



The Role of Human Resources to Improve the Optimization of e-Procurement Implementation in PT Pertamina Trans Kontinental's Ship Operations

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This study aims to analyze and evaluate the implementation of the e-procurement system in the operations of PT Pertamina Trans Kontinental (PT PTK) vessels, as well as the role of human resources (HR) in optimizing the application of this system. The research also explores the factors that influence the success of e-procurement implementation, both from the internal side of the company, such as good management and HR management, and from the external side, including supporting technological infrastructure and policies. This study uses a qualitative method with a descriptive approach and NVivo 12 software for data analysis. The research duration was 3 (three) months through interviews with informants consisting of the Procurement Manager, ICT Manager, Vessel Procurement and Operations Coordinator, SmartGEP Manager, and six HR employees involved in the implementation and management of the e-procurement system, totaling 10 participants, this research delves into the various challenges and solutions in implementing e-procurement in the vessel operations of PT PTK. The analysis results show that the implementation of e-procurement has increased efficiency, transparency, and accountability in the procurement of goods and services. However, there are still challenges related to HR adaptation and technological infrastructure. This research contributes to the development of e-procurement theory, particularly in the maritime industry context, and provides practical recommendations to enhance HR capacity in managing a more effective and sustainable e-procurement system.

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INTRODUCTION

Transportation, logistics, and strategy management play a crucial role in ensuring the smooth operation of a company, particularly those operating in the maritime transportation sector, such as PT. Pertamina Trans Kontinental (PTK). (Bowersox et al., 2020) Transportation management refers

to the process of planning, implementing, and controlling the flow of goods and services from their point of origin to their final destination, with the aim of meeting consumer needs in a cost-efficient and timely manner. Logistics management, meanwhile, is the process of efficiently and effectively planning and managing the flow of goods, information, and supporting resources to meet customer demand. Well-integrated logistics will enable companies to maximize resource utilization and improve operational efficiency. A sound logistics and transportation strategy also prioritizes the use of the latest technology to support optimization in supply chain and distribution management. In the case of PT. Pertamina Trans Kontinental, maritime transportation as part of logistics plays a crucial role in the distribution of goods and fuel, which must prioritize timeliness and cost efficiency, so that ship operations run smoothly and optimally. (Faturrahman, 2024)

The operation of ships as a means of maritime transportation requires regular maintenance and repairs, considering age and environmental conditions, which can accelerate deterioration. As technology advances, ship design and engine systems continue to innovate to improve efficiency and safety. As stated by (Purnomo, 2019) The development of ships in this modern era includes innovations in machinery systems, ship materials, and increasingly sophisticated navigation technology. PT. Pertamina Trans Kontinental, as a shipping company that manages a fleet of tankers, relies heavily on technological capabilities to support efficient and safe ship operations.

This research was conducted with a focus on PT. Pertamina Trans Kontinental because this company faces relevant challenges related to the procurement of goods and services, especially in supporting ship operations that are vital for the smooth distribution of energy in Indonesia. In addition, PT. PTK has used e-procurement in the procurement of goods and ship maintenance services, which provides an opportunity to explore the effectiveness of implementing this system in marine operations that have special and urgent needs. Focusing on this phenomenon is expected to contribute to the development of knowledge related to the implementation of e-procurement in the maritime industry, which is still relatively new and has received little attention in previous research. (Primastiwi et al., 2023)

The phenomenon in the implementation of e-procurement at PT. Pertamina Trans Kontinental is the lack of understanding of HR regarding the application features and the limited number of employees who can handle the procurement process. (Aryati & Pangaribuan, 2019). According to research conducted by (Mohungoo et al., 2020) The e-procurement application features related to requirements planning, selection of goods and services providers, and payment are not yet optimal. The e-procurement system implementation does not yet meet the specific operational needs of PTK vessels. The minimal number of employees at PT. Pertamina Trans Kontinental causes difficulties in the clear division of tasks and functions, which leads to the occurrence of dual positions that are not in accordance with Presidential Regulation No. 54 of 2010 concerning Government Procurement of Goods and Services. This has a negative impact on the effectiveness and efficiency of the goods and services procurement process, due to the lack of separation of duties that should be able to increase transparency and accountability. The procurement process, which should be carried out more quickly and efficiently, is actually hampered by this inconsistency in the division of tasks.

Research has been conducted on topics related to e-procurement, as found in studies by (Alipour & Damavandi, 2011), which highlights efficiency improvements through e-procurement in Iranian shipping companies, or (Narendira Kumar & Srinivasan, 2013), which examined the impact of e-procurement on ship management in India, most of these studies tend to focus on other sectors or are limited to specific areas, such as the construction or healthcare sectors. (Gurgun et al., 2024); (Smith & Flanegin, 2004). More in-depth research on the

implementation of e-procurement in the maritime industry, particularly in the procurement of goods and services for ship operations, is still very limited. This indicates a gap in the implementation of e-procurement systems in shipping companies and ship procurement, which is crucial in supporting smooth ship operations, as explained by (Budiman, 2019) which examines ISM regulations regarding ship maintenance.

