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ENHANCING MARITIME SHIPPING OPERATIONS DECISION-MAKING IN A FERTILIZER COMPANY THROUGH A DYNAMIC DASHBOARD: A QUALITATIVE CONTENT ANALYSIS

Edwin Octoriza[1]
[1]School of of Business Administration, Institut Teknologi Bandung, Jakarta, Indonesia

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Abstract

This research examines how a dynamic dashboard can enhance decision making process in PT Pupuk Indonesia's maritime fertilizer distribution system and identifies the performance metrics required to be embedded in the dashboard. The study employs a qualitative research methodology by using semi structured interviews with three key stakeholders from the Distribution Compartment: the Senior Vice President of Distribution, the Vice President of Distribution Planning and Controlling, and an Officer of Shipping Operations. The interview data were analyzed using Johnny Saldaña's (2009) First Cycle and Second Cycle coding techniques to systematically generate insights and derive thematic conclusions. The analysis reveals that current decision making process rely heavily on fragmented information and partially manual workflows, resulting in inconcistencies and limited visibility. Existing digital system does not provide enough operational level metrics and this study highlights the need for data integration across functions and subsidiaries, real time updates, and standardized operational KPIs to be embedded to support decision making.

Keywords: dynamic dashboard, decision support systems, maritime logistics, fertilizer distribution, qualitative content analysis, KPI standardization.

INTRODUCTION

Indonesia's maritime fertilizer distribution system is crucial in supporting national food security due to its archipelagic geography. According to the Food and Agriculture Organization (FAO, 2022), fertilizer availability directly shapes agricultural productivity and national food security. To overcome the challenges, it is important to have a reliable, timely, and resilient distribution system to support the national goal. PT Pupuk Indonesia (Persero) carries the mandate from the Indonesian government to distribute the subsidized fertilizer under the Public Service Obligation (PSO) scheme. The Ministry of Agriculture of Indonesia have already stated the prices and volumes of the fertilizer are already stated and must be delivered in timely manner. This mission needs a well coordinated maritime logistics. From the literature review, prior studies highlight that Indonesia is very dependant on sea-based logistics (Lazuardi et al., 2017; Shaffiyah, 2023) because of its geographical condition. Maritime transportation also comes with risks such as vessel delays, congestion, and weather disruptions that could create operational uncertainty (Gurning & Cahoon, 2011) that threatens PSO fulfillment.

Although PI Group employs several digital platforms, including SAP ERP and the Distribution Planning and Control System (DPCS), these systems need a complementary system to support day-to-day operational decision-making. Managers therefore rely on fragmented data: spreadsheets, WhatsApp updates, subsidiary reports, and ad hoc verbal communication. This fragmentation results in delays, inconsistencies, and structurally limited visibility. The existing systems need an integrated decision-support layer that aligns planning outputs (e.g., S&OP-derived shipment plans) with real-time maritime execution. Recent developments in business intelligence (BI) and dashboard systems show their benefits for turning complex information into practical insights that can be executed. However, applications in fertilizer logistics that are regulated by the government remain rare. This study investigates how a dynamic dashboard can enhance decision-making in PI Group's maritime distribution system and also identifies which ones are the performance metrics required to be embedded in the dashboard according to the key stakeholders. By integrating stakeholder insights with theory on decision-support systems (DSS), dashboard design, and maritime logistics, this study contributes both empirically and conceptually to improving decision quality in fertilizer maritime distribution system.

MATERIAL AND METHOD

This study uses a qualitative single-case study design, aligning with research targeting complex organizational settings and context-specific decision processes. Semi-structured interviews allow exploration of stakeholder perspectives across hierarchical levels while maintaining thematic consistency. Primary data were obtained via semi-structured interviews with three key stakeholders: Senior Vice President of Distribution, Vice President of Distribution Planning & Controlling, and Officer of Shipping Operations. Purposive sampling ensures participants have the required maritime fertilizer distribution expertise (Tongco, 2007). Qualitative content analysis was used to analyze the interview transcripts. Context came from internal documents, annual reports, and distribution regulations. The analysis followed Saldaña's (2009) two-cycle coding approach. First Cycle Coding captured stakeholders language and meaning by using descriptive and in vivo method, while the Second Cycle Coding categorized initial codes for higher level analysis. Through this iterative process, themes were generated to solve problems with dashboard designs and KPI needs study. Structured analytical methods make thins clearer, more accurate, and easier to repeat (Prior, 2020; Kleinheksel et al., 2020).

RESULT AND DISCUSSION

The responses from the participants revealed some issues regarding decision making workflows, system limitations, data fragmentation, and expectations for improved visibility. Codes focused on decision-making behavior, challenges, system gaps, and how they would prefer the dashboard features to be.

Codes were consolidated into analytical categories:

- Existing decision-making processes,
- decision-making constraints,
- dashboard requirements,
- data integration needs,
- real-time update expectations,
- system limitations,
- KPI requirements, and
- alert needs.

These categories later were translated into themes that linked to the research questions.

Themes for research question 1 are:

- Decision-making is hindered by fragmented, manual data flows, slowing response time.
- A dynamic dashboard must simplify complex data into actionable insights, prioritizing clarity and usability.
- Integrated, cross-subsidiary data is essential for unified decision-making, reducing discrepancies across PI Group.
- Real-time information is critical for managing vessel delays, stock issues, and congestion risks.
- Existing systems lack operational visibility, justifying the need for a complementary decision-support layer.

Furthermore, the themes related to the second research question are

- Operational KPIs require standardization to ensure measurement consistency.
- Key operational metrics include loading rate, unloading rate, vessel lateness, and congestion time.
- Distribution metrics such as PSO allocation fulfillment and regional stock levels are essential.
- Alerts enable early detection of operational risks, supporting proactive decision-making.

These insights are aligned with earlier studies that highlight the importance of standardized performance indicators (Weissman et al., 2008) and integrated decision-support architectures in distributed operational systems (Hudson & Rzasa, 2015; Niedermann et al., 2011) and the importance of standardized performance indicators

The suggested solution is a dynamic decision-support dashboard that integrates multiple data sources, visualizes operational and distribution KPIs, and generates alerts for critical deviations. Key features include:

- Multi-source data integration
- Standardized KPI structures
- Operational and distribution metric visualization, and
- Real time alerts for exception based management

Key recommendations include:

- developing an integrated data pipeline connecting SAP, DPCS, and subsidiary systems,
- defining and institutionalizing operational KPIs,
- incorporating PSO-related distribution metrics
- employing alert-based exception management, and
- establishing a cross-functional implementation team

These recommendations support PI Group’s broader digital transformation agenda and contribute to strengthening Indonesia’s fertilizer supply chain.

CONCLUSION & RECOMMENDATION

This study finds that PI Group’s maritime distribution decision-making is constrained by fragmented information flows, insufficient operational visibility, and inconsistent data across subsidiaries. A dynamic dashboard can address these constraints by integrating multi-source data, standardizing KPIs, and providing real-time monitoring capabilities. The dashboard framework offers a structured approach to enhancing decision quality and operational alignment.

Key recommendations include:

- developing an integrated data pipeline connecting SAP, DPCS, and subsidiary systems,
- defining and institutionalizing operational KPIs
- incorporating PSO-related distribution metrics
- employing alert-based exception management, and
- establishing a cross-functional implementation team

These recommendations support PI Group’s broader digital transformation agenda and contribute to strengthening Indonesia’s fertilizer supply chain.

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