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Knowledge Management Maturity Level of Steel Fabricator Companies in Indonesia

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Improving the maturity of knowledge management implementation is considered a promising approach that can help companies to gain a competitive advantage and improve company competitiveness. This study was conducted to evaluate the achievement of the maturity level of knowledge management implementation in steel fabricator companies in Indonesia using the methodology published by the Asian Productivity Organization (APO) in 2020. The evaluation was carried out on 7 steel fabricator companies in Indonesia with a non-random judgmental quota sampling method by distributing questionnaires, each of the question of indicators can be rate from 1 (doing poorly) to 5 (doing very well). Based on the results of the analysis, found that from 7 categories, there are some categories need to be improved, they are "Learning and Innovation", "Knowledge Processes" and "People". It is found that the maturity level of the application of knowledge management for steel fabricators in Indonesia is at the expansion level, where knowledge management has been implemented but has not been carried out thoroughly in the organization.

Keywords: Knowledge management; knowledge management maturity; steel fabricator.

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1. INTRODUCTION

Infrastructure development in Indonesia has been a government priority since 2014, with the acceleration of national strategic projects (PSN) through various regulations, such as Presidential Regulation Number 3 of 2016 and adjustments in 2018 and 2021. However, alongside globalization and the ASEAN-China free trade, and internal challenges such as democracy, decentralization, poverty, and inequality, the construction sector faces increasing complexity.

According to the Indonesia Iron & Steel Industry Association The metal industry, specifically steel, experienced a growth of 7.9% in the first quarter of 2022, supported by a surplus in iron and steel trade and increased exports. However, steel imports remain significant, accounting for around 20% of total consumption. To support the growth of the national steel industry, the government has implemented policies favoring the use of domestic products. Challenges from competitors must be overcome with the increasingly complex and competitive construction industry caused by globalization, free trade and deregulation [1].

The competitiveness indicators of a construction company include the ability to win contracts, retain customers, complete projects on time, meet technical specifications, and the capability to handle issues and risks [2]. Factors that can influence the success of a construction company in contract acquisition include quality, time, cost, and innovation [3].

According to Michael E. Porter (1980), competitiveness is the ability of a company to create, produce and sell products or services at a better price and quality than its competitors in the same market. [4] According to Scott, Mark and Joseph (2008), competitiveness is the ability of a company to create added value for customers by producing products or services that are better, cheaper or more innovative than its competitors [2].

Based on data from a fabricator company in Indonesia, the average contract acquisition ratio over a period of 5 years is 2.9%. from the total quotation. According to [5], knowledge management can help companies gain competitive advantages and improve business performance for increasing competitiveness. Application of knowledge management can increase the competitiveness of construction companies by increasing effciency, productivity and quality [6].

Research [7] on knowledge management was carried out at a steel company in India, the result shown that the impact of increasing implementing knowledge management on the private steel company have significantly increasing production growth and performance growth.

Therefore this research aims to explore the implementation of knowledge management (KM) in steel fabricator companies in Indonesia as a strategy to enhance competitiveness. This study contributes by examining the level of KM implementation in steel fabricator companies and formulating development strategies to enhance competitiveness in the increasingly competitive global market.

2. LITERATURE REVIEW

2.1 Steel Fabrication Business Process

Steel material is a superior material, especially if the parameters of strength, stiffness and ductility are the benchmarks [8]. The advantage of steel material compared to concrete or wood material is that the material is made by a factory, which certainly has good production control, so that the quality provided can be maintained.

Fabrication Process. This process aims to change raw steel material into material that can be constructed according to the fabrication work drawings. Steel structure fabrication is generally carried out in workshops, especially for fairly large scale projects, the fabrication stages for steel structures are from marking raw material, cutting, drilling, welding and finishing [9].

2.2 Knowledge Management

According to King, W.R. (2009), the basis of knowledge management is the inability of humans to fully describe the record of brain potential and organizations cannot fully utilize the knowledge they have [10]. The knowledge management cycle is how organizations can generate, maintain and organize the right set of knowledge strategically to create value [11].

