



Proposed Knowledge Management System for the Time Efficient in R&D Department of PT Automotive Lumina

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ABSTRACT: The automotive industry has grown post-Covid 19, positively impacting related sectors like car lighting. Due to high demand, PT Automotive Lumina, a lamp manufacturer specializing in OEM car lights, needs better time management. Responding to RFQs for new car models poses significant challenges due to delays caused by dependence on Juoku Technology. To tackle this, the company initiated an independent R&D process, but the need for more effective knowledge management worsens the situation, affecting competitiveness in a rapidly changing market.

This research addresses two key questions: What Knowledge Management system can be proposed for time efficiency in the R&D Department of PT Automotive Lumina? and How to implement the suggested Knowledge Management system for time efficiency in the R&D Department of PT Automotive Lumina? Qualitative research methods were employed to study these questions, including interviews with key stakeholders. Analysis revealed eight sub-causes contributing to the observed problems, including a lack of skilled personnel, ineffective knowledge management, reliance on Juoku's R&D schedule, rapid technological advancements, inefficient processes, limited decision-making authority, limited testing equipment in the R&D department, and most importantly, the absence of a knowledge management system. Several solutions to these challenges are presented based on the SECI, PPT framework, and Core, Advanced, and Innovative knowledge framework. Direct training, knowledge capture, and collaboration tools are among the planned knowledge management programs at PT Automotive Lumina. Preparation procedures were conducted in November and December 2023, with the proposed solution implementation set to begin in February 2024. Following deployment, knowledge management activities will be evaluated, and necessary modifications will be made for future improvements. PT Automotive Lumina aims to enhance time efficiency and support independent R&D through improved knowledge management procedures.

KEYWORDS: Core Advance Innovative Knowledge, Car Lamp Industry, Efficient R&D Department, Knowledge management, PPT, SECI.

INTRODUCTION

PT Automotive Lumina, a prominent OEM auto lamp manufacturer, has witnessed a consistent rise in passenger car production in Indonesia post the Covid-19 pandemic. Despite this positive trend, the company grapples with challenges in its Research and Development (R&D) department, specifically in design, raw material selection, and a significant reliance on Juoku Technology. Despite having an R&D department, PT Automotive Lumina faces delays in the initial stages of the New Product Development Process, impacting its competitiveness in responding to Request for Quotation (RFQ) from various car manufacturers. The company's management has initiated an independent R&D process to address these challenges but encounters obstacles due to the need for an effective knowledge management system. Knowledge management, crucial for an organization's intellectual capital, involves human, structural, and relational capital. Successful knowledge management fosters innovation, supports organizational learning, and facilitates knowledge transfer. A proper knowledge management system must improve PT Automotive Lumina's performance and exacerbate dependency issues. PT Automotive Lumina requires an efficient Knowledge Management system to overcome these challenges. This system aims to expedite independent R&D, enhance employee knowledge accuracy, accelerate work processes, and facilitate knowledge dissemination. The proposed system will enable PT Automotive Lumina to achieve time-effective and independent R&D by 2026, aligning with the management's target. The research questions revolve around proposing and implementing a Knowledge Management system for time efficiency in the R&D Department of PT Automotive Lumina: What Knowledge Management system can be proposed for time efficiency in the R&D Department of PT Automotive Lumina? and How can the suggested Knowledge Management system be implemented for time efficiency in the R&D Department of PT Automotive



Lumina? The business issue centres on challenges in the design and testing phase of the R&D department, with dependencies on Juoku Technology leading to ineffective time allocation, impacting competitiveness, and hindering the production of new lamps. The proposed Knowledge Management system is crucial for capturing, storing, and sharing knowledge efficiently, reducing dependence on specific employees, preventing knowledge loss, and supporting the success of independent research and development projects, ultimately accelerating the R&D process at PT Automotive Lumina.

