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Enhancing Knowledge Management Development in Cargo Companies through Agile Principles and Practices

Denny Jean Cross Sihombing
Information System Study Program, Atma Jaya Catholic University of Indonesia

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ABSTRACT
This research highlights the significant problems the cargo industry faces in managing knowledge to improve operational efficiency, overcome competition, and meet increasingly complex customer needs. Applying an Agile approach to knowledge management (KM) development in a cargo company, this research designed and implemented a responsive, adaptive, and high-quality KM solution through a series of stages such as requirements definition, planning, development, and testing. The results showed significant improvements in operational efficiency, more vital cross-team collaboration, and more accurate data-driven decision-making. At the same time, a thorough testing process proved the optimal usability, performance, and security of the developed KM solution. This research contributes to developing KM theory and practice in the cargo industry. It highlights the value of applying Agile principles in improving operational efficiency and providing significant added value to cargo companies in managing their knowledge in today's digital age.

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Corresponding Author:
Denny Jean Cross Sihombing
Atma Jaya Catholic University of Indonesia
Jakarta, Indonesia
denny.jean@atmajaya.ac.id

INTRODUCTION

The cargo industry is one of the fastest-growing sectors in the era of globalization, with increasing international trade and increasingly complex flows of goods. Trends such as e-commerce and increasingly integrated supply chains are also putting additional pressure on cargo companies to provide faster and more efficient services(Bombelli & Fazi, 2022; Guo et al., 2022; Jörgensen et al., 2023; Malmgren et al., 2023; Polkinghorne et al., 2024; Riaz et al., 2023). Its role in the economy is vital as it supports the distribution of goods from producers to consumers, facilitates business growth, and provides significant employment.

Traditional approaches to knowledge management often involve lengthy and sometimes inflexible processes, such as manual data collection, lack of collaboration between departments, and lack of mechanisms to adapt to rapid changes in the business environment(Batliner et al., 2022; Humpert et al., 2022; López et al., 2022; Ouriques et al., 2023; Paasivaara et al., 2018). This leads to challenges in optimizing available knowledge and updating data-driven strategies. In the cargo industry, issues are further complicated by the need to track receipts in real time, deal with fluctuating fuel prices and operating costs, and address regulatory changes that often impact the shipping process. In addition, the need for

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system integration between various functions within cargo companies, such as warehouse management, logistics, and customer service, is also an obstacle to gaining overall visibility into business processes and the need for accurate and timely information. Thus, improving knowledge management in the cargo industry is becoming increasingly important in addressing these issue and maintaining competitiveness in a competitive market(Bahamid et al., 2022; Farafontova et al., 2022; Lokras et al., 2022; Polkinghorne et al., 2024; Wang et al., 2023).

Agile principles, such as iterative development, responsiveness to change, and a focus on effective human-machine interaction, have great potential to improve the efficiency and effectiveness of knowledge management in the cargo industry(Alami et al., 2023; Almeida et al., 2022; Al-Saqqa et al., 2020; Dingsoeyr et al., 2019; Estrada-Esponda et al., 2024; Najihi et al., 2022; Rindell et al., 2021; Santos et al., n.d.; Serrador & Pinto, 2015; Shrivastava & Rathod, 2014). The Scrum approach in Agile can help teams identify and resolve problems faster, while Kanban practices can help better manage the flow of information. Moreover, the adoption of Agile in application development also provides additional benefits. With an Agile approach, the development team can more easily adapt the application to changing user needs or emerging business requirements. This allows for developing more responsive and relevant applications to market needs, thereby increasing user satisfaction and accelerating product time-to-market. With iterative iterations and continuous feedback from users, the application can be continuously updated and improved, keeping pace with the ever-changing technology and needs of the cargo industry(Dingsøyr & Lassenius, 2016; Gutierrez et al., 2019; Hinderks et al., 2022; Kantola et al., 2022; Martin, 2023; Mero et al., 2022; Persson et al., 2022).