One way to achieve project goals and contribute to organizational learning requires a knowledge management process. The main benefit of this knowledge management is that previous organizational knowledge is utilized to produce or improve project outcomes and the knowledge

created by the project is available to support organizational operations and future projects. [12] According to [13], knowledge management can reduce costs from project to project that have been carried out by implementing a systematic process to capture, structure, manage and disseminate knowledge throughout the organization.

Knowledge consists of knowledge repositories, relationships, information technologies, communications infrastructure, functional skill sets, process know-how, environmental responsiveness, organizational intelligence, and external sources. The get, learn, and contribute phases are tactical in nature. They are triggered by market-driven opportunities or demands, and they typically result in day-to-day use of knowledge to respond to these demands. The assess, build/sustain, or divest stages are more strategic, triggered by shifts in the macroenvironment. These stages focus on more longrange processes of matching intellectual capital to strategic requirements. [14].

2.3 Knowledge Management Maturity Model

Knowledge Management Maturity Model (KMMM) is a framework used to assess and measure the level of maturity or maturity of an organization in managing knowledge. This model helps organizations understand the extent to which their systems, processes, and culture support knowledge management initiatives. By evaluating the maturity level, organizations can identify their areas of strength and weakness when it comes to knowledge management, as well as plan improvement steps.

A maturity model is a method or framework for measuring the maturity level and providing a blueprint for the development of an entity within a company. The maturity level describes the fundamental attributes of criteria that must be met at each maturity level, thereby assisting the company in determining strategic steps in the process of development and optimization [15].

According to the research by Septari in 2020 on a State-Owned Construction Company in Indonesia, after analyzing the maturity level using seven organizational or functional factors/categories, it was found that the KM maturity level is at level 3, meaning "used to some extent" (IAEA) [16]. However, there is a difference in the KM maturity level between the current condition and the expected condition, with the cultural factor of KM having the largest gap value.

The Asian Productivity Organization (APO) method is in line with Indonesian culture, values, and business practices by taking into account and respecting cultural diversity and facilitating collaboration between individuals and organizations.

The APO framework method focuses on 4 main elements, namely, the vision and mission of the organization, accelerators, knowledge processes and the results of knowledge management on KM initiative [17].

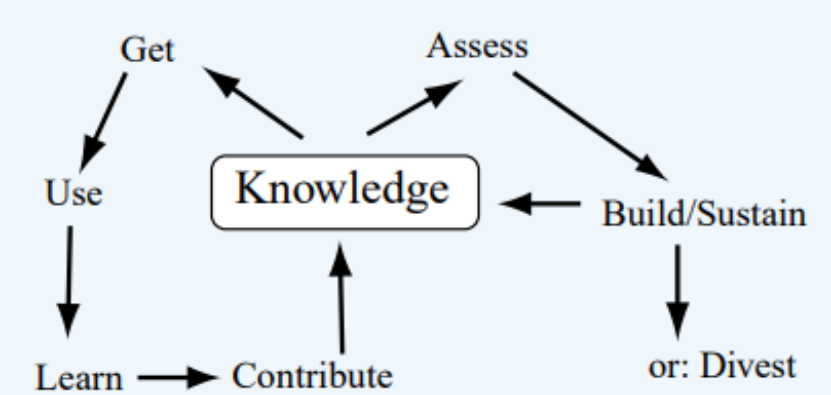

Fig. 1. The Bukowitz and Williams KM Cycle

The APO KM Assessment Tool categories and indicator based on the 4 major elements of the framework, as follow :

- KM Leadership

To evaluates the organization's leadership capability to respond to the challenges of a knowledge-based of the growth of organization. This category consist of 6 indicators to evaluate.

- Process

To assess how knowledge is used in managing, implementing and improving the organization's performance. This category consist of 6 indicators to evaluate.