LITERATURE REVIEW

Knowledge management, outlined by DiMattia and Order (2001), involves systematically structuring organizational knowledge from various sources, including databases and individuals' intellectual capacity. It is a purposeful endeavor, as defined by Wiig (1999), aimed at optimizing organizational assets and returns. Challenges in knowledge management often arise from neglecting people-related and cultural factors (Kitimbo and Dalkir, 2013). Organizational knowledge, according to Nonaka and Takeuchi (1995), significantly influences structural frameworks and signifies the evolving nature of the modern workforce. The Knowledge Management System (KMS), per Akeel (2013), is a structured assembly supporting knowledge-intensive processes, effective when integrated into organizational practices (Alavi et al., 2001). Notably, Information Technology (IT) alone does not constitute the entirety of a KMS; successful operation requires integration with other components (Zack, 1999). The SECI framework by Nonaka and Takeuchi (1996) captures the dynamic nature of knowledge generation, emphasizing the interplay between tacit and explicit knowledge. It involves four modes of knowledge transformation forming a knowledge spiral. The People, Process, and Technology (PPT) components are integral to effective Knowledge Management (KM) strategies (Goswami, 2013; Bhojaraju, 2006). The strategic knowledge framework categorizes companies based on their knowledge strategy, from innovators actively seeking new knowledge to laggards relying on minimal internal knowledge (Zack, 1999). Companies can adopt various knowledge strategies like the Exploiter, Explorer, Innovator, or Unbounded, each offering unique benefits and challenges, allowing for a tailored approach based on individual circumstances and goals (Zack, 1999). This strategic diversity enables organizations to navigate the competitive landscape effectively.

RESEARCH METHOD

This study employs a mixed-methods approach, utilizing primary and secondary data sources. Primary data is gathered through structured interviews with seven professionals employed at PT Automotive Lumina, holding key positions such as HRGA Manager, Head of Product Engineering Department, R&D Supervisor, R&D Staff, Product Engineering Staff, and IT Staff. Each interview, lasting between 45 to 75 minutes, is crucial for comprehensively exploring the challenges faced by the company during the pandemic, eliciting insights into business strategies in this context, and understanding the knowledge management practices essential for sustaining competitiveness. In knowledge management, interviews are strategically chosen to capture tacit knowledge from experienced practitioners. Beyond knowledge acquisition, interviews serve a multifaceted role by evaluating competencies, assessing a candidate's proficiency in navigating knowledge transfer and organizational learning, and examining industry-specific knowledge. Consequently, interviews are exclusively designated as this study's primary research method for formal information gathering. Here are the list of interviewee details is presented in Table 1.

Table 1. 1 Interviewee Details

No	Position	Reason to Selection
1	Manager HRGA	The Human Resources & General Manager at Automotive Lumina plays a crucial role as a primary stakeholder in enhancing the performance of the R&D department through the implementation of knowledge management. Their viewpoints and expertise in HR policies and practices can offer valuable insights, contributing to the creation of an innovative framework. Tenure: 1 Years
2	Head division of Product Engineering	The Head of New Product Engineering holds a critical role in Knowledge Management (KM) implementation due to their strategic leadership, overseeing key projects, fostering cross-functional collaboration, and contributing valuable experience and expertise. Their influence is pivotal in shaping



		a culture that prioritizes knowledge sharing and in spearheading the development of a centralized knowledge repository. By leveraging these aspects, the Head plays a key part in ensuring the success of KM initiatives within the New Product Engineering division at Automotive Lumina. Tenure: 3 Years
3	Supervisor R&D	The R&D Supervisor is in charge of making sure we use Knowledge Management (KM) in the R&D Division. They're valuable because they know a lot from their experience in research and development. They act like a bridge, helping share important information between management, research, and development teams. By keeping an eye on projects, they find important knowledge and make sure we save and share the best ways of doing things. The R&D Supervisor also encourages everyone to work together and share what they know. They're super important in making KM work well for the Automotive R&D Division. Tenure: 5 Years
4	Staff R&D 1	New staff are important to assess the degree to which the transfer of knowledge has been implemented for the integration of new members into the R&D division. Tenure: 1 Week (when interviewed)
5	Staff R&D 2	It is imperative to conduct an interview with the recently trained staff, who underwent training in Taiwan, in order to assess the extent and effectiveness of the knowledge transfer process. Tenure: 7 Years
6	Staff R&D 3	It is essential to conduct interviews with R&D personnel who possess eight years of work experience to ascertain the current status of knowledge management within the company. Tenure: 8 Years
7	Staff Product Engineering	Conducting interviews with the Staff in Product Engineering is crucial to evaluate the flow of knowledge from the R&D division into Product Engineering, particularly concerning the development of new products. Tenure: 1 Years
8	Staff IT	Interviewing IT staff is essential for a comprehensive understanding of technical requirements, system integration nuances, and ensuring user-friendly solutions. Their specialized expertise is crucial in aligning KM systems with existing IT infrastructure, addressing security concerns, and optimizing the overall functionality of KM platforms for the R&D team. Tenure: 6 Month

