Improvement and Digitalization of Knowledge Management System in Supply Chain

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ABSTRACT: *Coffee consumption in Indonesia still grows during the pandemic, with 3in1 instant coffee as the main growth driver. The supply chain plays a crucial role in ensuring product cost competitiveness, and in the Industry 4.0 era, supply chain knowledge management digitalization has become pivotal. Digital improvement will speed up knowledge creation of tacit and explicit knowledge and knowledge-sharing processes within the organization. This will result in an increased rate of knowledge internalization, which can increase knowledge workers' capability and, in the end, increase supply chain efficiency. The study aims to identify Knowledge Management (KM) improvement opportunities and digitalization of KM process to achieve sustainable and efficient supply chain processes. The research focuses on KM Assessment using APO KM Assessment to identify opportunity for improvement of Knowledge Management and digitalization opportunity in the supply chain. KM Strategy was discussed with top management to ensure KM strategy is aligned with the business strategy. APO KM Assessment shows that KM Maturity has already reached the Refined stage. Identified KM interventions to improve the knowledge management system are creating and communicating knowledge creation framework, leverage knowledge creation from supplier and customer, improve knowledge document management system, and digitalization process for KM in supply chain.*

KEYWORDS – *Digitalization, Knowledge Management, APO Knowledge Management Maturity Assessment, Supply Chain*

I. INTRODUCTION

Coffee consumption during the COVID-19 pandemic is still growing. Indonesia's coffee consumption data from the International Coffee Organization (ICO) in 2022 shows that coffee consumption has rapidly grown in the last ten years with a CAGR of the previous ten years 3.76%. In the last three years and during the Covid pandemic, Indonesia's Coffee consumption has grown, with 2021 Indonesia consumption in 2021 at 5 million bags of 60 kgs of coffee, growing from 4,8 million before the pandemic (2019). Indonesia's coffee consumption growth in 2022 vs the previous year (4.04%) has surpassed its CAGR, which shows that the coffee consumption market is still growing and significantly recovering after COVID [1]. According to USDA data, Indonesia's instant coffee consumption in 2022 accounted for almost 40% of total coffee consumption [2]. Over 90% of the instant coffee products sold in Indonesia are 3in1 instant coffee.

The competition in 3in1 instant coffee is fierce, and cost competitiveness, especially supply chain-related cost, is one of the critical factors for the instant coffee industry. This supply chain-related cost also impacted the ingredients supplier for 3in1 instant coffee manufacturers. One of the main ingredients used in instant coffee 3in1 products is creamer. This study takes place in the supply chain division at one of the creamer manufacturing companies. The supply chain division manages creamer end-to-end supply chain activities from sourcing materials, operational activities, and delivering goods to the customers. Knowledge management has been known to have an impact on increasing the efficiency and effectiveness of organizations in producing goods and services and creating innovations that lead to competitive advantages [3]. To maintain competitiveness, it can be concluded that organizations need to implement Knowledge Management (KM). Organizations need to measure their KM maturity level to ensure that a proper KM strategy is implemented. One of the measurement tools for KM maturity is developed by Asian Productivity Organization (APO).

This research aims to investigate the maturity level of current knowledge management of the Supply Chain division and improve the knowledge management process in the company to improve its supply chain cost efficiency to maintain its competitive advantage.

II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

APQC first identified Knowledge Management during the 1st Knowledge Management conference in Houston. Knowledge management (KM) is a collection of systematic approaches to help information and knowledge flow to and between the right people at the right time (in the proper format at the right cost) so they can act more efficiently and effectively to create value for the organization. The main objective of Knowledge Management is creating value through [4]:

1.   Discovery of new know-how can become a knowledge asset for knowledge-based innovation.
2.   Based on that new knowledge, organization can improve and optimize its business process and working capacity to become a world-class organization.
3.   The organization can eventually create value through innovation based on optimized business processes and working capacity.

