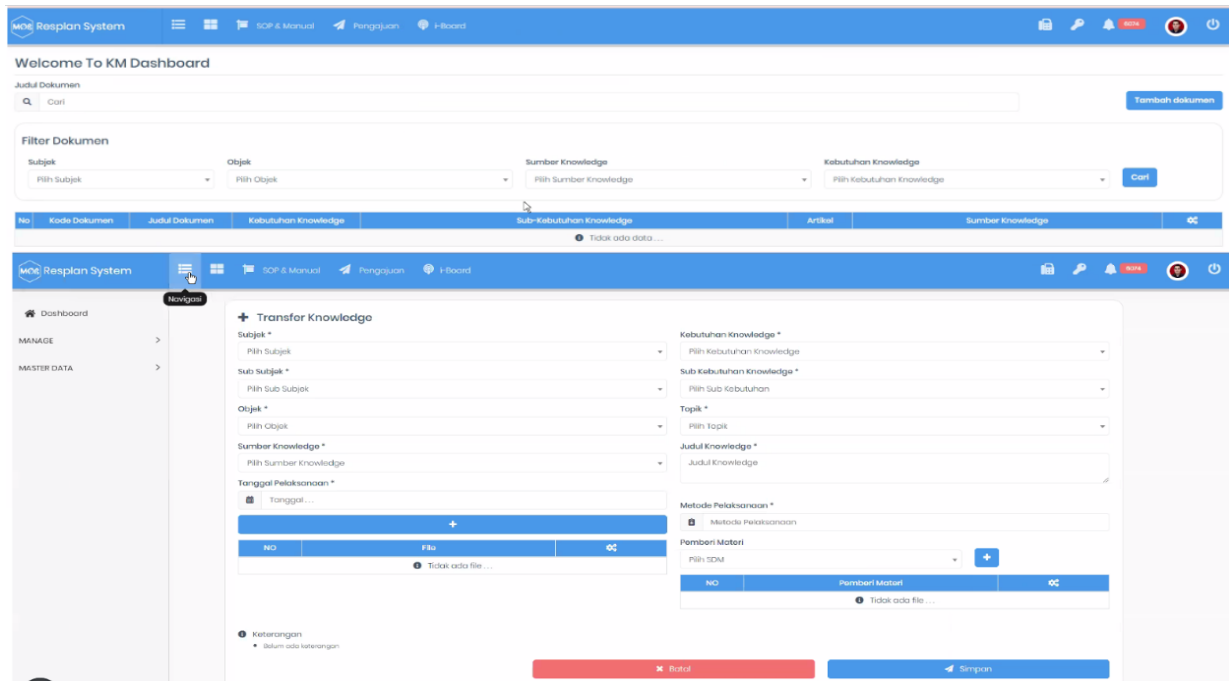


Figure 8. Multi Phi Beta KM Repository

KM features in Resplan have been established starting from creating knowledge to storing the knowledge. However, the existing knowledge repository in Multi Phi Beta faces several challenges. Firstly, there is low utilization of the KM application; employees and engineers are not fully engaging with the system. Secondly, there is a lack of communication; there are no regular updates or prompts to encourage employees to contribute to and utilize the KM repositories. Lastly, the lack of features in Resplan to link knowledge-sharing initiatives with reward systems.

Action Plan

1. Enhanced KM Features

- Total View Counter: Useful to which documents or knowledge are most used and viewed, impacting the ability to reward employees for their contributions and assess document reuse metrics.
- Document View Tracking: The company can identify who has accessed specific documents, which could be valuable for tracking document usability in specific projects.
- Top Contributor Recognition: Create a section on the KM page to highlight top contributors.
- Peer and Expert Review System: Introduce a peer and expert review process for validating documents.
- Personal Contribution Point: For every contribution of knowledge, then there is a learning point obtained in the contributor account. Personal metrics can be connected to the reward system.
- Company Information Update: System administrators can upload company important information to the KM repository.

2. Periodic Communication and Training for Knowledge Repository

- Establish regular communication to encourage KM repository utilization.
- Conduct training sessions to educate employees on the importance and use of the KM system.

3. Connect metrics obtained from the knowledge repository to the rewards system

- Implement incentive programs to motivate employees to contribute to the KM repository.
- Recognize and reward top contributors publicly.

Goals:

- Increased Utilization: Enhanced features and centralized management will lead to higher usage of the KM system.
- Improved Document Quality: Peer and expert reviews will ensure that documents are of high quality and reliable.



• Better Knowledge Retention: A centralized and well-organized KM system will improve knowledge retention and prevent knowledge loss.

7. Allocate a dedicated budget for KM initiatives

A well-funded KM program ensures that necessary resources are available to capture, document, and share knowledge effectively. Currently, Multi Phi Beta only budgets for KM once when creating the KM feature in ERP. Other allocations such as Incentives, Rewards and Programs have never been budgeted.

Action Plan

Budget allocation for KM initiation is included in the annual budget plan.

- Assess current and future KM needs to determine an appropriate budget.
- Present a budget proposal highlighting the benefits and ROI of KM investments.
- Monitor and review the allocation of funds to ensure they are effectively utilized for KM activities.

Goals

- Sufficient resources are available for KM activities, leading to the successful implementation of KM projects and initiatives.

8. Establish a Continuous Improvement Program

When new technology, knowledge sharing, flexibility, efficiency, and effectiveness are not factored into the design of processes, it indicates that the company is not continually evaluating and improving its design and work processes. Implementing a continuous improvement program is essential, as it allows the company to regularly assess and refine its processes, ensuring that these critical factors are integrated into the design.