ANALYSIS

The Knowledge Management (KM) analysis within the Research and Development (R&D) Department of PT Automotive Lumina, based on the SECI framework, reveals a comprehensive approach to knowledge processes. Socialization, characterized by interpersonal interactions and collective experiences, is facilitated through various channels such as Zoom meetings, R&D Gatherings, on-the-job training, and APQP sessions. These activities contribute to knowledge exchange, collaboration, and the development of a shared understanding among team members. Externalization is effectively implemented through the documentation of Standard Operational Procedures (SOPs), Working Instructions (WIs), and the Problem Follow Sheet, ensuring the conversion of tacit knowledge into explicit forms for widespread accessibility. Combination mechanisms, including the "Everyone" server and Secure Share platforms, play a pivotal role in aggregating explicit knowledge from diverse sources, fostering a centralized repository for streamlined access and collaborative sharing. Internalization is addressed through the Training from Astra Module, offering structured learning experiences for employees to absorb, apply, and internalize knowledge relevant to their roles. However, it is noted that the current training program lacks coverage of technical aspects, potentially leading to knowledge disparities among team members, highlighting an area for improvement in the KM strategy.

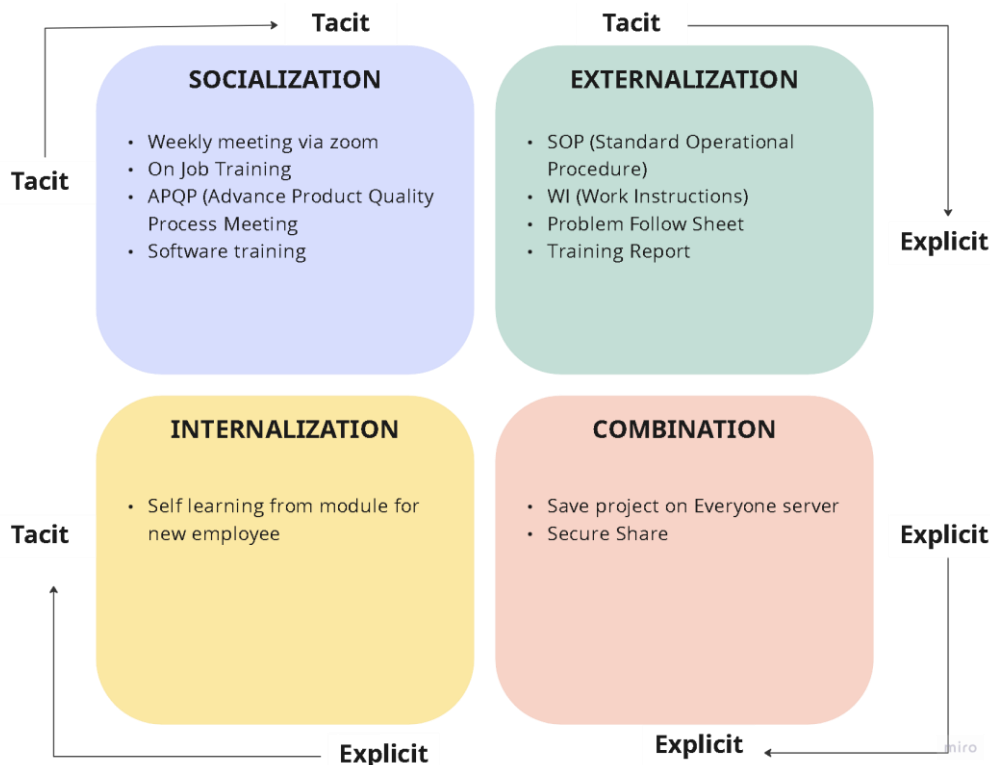


Figure 1. 1 Current Condition of SECI in R&D Department of PT Automotive Lumina (Author, 2023)