- People

To assess the organization's ability to create and sustain learning culture, knowledge sharing, collaboration and knowledge worker. This category consist of 6 indicators to evaluate.

- Technology

To reviews the organization ability to develop and deliver knowledge-based solution, collaborative tools, and content management systems. This categoty consist of 6 indicators to evaluate.

- Knowledge Processes

To assess the organization ability to identify, create, store, share and apply knowledge systemcatically. This category consist of 6 indicators to evaluate.

- Learning and Innovation

To assess the organization's ability to encourage, support and strengthen learning and innovation process. This category consist of 6 indicators to evaluate.

- KM Outcomes

To measure the organization's ability to enhance value to customers through new and improved products and service, increase of productivity, quality, profitability, and sustain growth through the effective use of resources. This category consist of 6 indicators to evaluate.

The result of APO KM Maturity assessment provide an understanding of the level of KM readiness in an organization.

3. METHODS

3.1 Data Collection

Quantitative data analysis conducted by the 56 questionnaires distributed to 7 steel fabricator companies in Indonesia which located on Java Island and have production greater than 1.000 tons in a month, 43 questionnaires were returned, resulting in a response rate of 76.07%. The feedback is resume and categorized by their education, experience on work and posisition as shown on Table 1.

3.2 Data Analysis

3.2.1 Homogeneity test

Testing on 3 groups will use the Kruskal- Wallis H Test, with the hypothesis used in homogeneity testing as follows:

- Ho: There is no difference in the understanding of respondents with different education, length of work, and position.
- Ha: There is a difference in the understanding of respondents with different education, length of work, and position.

For testing the Kruskal-Wallis H test, Ho is accepted if the p value (Sig.) > significance level (α=0.05) and Ho is rejected if the p value (Sig) < significance level (α=0.05).

Based on the summary of the homogeneity test results in Table 2, the indicators to be excluded in this study are 7 indicators which is:

3.2.2 Validity test

To get the value of r table, the calculation of df is carried out, namely (n-2), in this study there were n = 43, so that df = 41 was obtained. The table is searched at of 0.05. It was found that the value of r table was 0.3008. It can be concluded that out of a total of 42 variables, there is no calculated r value ≤ r table of 0.3008.

Table 1. Resume respondents

Company	Responden	Education			Experience on years			Posistion		
		Diploma	Bachelor	Magister	< 10	10-20	>20	Staff	Supervisor	Management Level
A	10	7	33	3	18	14	11	18	10	15
B	6									
C	6									
D	6									
E	6									
F	4									
G	5									

Table 2. Resume homogeneity test

Category	Test Method	Indicators	Value
Education	Kruskal-Wallis	Financial resources are allocated for KM initiatives	0,011
Experience	Kruskal-Wallis	Knowledge accrued from completed tasks or projects is documented and shared	0,045
		Critical knowledge from employeed leavinf the organization is retained	0,032
Position	Kruskal-Wallis	The organization implements and manages its key work processes to ensure that customer requirements are met and business results are sustained	0,027
		The organization shares best practices and lessons learned across the organization so that there is no constrant reinventing of the wheel and work duplication	0,034
		Management is willing to try new tools and methods	0,041
		The organization has a history of successfully implementing KM and other change initiatives	0,040

Table 3. Realiability test

Variables	Reliability Coefficient	Criteria	Description
Level of Knowledge Management Implementation	0.755	0.6	Reliable

3.2.3 Reliability test

Based on the calculation results displayed in Table 3, it is known that the reliability coefficient is above the Cronbach's Alpha value for the level of application of knowledge management so that it can be asked that the variable is reliable or consistent in measuring

3.2.4 Analysis of knowledge management implementation level

After the analysis of the homogenity, validity and realibility the instrumen used to assess the maturity level of KM is a questionnaire of consist of 35 indicators covering the seven elements, from 42 indicators before statictical analysis. Each of the question of indicators can be rate from 1 (doing poorly) to 5 (doing very well) as describe in Table 4.