This research can benefit KM practitioners in cargo companies, helping them understand how best to integrate Agile principles in their knowledge management. In addition, the theoretical contributions of this research can also enrich our understanding of how Agile approaches can be applied in different industry contexts. Overall, this research has high practical value and can change how cargo companies manage and utilize their knowledge.

METHODS

This research consists of four main stages, as shown in Figure 1. The research stages include needs definition by identifying specific challenges and needs in knowledge management in the cargo industry, planning by designing an Agile framework, assigning a project team and drawing up a realistic work plan, development by implementing Agile principles in the construction of a responsive and adaptive knowledge management system, and testing through functional, performance, and security trials of the system and involving stakeholders to obtain valuable feedback. By following these steps, this research is expected to provide an effective solution to improve knowledge management in the cargo industry due to the changing market demands and increasing complexity.

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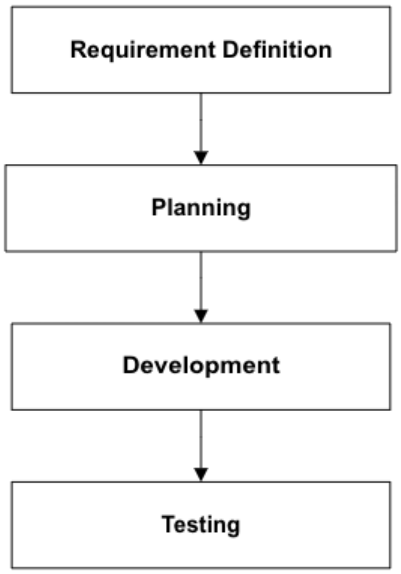

Figure 1. Research Stages

Definition of need

At this stage, the main focus of the research is on identifying and deeply understanding the specific challenges and needs faced by cargo companies in their knowledge management. By conducting an in-depth analysis of their business environment, relevant literature study, and direct interaction with practitioners in the industry, the research will clearly define the problems to be solved and the needs to be met in developing more effective and efficient knowledge management.

Planning

Once the needs and challenges were identified, the next step was to plan how the Agile approach would be applied to develop knowledge management in the cargo company. This includes designing an Agile framework that suits the business needs and characteristics of the cargo industry, establishing the project team involved, developing realistic work schedules, setting the required budget, and establishing clear evaluation metrics to measure the success of Agile implementation in improving knowledge management.

Development

The development phase will focus on the implementation of Agile practices that have been designed in the previous planning. The project team will be actively involved in developing an adaptive, responsive, and high-quality knowledge management system or platform per Agile principles. Regular collaboration sessions and periodic progress monitoring will ensure that the development goes according to plan and fix any issues that arise quickly.

Testing

Once development is complete, the next stage is to test the knowledge management solution that has been built. The trial will include functional, performance, and security testing of the system and involving relevant users or stakeholders to provide valuable feedback. The results of these trials will be carefully analyzed to identify areas that need to

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be improved or refined before the full implementation of the Agile solution in the development of knowledge management in the cargo company.

RESULTS AND DISCUSSION

Definition of need

The results of the needs definition stage in this research include several essential aspects. Firstly, through identification, the research successfully identified the challenges and needs that cargo companies face in managing their knowledge. These include issues such as lack of visibility into logistics information, difficulties in cross-team collaboration, and the need to improve data-driven decision-making in day-to-day cargo operations. Secondly, through a thorough literature study, the research understood the concept of Agile and how it can be effectively applied in the context of knowledge management (KM) in the cargo industry. This involved an in-depth understanding of Agile principles such as iterative development, responsiveness to change, and cross-team collaboration. Thirdly, through interviews with KM practitioners and managers in cargo companies, the research gained more profound insights into their specific needs in knowledge management development. These include the desire to have a more adaptive, flexible system that can provide accurate and real-time information to support better decision-making. With the outcome of this needs definition stage, the research was ready to proceed to the planning and development stage of an Agile-based solution that suits the identified needs.