PT Automotive Lumina's Knowledge Management (KM) analysis in the R&D Department, based on the People, Process, and Technology (PPT) framework, embraces an integrated approach. Regarding People, diverse teams and individuals foster a collaborative culture, recognizing knowledge as a dynamic asset shaped by workforce expertise. Within Processes, well-defined structures facilitate efficient knowledge management. Regular meetings, hands-on learning, and standardized documentation, like SOPs, ensure a consistent and aligned knowledge flow. Technology is a powerful catalyst, with tools like Zoom and the "Everyone" server enhancing communication and collaboration. Secure Share ensures safe information sharing. This PPT framework positions PT Automotive Lumina to optimize organizational knowledge across departments.

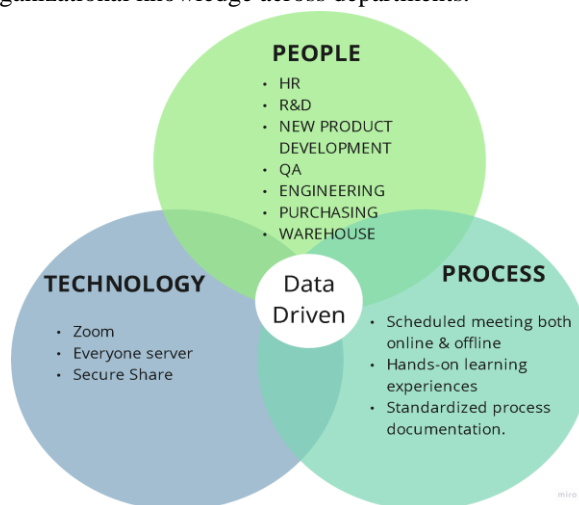


Figure 1. 2 1 Current Condition of PPT (People, Process, & Technology) in R&D Department of PT Automotive Lumina (Author, 2023)



PT Automotive Lumina's Knowledge Management Analysis in its R&D Department, evaluated through the Core, Advanced, Innovative Knowledge Framework, showcases the company's progression through different knowledge stages in the automotive lighting industry. The foundational "Core Knowledge" stage involved expertise in producing halogen car lights, particularly for rear lights. The company then advanced to the "Advanced Knowledge" stage by transitioning to LED technology for car rear lights, later expanding to produce adaptive LEDs for headlights. This growth was facilitated by a strategic partnership with Juoku Electronics, providing access to established practices and proven technologies. Currently positioned as an "Explorer" in the knowledge strategy, Automotive Lumina focuses on generating or acquiring novel knowledge resources for competitive advantage. Simultaneously, its external reliance on Juoku Technology places it strategically in the external column, emphasizing the company's quest for innovative knowledge and dependence on external technological support. This dual positioning positions PT Automotive Lumina as a dynamic player in the automotive lighting sector.

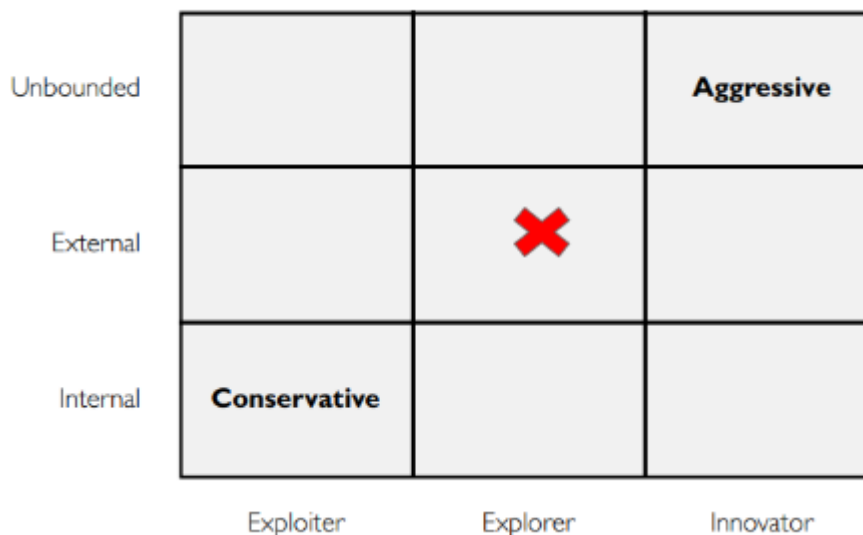


Figure 1. 3 Current Condition of Firm’s Knowledge Strategy (Author, 2023)