Action Plan

- Establish and organize regular Kaizen events program by identifying team members and assigning roles.
- Develop a schedule for regular process evaluations and formal reviews.
- Implement a standardized process for documenting and analyzing evaluation results.

Goals

- Properly conducted Kaizen events
- Regular updates and communication on process improvements
- Consistent application of best practices and new technologies across the organization.

9. Establish formal mentoring, coaching, and tutoring program

Mentoring relationships vary widely, ranging from informal or spontaneous to highly structured and planned (Karkoulian et al., 2008). The key finding of the study is that informal mentoring is strongly and positively associated with knowledge management (KM). This means that when employees engage in informal mentoring, knowledge is more readily shared and utilized within the organization. In contrast, formal mentoring shows less support; while it does facilitate knowledge sharing, this knowledge is not always effectively utilized. This may be due to the rigid structure of formal programs, which require knowledge exchange between mentor and mentee but do not guarantee its practical value to the mentee. The significant impact of informal mentoring on KM highlights the importance for management to foster and support informal mentoring relationships.

Action Plan

- Identify and train mentors, coaches, and tutors within the organization.
- Match employees with mentors based on their career development needs and goals.
- While introduce formal mentoring program, company must also nurturing informal mentoring.
- Monitor and evaluate the mentoring and coaching programs to ensure they meet their objectives.

Goals

Enhanced employee development and knowledge transfer, leading to a more skilled and capable workforce.

10. Create a 'Safe to Fail' Environment

When an organization disapproves risk-taking or committing mistakes as learning opportunities, it often signals a culture where employees fear failure and avoid taking risks. This can lead to employees are not encouraged to explore new ideas or learn from their errors.



Action Plan

- Identify members responsible for promoting a 'Safe to Fail' culture.
- Create guidelines that encourage risk-taking and frame mistakes as learning opportunities.
- Conduct workshops and training sessions to educate employees on the benefits of a 'Safe to Fail' environment.
- Share examples of how risk-taking and learning from mistakes have led to positive outcomes within the organization.

Goals

- A culture that encourages innovation and creativity.
- A systematic approach to learning from mistakes and applying these lessons to improve processes.

Implementation Plan

The implementation plan will outline the initiatives and actions required for Multi Phi Beta to enhance its knowledge management. It will leverage the current tools used as the main knowledge repository, setting the foundation for further development in the following year.

Table 7. KM Implementation Plan for PT Multi Phi Beta

No	Implementation Plan	2024			2025									
		Q4			Q1			Q2			Q3			
		10	11	12	1	2	3	4	5	6	7	8	9	
1	Implement Standardized KM Processes													
	Develop KM Guidelines													
	Implement KM tools: AARs and Knowledge Cafe													
	Integrate KM processes with knowledge repository													
2	Rewards and recognition program for knowledge sharing													
	Conduct Needs Assessment for Rewards													
	Define Criteria for KM Contributions & Develop Rewards Type													
	Implement Rewards Program (Monthly)													
3	KM Workshops for Managers and Senior Leadership													
	Develop Workshop Curriculum													
	Conduct Workshops													
	Follow-Up and Support for Managers													
4	Regularly update and maintain the KM feature in Resplan													
	Enhance KM Features													
	Connect metrics to Rewards System													
	Periodic Communication and Training													
5	Establish a Continuous Improvement Program													
	Organize Kaizen Events													
	Schedule Regular Process Evaluations													
	Standardize Documentation and Analysis of Evaluations													
6	Develop and implement a comprehensive set of metrics													
	Translate KM Vision into Measurable Goals													
	Communicate and Link Metrics to Objectives													
	Reality Check and Evaluation													
7	Establish a KM Department													
	Identify Key Roles & Job Description													
	Establish KM Department													
8	Include KM funding in the annual budget													
9	Establish a formal mentoring and coaching program													
	Identify and Train Mentors and Coaches													
	Match Employees with Mentors													
10	Create a 'Safe to Fail' environment													
	Identify Members for Promoting Program Guidelines													
	Quarter Evaluation													

CONCLUSIONS

The current KM readiness level at Multi Phi Beta is at the Initiation stage, with a score of 100 out of 210 points, indicating an initial recognition of KM importance but lacking full integration. Key gaps exist in leadership, knowledge processes, and people, with scores of 11.80, 12.15, and 12.54 respectively, while technology, scoring 20.97, still needs improvement. To reduce knowledge



loss, Multi Phi Beta should enhance its KM vision, allocate a dedicated KM budget, and establish a dedicated KM department. Standardizing processes, conducting After-Action Reviews (AARs), and organizing knowledge cafés will help capture and share valuable insights. A formal mentoring program and integrated knowledge repositories will facilitate effective knowledge transfer. A formal rewards program and KM workshops for managers will motivate employee participation and ensure leadership commitment. Implementing metrics based on the Balanced Scorecard method will enable continuous monitoring and improvement of KM initiatives.

RECOMMENDATION

Start with small, manageable pilot programs in the project management department, to demonstrate the value of KM initiatives and allow for adjustments before scaling up. Multi Phi Beta can focus on quick wins and less resource-intensive solutions, like AARs, which can provide immediate benefits using simple templates led by project leaders. Introduce a formal rewards and recognition program to motivate employees in knowledge sharing, using non-monetary incentives to keep costs low. Future research should explore leveraging big data technologies to enhance KM in engineering consultancy firms, particularly in complex, multidisciplinary projects.

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