Table 1. Results of Needs Definition

Requirement Definition Result	Data Source
Identify specific challenges and needs in knowledge management in cargo companies. These include issues of visibility into logistics information, cross-team collaboration, and data-driven decision-making.	Direct observation, analysis of company documentation, and interviews with operations and IT managers.
An in-depth literature study to understand the Agile concept and its application in the context of knowledge management (KM) in the cargo industry. This includes Agile principles such as iterative development, responsiveness to change, and cross-team collaboration.	Database searches of journals, textbooks, and academic articles related to knowledge management and Agile principles.
Interviews with KM practitioners and managers at cargo companies to gain deeper insight into their needs. These include a desire for more adaptive, flexible systems that can provide real-time information to support better decision-making.	In-depth interviews with KM managers, IT practitioners, and direct users of knowledge management systems.

The results of the Needs Definition stage, as shown in Table 1, provide a comprehensive overview of cargo companies' specific challenges and needs in their knowledge management. The analysis is based on data from various sources, including direct observation, analysis of company documentation, and in-depth interviews with operations and IT man-

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agers. The results of this identification included issues such as lack of visibility into logistics information, constraints in cross-team collaboration, and the need to improve data-driven decision-making in day-to-day cargo operations. In addition, the results of a thorough literature study on Agile concepts and their application in knowledge management in the cargo industry provided a solid understanding of Agile principles such as iterative development, responsiveness to change, and cross-team collaboration. Furthermore, interviews with KM practitioners and managers in cargo companies provided diverse perspectives, enabling a deeper understanding of their needs and expectations of the new knowledge management system. Thus, the analytical results of this need definition stage provide a solid foundation for the next steps in the research, such as planning and developing an Agile-based solution that fits the identified challenges and needs.

Planning

The results of the stage include several vital aspects. Firstly, the research successfully designed an Agile framework to develop cargo companies' knowledge management (KM). This involved selecting Agile principles that fit the business needs and characteristics of the cargo industry, such as iterative development, responsiveness to change, and effective cross-team collaboration. Secondly, the research successfully identified the project team that would be involved in the KM development and clearly defined the roles and responsibilities of each team member. This included selecting a team with relevant skills and experience in Agile and KM and setting up an organizational structure that facilitated effective collaboration and communication. Third, the study successfully created a comprehensive project plan, including a realistic timeline, a budget adjusted to the resources required, and metrics that would be used to evaluate the project's success.

The project plan also includes efficient resource allocation and continuous monitoring of the project progress to ensure that the set goals and targets can be achieved according to the predetermined schedule. Thus, the results of this planning stage provide a solid foundation for implementing Agile-based knowledge management development in cargo companies. Figure 2 shows the activities in the planning stage, starting from designing the Agile framework, identifying the project team to creating a project plan that includes aspects such as Agile principles to be applied, selection of team members, organizational structure, work schedule, project budget, required resources, and project success evaluation metrics. This diagram provides a clear picture of the steps in the planning stage to develop Agile-based knowledge management in a cargo company.

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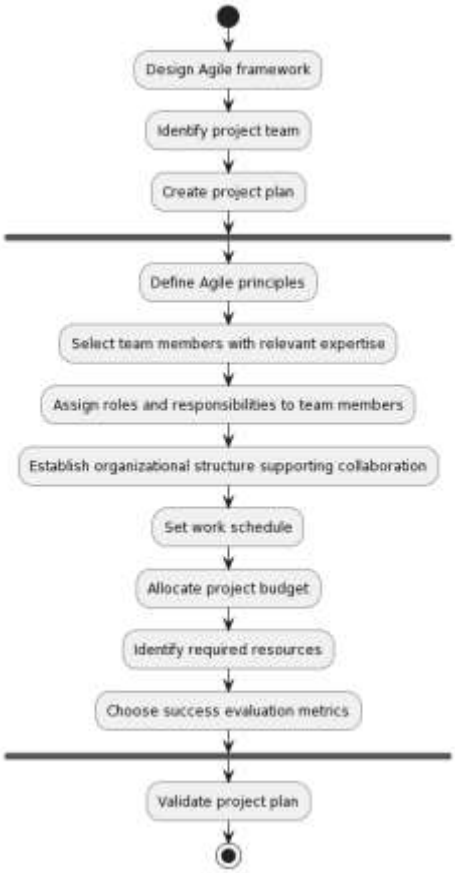