APO Knowledge Management (APO KM) Assessment Tool is a questionnaire designed to help organizations quickly assess their KM readiness. The evaluation is done at the beginning of the KM program. Before starting the KM journey, it is essential for the organization needs to know opportunities for improvement. The organization can then focus on its KM programs to fill in the gaps identified during the assessment. The starting point of the APO KM framework is to understand the organization's vision, mission, business goals, and strategic direction. This helps the organization identify and analyse its core competencies, capabilities, and areas to develop. The outcome of KM efforts measures the effectiveness of knowledge processes supported by critical success factors (accelerators, vision, and mission). There are 4 enablers for KM based on APO: **Leadership/Governance, Technology, People,** and **Processes**. APO KM assessment questionnaire consists of 42 questions with a maximum score of 210 points. Each question is rated from 1 (doing poorly) to 5 (doing very well). The APO KM Assessment Tool has 7 audit categories based on the critical elements of the framework [5]:

1. KM Leadership
This category evaluates the organization's leadership capacity for responding to the challenges of a knowledge-based economy. KM leadership is assessed in terms of KM policies and strategies in place in the organization. Leadership capacity is also evaluated regarding the organization's efforts to initiate, guide, and sustain KM practices.

2. Process
The process category assesses how knowledge is used in managing, implementing, and improving the organization's key work processes. It also considers how the organization continually evaluates and improves its work processes for better performance.

3. People
The people category assesses the organization's ability to create and sustain a knowledge-driven learning culture. The organization's efforts to encourage knowledge sharing and collaboration are evaluated. The development of knowledge workers is also considered.

4. Technology
The technology category reviews the organization's ability to develop and deliver knowledge-based solutions such as collaborative tools and content management systems. The reliability and accessibility of these tools are also assessed.

5. Knowledge Processes
The organization's ability to identify, create, store, share, and apply knowledge systematically is evaluated. Sharing of best practices and lessons learned to minimize reinventing the wheel and work duplication is also assessed.

6. Learning and Innovation
This category determines the organization's ability to encourage, support, and strengthen learning and innovation via systematic knowledge processes. Management's efforts to inculcate values of learning and innovation and provide incentives for knowledge sharing are also assessed.

7. KM Outcomes
The KM Outcomes category measures the organization's ability to enhance value to customers and citizens through new and improved products and services. The organization's ability to increase productivity, quality, profitability, and sustainable growth through the effective use of resources and as a result of learning and innovation is evaluated.

The conceptual framework for this research can be illustrated in Figure 2.1 below. Knowledge management is critical in the organization and essential in sustaining supply chain performance in the company. Implementing Knowledge Management needs Top Management supports, and all gaps must be identified using KM Tools. To ensure continuous improvement and sustainable best practices in business, a plan to implement Knowledge Management needs to be done.

Figure II.2 Conceptual Framework
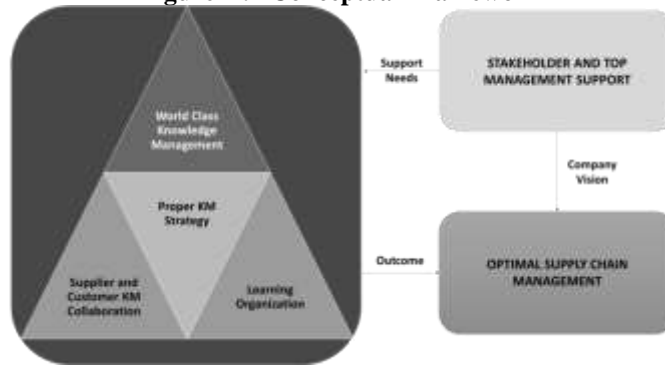
III. Research Methodology

3.1 Research Design

This research (Figure III.1) uses a quantitative approach using the APO KM Assessment tools checklist as the questionnaire that is brought to leadership teams of the Operation Division. Data collection is collected through interviews, filling out the APO Maturity index, and analysis based on the APO KM assessment. The sample for this research is all employees in the supply chain division. This has met the requirement from APO Guidelines, which stated that, at minimum, 70-80% of the sample size from the total population.

Figure III.1 Research Framework

3. 2 Data Collection and Analysis

The research method used in this research is a descriptive method using interview and observation approaches. The facts obtained in the study are described for analysis and further provide a solution using existing theories. The purpose of this descriptive research is to provide descriptive, factual, and accurate information about the facts, properties, and solutions in the phenomena studied, where the data collection method uses:

- Primary Data:
o Interview: Interview the related person (especially top management) to gather the needed information.
o Observation: Collecting data from questionnaires.
- Secondary Data:
o Documentation: primary data, such as employee data, organizational structure, rules, and records.
o Literature Review

Analysis of the KM Strategy was done in two steps. First, current KM Maturity was assessed by doing Knowledge Management Maturity Analysis through APO KM assessment, resulting in a gap between the current and ideal stages. To identify the root cause of the problem, the 2nd step of analysis is Root Cause

analysis using Fishbone Analysis. These were done for each gap through 4 enablers of KM; People, Business Process, KM Tools, & KM Methods.