PROPOSE SOLUTIONS

The table presented below serves as a means for the author to do so explains the proposed knowledge management system at PT Automotive Lumina:

Sub Cause	Action	Critical Knowledge	KM Objective	Knowledge Management Framework	
				People	Process
People Factors:					
Lack of skilled personnel	Implement a talent acquisition and retention program with targeted recruitment, internal training, and competitive compensation packages.	Expertise in specific R&D processes, industry trends, and emerging technologies.	Develop a learning management system and mentorship programs to foster knowledge transfer and continuous skill development.	BOD, HRGA, Trainers, Product Engineer Head Department, R&D Supervisor	Direct training, Documenting the project, Mentorship, Self-Learning



Sub Cause	Action	Critical Knowledge	KM Objective	Knowledge Management Framework	
				People	Process
Ineffective knowledge management	Integrate knowledge capture and sharing into project workflows, incentivize document creation and peer review, and facilitate knowledge exchange with Juoku Technology.	Lessons learned from past projects, R&D best practices, and project-specific information.	Implement a central knowledge repository with user-friendly search and collaboration features and encourage a culture of knowledge sharing with recognition programs.	BOD, HRGA, Trainers, Product Engineer Head Department, R&D Supervisor	Knowledge capture processes, Collaboration tools, Peer review mechanisms
Process Factors:					
Inefficient processes & procedures	Conduct operational audits and process mapping to identify bottlenecks and implement lean principles for streamlining workflows.	Understanding of current inefficiencies, root causes of delays, and industry best practices in R&D process management.	Develop standardized operating procedures, document workflows, and establish performance benchmarks for process improvement initiatives.	BOD, HRGA, R&D Manager, R&D Supervisors	Standardized processes, Documentation guidelines, Collaboration tools
Limited decision-making authority	Delegate decision-making authority to R&D teams within defined parameters, foster a culture of ownership and accountability, and improve communication with senior management.	Understanding of risk management principles and Juoku's decision-making framework.	Establish clear decision-making frameworks for R&D teams, train on risk assessment and mitigation strategies, and implement regular communication channels with senior management.	BOD, HRGA, R&D Manager, R&D Supervisors	Feedback systems, Recognition programs, Performance evaluations
External Factors:					
Dependency on Juoku's R&D Schedule	Negotiate flexible scheduling arrangements with Juoku, develop contingency plans for potential delays, and explore alternative R&D partnerships for specific stages of the product development process.	Understanding of Juoku's internal constraints and alternative R&D options.	Establish collaborative risk management protocols with Juoku, conduct scenario planning exercises for potential delays, and identify and build relationships with potential alternative R&D partners.	BOD, HRGA, Product Engineer Head Department	Collaboration agreements, Risk management plans
Fast technological advancements	Implement a technology scouting and monitoring system, invest in continuous learning & development programs	Awareness of emerging technologies and their potential impact on	Establish partnerships with universities and research institutions, organize internal knowledge transfer	Technology Experts, Trainers, R&D Manager	Technology scouting, Training programs, Knowledge



Sub Cause	Action	Critical Knowledge	KM Objective	Knowledge Management Framework	
				People	Process
	for R&D staff, and encourage participation in industry conferences and collaborations.	the car lighting industry.	sessions on new technologies, and incentivize employee participation in industry events and collaborations.		sharing workshops
Technology Factors:					
Limited testing equipment in R&D	Allocate budget for acquisition or development of state-of-the-art testing equipment for diverse materials and explore partnerships with external testing labs for access to additional resources.	Understanding of testing requirements for various materials and technologies, equipment calibration procedures, and cost-effectiveness of different testing options.	Develop standardized testing protocols and operating procedures for different equipment, document calibration processes, and conduct cost-benefit analysis for outsourcing specific testing needs.	BOD, HRGA, R&D Manager, IT Staff, Technology Experts	Equipment procurement, Technology training
Absence of knowledge management system	Implement a dedicated knowledge management system for R&D data, including test results, design specifications, and project documentation, ensuring user-friendly interface and data analysis capabilities.	Historical R&D data, design iterations, and best practices for different materials and technologies.	Train R&D staff on data entry and utilization within the system, conduct regular data analysis to identify trends and insights, and leverage extracted knowledge for future project development and decision-making.	R&D Manager, IT Staff, Technology Experts	Knowledge capture, Data storage