Table 4. Rating level and secription

Level Description	Scale Rating
Doing very poorly	1
Doing poorly	2
Doing adequately	3
Doing well	4
Doing very well	5

The data from respondents will then be calculated in terms of quantity and grouped into each rating scale and categorized. The average values for each variable will be sought. The processe data results are presented using a spider-web chart, allowing the values of each component to be visibleb [10].

According Fig. 1, The highest category is “Processes” category and the lowest category is “learning and innovation” categories with a value 3.59. Both tehcnology and KM outcomes are having average score on 3,7. This is conclude that steel fabricator in Indonesia is quite focusing on achieved higher productivity, profitability quality and customer satisfaction through reduced cycle time, bigger cost savings, enhanced effectiveness and more effcient use of resource. Tehcnology also plays a role in facilitating knowledge collaboration and accesibility of knowledge through all organization.

The highest value of indicators are on processes category which “The organization periodically evaluates and improves work processes to improve performance, improve products and service in line with business trends”. The lowest value of indicators are on Learning and Innovation category which “individuals are given incentives to cooperate and share information”.

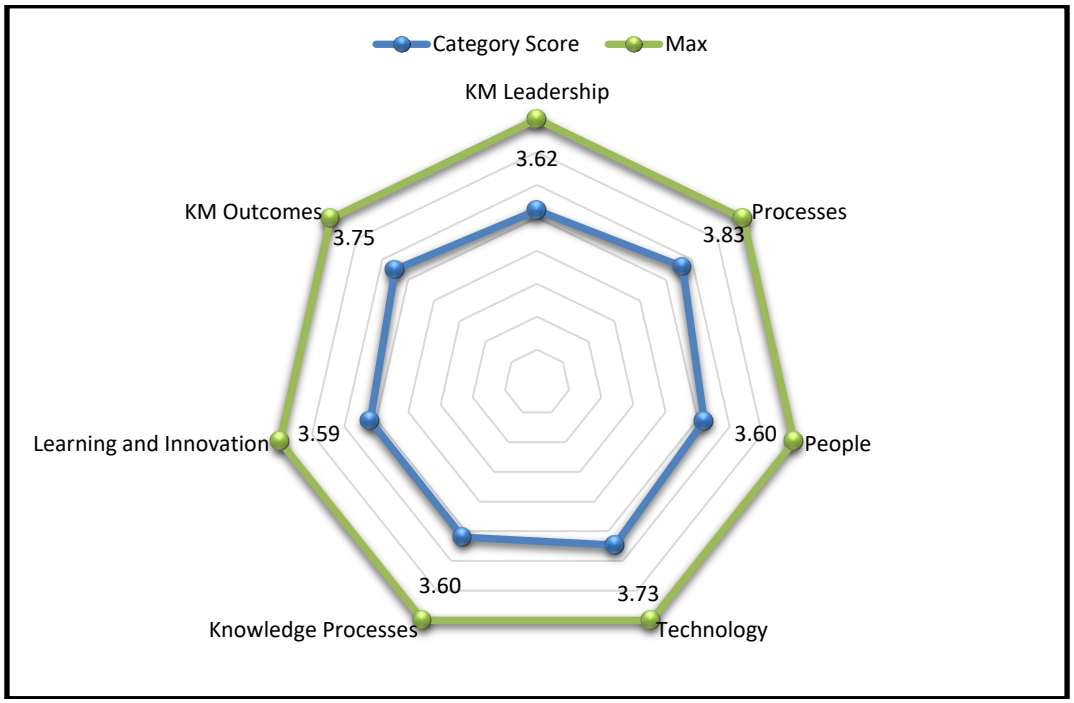

Fig. 2. KM Assessment radar chart

4. RESULTS AND DISCUSSION

Based on Table 5, the majority respondents perceived that maturity level of the of knowledge management in steel fabricator at the "expansion" level, which obtained the average value is 128.90. Expansion level where knowledge management has been implemented but has not been fully applied to the system, so it is necessary to expand policies and increase human resources in carrying out the knowledge management process [18].