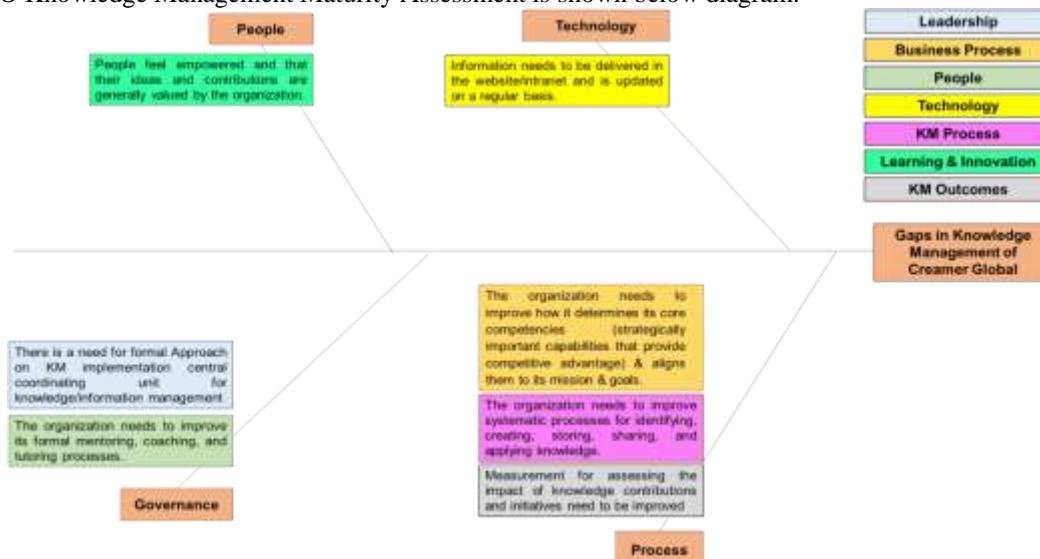## IV.   RESULT AND DISCUSSION

The APO KM Maturity Assessment was used to determine the knowledge maturity of the organization. APO KM maturity assessment covers seven categories: Leadership, Process, People, Technology, Knowledge Process, Learning & Innovation, and KM Outcomes. The total maturity score in this research is calculated by finding the average score for each category from all respondents. 68 respondents from the Supply Chain division were given the questionnaire. The result for each category is as follows:

Table 1. APO Knowledge Management Overall Score and KM Maturity Level

No	Category	Max Score	Average Score	Gap Score
1	Leadership	30	25.76	4.24
2	Process	30	26.99	3.01
3	People	30	25.57	4.43
4	Technology	30	25.01	4.99
5	Knowledge Process	30	24.74	5.26
6	Learning & Innovation	30	25.17	4.83
7	KM Outcomes	30	26.38	3.63
	TOTAL	210	179.62	30.38
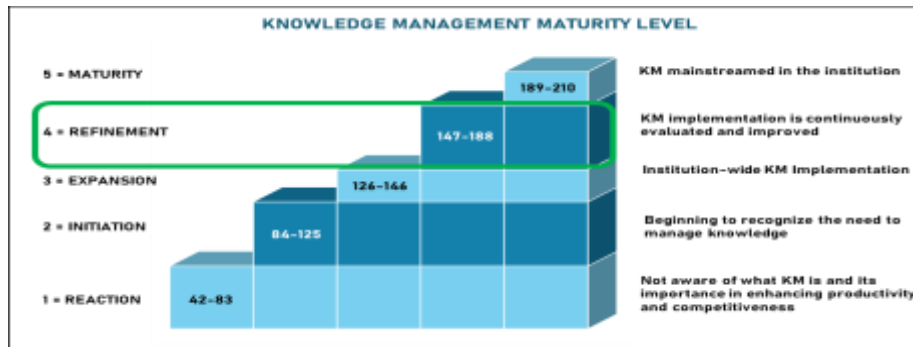
According to Table 1, the Knowledge Management maturity level of the supply chain division is at refinement because the total average score is 179.62, which fits the criteria for **refinement** (KM maturity score between 147 – 188). This means KM implementation in the company's supply chain is continuously evaluated and improved. To further analyze the results, a fishbone analysis was conducted to break down the root causes of the gap for each category. Root Cause was identified and categorized based on four enablers of Knowledge Management: People, Process, Governance, and Technology. The Fishbone analysis of gaps from each category of APO Knowledge Management Maturity Assessment is shown below diagram:

From the fishbone diagram above and discussion with the top management of the company, the root causes and opportunities for improvement are summarized in Table 2 below:

Table 2. Root Cause and Opportunity for Improvement

Components	Root Cause	Opportunity For Improvement
Leadership / Governance	Improvement is needed regarding formal policy and approach to Knowledge Management Systems in terms of the following: 1. Formal policy regarding Knowledge Management implementation.	**1. Improve knowledge strategy to include a formal policy on coaching, mentoring, and tutoring, which knowledge workers can use.** **2. Creation of a Knowledge Creation Strategy incorporating Strategic Tacit Knowledge identification and a clear person in charge. Knowledge creation can follow SECI Matrix.**
Process	Improvement needed for the implementation of the knowledge management process includes: 1. How the organization identifies critical knowledge & aligns with company vision. 2. Systematic process of identifying, creating, storing, and sharing knowledge among knowledge workers.	**Improvement for the Knowledge Management Process includes:** **1. Create a clear guidance for identification of strategic knowledge identification and a clear KM document system (including verification and validation process of knowledge document).** **2. Leveraging knowledge creation from supplier and customer through specific communication forum with supplier and customer, example Rolling Forecast meeting.**
People	Clear organization alignment and information to knowledge workers so that people feel empowered and the company values their contribution to the knowledge management process.	**Clear organization alignment and information from each knowledge worker can be improved by creating a Knowledge Creation Framework Workshop to ensure same understanding between knowledge workers on how knowledge creation process is done in the organization.**
Technology	**There are needs from the employee to have information and knowledge delivered to the website/intranet and updated regularly.**	**Several digitalization opportunities for the supply chain include creating:** **• Digital Action Plan Board for Small Group Activities. Small group activities (Kaizen Team) have been pivotal in knowledge creation and knowledge sharing process in the company. As both processes are done daily, there is a strong need to store all discussion and coaching processes in digital format to increase their uses. Digital Action board can also help visualize each milestone and current issues that are faced by operation and supply chain team.** **• Digital Knowledge Sharing Platform to increase accessibility of employees and support digital transformation. The primary purpose of digital sharing platforms is to increase usage of digital sharing platform and use it as knowledge café**

Identified KM interventions to improve the knowledge management system to reach mature stage can be categorized into four key initiatives. First is **creating and communicating knowledge creation framework**. Company could benefit more from having a clear policy for Knowledge Management in general so that employees feel that the company is paying attention to their contribution to the KM. Second initiatives are **leveraging knowledge creation from supplier and customer**. Knowledge in the supply chain player is not only related to tacit knowledge within the organization (Know How Knowledge) but can also be extracting knowledge from suppliers and customers to create new tacit knowledge in the company through co-creation. Third and fourth initiatives is **improving knowledge document management system**, and **digitalization process** for KM in supply chain. Company could also benefit more should the Knowledge Implementation

process be implemented systematically. This means that all accelerators and knowledge processes are being integrated into a KM system where the knowledge workers can easily access knowledge.

V. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

APO Knowledge Management maturity assessment was used to identify opportunity for improvement in the supply chain division of manufacturing company. APO KM Assessment shows that KM Maturity has already reached the Refined stage. Identified KM interventions to improve the knowledge management system are creating and communicating knowledge creation framework, leverage knowledge creation from supplier and customer, improve knowledge document management system, and digitalization process for supply chain KM.

5.2 Recommendation

To reach KM Maturity and keep its competitive advantage in the challenging environment of the creamer business, the author recommends several actions below:
1. Deploying organization-wide KM Implementation after finishing the review of the current KM Project.
2. Continuously improve digital use of the knowledge repository process by exploring the use of Artificial Intelligence (Chat GPT etc.) to increase the effectiveness of the extracted knowledge.
3. Continue external collaboration with suppliers and customers to ensure sustainable competitive advantage through knowledge management for innovation.
4. Explore using Big Data, Data Analytics, and Machine Learning to increase the Knowledge Exploration and Creation Process even more. Benchmarking with crucial customers and suppliers regarding Industry 4.0 implementation can also speed up the transformation process. Ultimately, it will update the current Knowledge Stock & Flow to include big data and machine learning.

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