PT Automotive Lumina's current strategic stance as an explorer is deemed appropriate, and there is no immediate imperative to alter it. This decision is grounded in the company's existing lower knowledge base compared to both competitors and the strategic requisites. Therefore, there is a pressing need to augment knowledge in specific areas. Moreover, the automotive lighting industry confronts a swiftly evolving landscape, rendering knowledge quickly obsolete. Consequently, continual innovation and learning are imperative. Unfortunately, internal generation of unique and valuable knowledge is constrained, as the R&D Department lacks independence. Hence, the company must rely on external sources such as publications, universities, consultants, or alliances. The transition to an aggressive strategy can only be effectively executed once PT Automotive Lumina has successfully addressed and resolved these challenges.

Unbounded			Aggressive
External		X	
Internal	Conservative		
	Exploiter	Explorer	Innovator

Figure 1. 4 Solution using Firm’s Knowledge Strategy (Author, 2023)

The following is a proposed knowledge management roadmap which is planned to be used as a solution to company problems.



Figure 1. 5 Knowledge Management Roadmap (Author, 2023)



SOLUTION IMPLEMENTATION PLAN

No	Activities	PIC	Tools	Proposed Time Frame- Year 2023-2024											
				2023		2024									
				Nov	Des	Jan	Feb	Mar	Apr	May	Jun				
A Preparation of Knowledge Management Solution Implementation Phase															
1	Conduct organizational needs assessment	HRGA Manager	Surveys												
2	Identify key knowledge areas for improvement in R&D department	Head division of Product Engineering	Interviews, Brainstorming sessions												
3	Develop a comprehensive KM strategy	HRGA Manager	KM Framework Models												
4	Establish KM implementation in R&D department	BOD	Internal communication												
B Implementation of KM Solution Phase															
1	Introduce KM system to employees	HRGA Manager	Internal communication												
2	Implement forums for knowledge sharing	R&D Manager	Online Forums, Internal Systems												
3	Launch internal knowledge sharing platform	HRGA Manager	Internal Knowledge System												
4	Promote best practices for knowledge documentation	BOD	Guidelines, Workshops												
C Evaluation of KM Solution Phase															
1	Monitor user engagement with KM tools	HRGA Manager	Analytics Dashboard												
2	Collect feedback on KM system effectiveness	R&D Manager	Surveys												
3	Assess the impact of KM on organizational objectives	HRGA Manager	KPI												
D Post Evaluation of KM Solution Implementation Phase															
1	Identify areas for improvement based on evaluation	HRGA Manager	Internal Knowledge System												
2	Adjust KM strategy and tools accordingly	R&D Manager	Internal Knowledge System												
3	Communicate changes and updates to R&D Department	HRGA Manager	Internal communication												



CONCLUSION AND RECOMMENDATIONS

In summary, the findings of this thesis lead to two principal conclusions centered around the posed research questions. Firstly, addressing the challenge of inefficient time allocation in R&D is imperative for PT Automotive Lumina's success. The author recommends a comprehensive Knowledge Management System, employing tools such as fishbone diagrams and the PPT framework within the SECI Framework. This encompasses strategies for socialization, externalization, combination, and internalization, involving initiatives like direct training, mentorship, collaboration tools, and standardized processes. The goal is to foster innovation while reducing dependence on specific technologies. Secondly, the proposed implementation plan for the Knowledge Management System spans 14 months, from November 2023 to December 2024. The process involves four stages: Preparation, Implementation Solution, Evaluation, and Post-Evaluation. The initial preparation occurred in November and December, with collaboration between the author and experts from PT Automotive Lumina. The subsequent implementation of the Knowledge Management Solution is scheduled for February 2024, followed by an evaluation in April 2024 to assess its impact on time allocation efficiency. A post-evaluation in October 2024 aims to identify areas for improvement, presenting a comprehensive timeline for the strategic initiative.

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