Figure 2 The Planning Phase

Development

As a result of the development phase, several important aspects were successfully achieved. Firstly, the research successfully implemented Agile principles such as Scrum or Kanban in developing a knowledge management (KM) solution in a cargo company. Agile methods that suit the project's needs allow the team to work iteratively, be responsive to changes, and improve the efficiency and quality of KM solution development. Secondly, the research successfully built a KM system or platform that is responsive, flexible, and can be adapted quickly to the business needs of the cargo company. The system can provide accurate and real-time information by applying Agile principles, support cross-team collaboration, and facilitate better decision-making as shown in Table 2. Thirdly, the researcher regularly organized collaboration sessions and meetings with the team to evaluate the project's progress, resolve any issues that arose, and identify changes needed to develop the KM solution. Through these meetings, continuous project monitoring can be done to ensure the achievement of the set goals and targets based on the Agile principles applied earlier. Thus, the results of this development phase demonstrate the success of implementing an adaptive, responsive, and high-quality KM solution in a cargo company by the pre-designed Agile approach.

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Table 2 Sprint

Sprint	Activities
Sprint 1	Sprint Planning Meeting
	User Stories Prioritization
	Frontend Development
	Backend Development
	Unit Testing
	Code Review
	User Acceptance Testing
Sprint 2	Sprint Planning Meeting
	User Stories Prioritization
	Frontend Development
	Backend Development
	Unit Testing
	Code Review
	User Acceptance Testing
Sprint 3	Sprint Planning Meeting
	User Stories Prioritization
	Frontend Development
	Backend Development
	Unit Testing
	Code Review
	User Acceptance Testing

Planning

The testing phase results include several vital steps that were successfully undertaken. First, the research designed test scenarios that included functional, performance, and security testing of the knowledge management (KM) system. Functional testing ensures the KM system can function according to the needs and specifications. Meanwhile, performance testing is carried out to measure the responsiveness and performance of the system under certain load conditions. Meanwhile, security testing aims to assess how well the system can protect its data and information. Then, the research conducts a pilot test involving users or stakeholders. This is done to get more accurate feedback on the KM system's usability, performance, and reliability. By involving direct users, the research can gather valuable insights into users' experiences using the system, evaluations of the system's performance, and the system's reliability in providing and managing the information needed.

Furthermore, after the trial was completed, the researchers analyzed the trial results. This analysis aims to evaluate the system's performance, identify any problems or shortcomings, and make the necessary improvements or adjustments before implementing a comprehensive KM solution in the cargo company. This step is essential to ensure the KM

system is ready for widespread use and can provide maximum added value to the company and its users. Thus, the results of this testing phase ensure that the KM solution developed through the Agile approach has been thoroughly tested and is ready for widespread implementation at the cargo company. By taking into account the system's optimal usability, performance, and security, the research can produce an effective KM solution that can positively impact companies in managing their knowledge.

CONCLUSION

Implementing Agile principles in developing knowledge management (KM) in cargo companies has had a significant positive impact. This study identifies the challenges of the cargo industry, especially in terms of competition, efficiency, and customer satisfaction, which can be addressed with a responsive and adaptive Agile approach. The results show that using an Agile framework to develop KM solutions enables cargo companies to improve operational efficiency, strengthen cross-team collaboration, and enhance data-driven decision-making. In addition, through a thorough testing process and analysis of trial results, this research resulted in a more reliable, responsive, and secure KM solution for the cargo company. In conclusion, applying Agile principles in KM development in the cargo industry has high strategic value in facing complex and dynamic business challenges in today's digital era.

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