Table 5. Maturity level score

Maturity Level	Range Score	Precentage
Maturity	189-210	0,0%
Refinement	147-188	18,6%
Expansion	126-146	41,9%
Initiation	84-125	37,2%
Reaction	42-83	2,3%

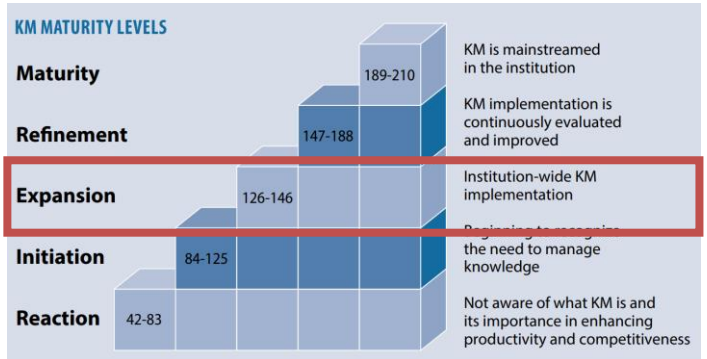

Fig. 3. KM Maturity Level (APO, 2020)

According to research by Ade (2020) and Zain (2019) on private and state-owned construction service business entities (BUMN) in Indonesia using the 2016 IAEA indicators, the level of maturity of private knowledge management is at level 3 "to some extent" and BUMN at level 2, namely "a little much". [16,19] According to IAEA (2016), the main focus at level 2 is that in the development stage, the strategy for knowledge management must be closely connected to the company's business strategy and goals and must identify business opportunities to implement knowledge sharing and knowledge transfer approaches. [20] While the main focus at level 3 is to manage knowledge management strategies, processes and approaches so that they can be standardized. Standardization will be achieved by integrating best practices from knowledge management approaches and processes that are already in use and improving the results with best practices to fill practice gaps.

The highest value in this study lies in the “process” categories with a value of 3.83, with a gap value of 1.17. According to APO (2020), process is how knowledge is managed, applied and developed as the key to the organization's work process by always evaluating and developing in the work process to get better results. [17] One of the indicators have highest score, namely "The organization periodically evaluates and improves work processes to obtain improved performance, improved products and services in line with business trends".

The lowest value in the study lies in the learning and innovation categories with a value of 3.59, with a gap value of 1.41. According to APO (2020, learning and innovation is the organization's ability to encourage, support and strengthen learning and innovation with a systematic knowledge process. [18] Based on research (Dash & Rath, 2021) states that the increase in the amount of expenditure made by the *Steel Authority* of India Limiter (SAIL) on development and research is in line with positive resources and increasing revenue [7].

One of the low indicators is, namely "Individuals are incentivized to cooperate and share information", according to APO (2020) management needs to reward learning and innovation by providing incentives to shared knowledge. According to (Stajkovic & Luthans, 2001) there are several types of incentives including monetary incentives, recognition and feedback. [21] Research states that monetary incentives and recognition have an effect on improving performance, while input has no effect on improving performance.

Therefore the recommendation strategy to enhanced learning and innovation category are giving incentive to those who want to share knowledge and want to learn and bring innovation to organization. This is supported by research [22], which one of the critical success factor to enhanced knowledge management maturity model is support of top management which is giving incentive/motivation to member of organization for sharing knowledge [23,24].

5. CONCLUSION

After series of analyses of the level of KM implementation using tools from the Asian Productivity Organization in 2020, it was found that the maturity level of knowledge management implementation was at level 3, namely expansion or at level 3. The highest value in this study lies in the “process” categories with a value of 3.83. The lowest value in the study lies in the learning and innovation categories with a value of 3.59, with a gap value of, so it is the first priority to improve. The second lowest are category of “people” and “knowledge processes” which have to imrpove after.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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