Although numerous studies have discussed the implementation of e-procurement in various sectors, particularly those focusing on the technology and process aspects, the role of Human Resources (HR) in its implementation and optimization in the maritime sector, particularly in ship operations, remains very limited. Research by (Amanah & Naji, 2024) revealed that e-HRM (Electronic Human Resource Management) can enhance an organization's ability to adapt quickly to dynamic environmental changes and improve operational efficiency. However, the lack of attention to HR aspects in implementing e-procurement in the maritime sector represents a gap that needs further exploration. (Fadhil & Al Hussein, 2023) also emphasize the importance of e-HRM in sustainable HR management, but their research focuses more on the public sector and has not specifically discussed the challenges faced by HR in the maritime industry that require adaptation to technology management in ship operations.

Moreover, although technologies such as ERP (Enterprise Resource Planning) and SNA (Social Network Analysis) have been proven to improve procurement performance across various sectors (Shaharudin et al., 2021), The application of this technology in the procurement of goods and ship services at PT Pertamina Trans Kontinental has not been widely discussed. Research by (Suliantoro & Ririh, 2019) revealed that organizational values such as polychronicity and organizational learning capacity play an important role in e-procurement adoption, but their research is more directed at the government sector. Therefore, it is important to explore further how HR can play a vital role in the adoption and optimization of the e-procurement system at PT Pertamina Trans Kontinental, both in terms of HR training, organizational culture adaptation, and technological infrastructure improvement. (Leisthari et al., 2025) demonstrated that developing digital skills within HRM strategies is crucial for increasing productivity, but their research focused more on the application of technology in the industrial sector in general. Therefore, a clear research gap exists in the application of e-procurement in ship operations, which requires special attention to the role of HR in improving the effectiveness and sustainability of such systems.

(Dixit & Agrawal, 2020) While discussing procurement integration in ship projects and game theory in procurement policy, the research focus is often more on ship project management or procurement policy more generally, without delving deeper into how e-procurement technology can be integrated to improve efficiency in ship operations in practice. Furthermore, another research gap is seen in the limited studies on the obstacles and challenges faced by shipping companies in implementing e-procurement systems, as revealed in research by (Gurgun et al., 2024), which discusses the barriers to e-procurement adoption in the construction sector.

Practical aspects of procurement for the maritime industry, as experienced by PT. Pertamina Trans Kontinental, still receive minimal attention. (Faturrahman, 2024) Research on the challenges of adopting digital systems for procurement of goods and services in the maritime sector is still lacking, particularly regarding the adoption of technologies capable of improving slow and bureaucratic procurement processes. Therefore, the study, entitled "The Role of Human Resources (HR) in Increasing the Optimization of E-procurement Implementation in PT Pertamina Trans Kontinental's Ship Operations" It is crucial to fill this gap by exploring how e-procurement can address existing constraints in the procurement of goods and services for ships, as well as contribute to more specific developments in this area. (Yuswantoro et al., 2022).

Title "The Role of Human Resources (HR) in Increasing the Optimization of E-procurement Implementation in PT Pertamina Trans Kontinental's Ship Operations" This study was chosen because of the importance of understanding the effectiveness of e-procurement in supporting the smooth operation of ships, particularly in the procurement of urgent, timely goods and services, and minimizing delivery delays and damage to ships, such as spare parts. By using a qualitative descriptive approach, this study is expected to provide a more comprehensive and systematic picture of the implementation of e-procurement, as well as identify solutions to overcome existing challenges in the field. This study also aims to fill the research gap in this field. (Pudjijono et al., 2022)

METHODOLOGY

This research uses a qualitative approach with a qualitative descriptive research type. Qualitative research, according to (Suliyanto, 2020), focuses on a deep understanding of social phenomena through revealing the meaning and dynamics behind the phenomenon. Rooted in the philosophies of interpretivism and constructivism, this research seeks to understand the perspectives of individuals or groups involved in the phenomenon being studied. In this context, the focus of the research is the implementation of e-procurement in the operations of PT. Pertamina Trans Kontinental vessels, which aims to optimize the procurement of goods and services through a digital platform that is expected to increase cost efficiency, time, and procurement transparency.

E-procurement in ship operations at PT. Pertamina Trans Kontinental supports the procurement of ship equipment, fuel, maintenance services, and other materials needed to ensure smooth operations. This study aims to analyze how the implementation of e-procurement can increase transparency, reduce budget leakage, accelerate the procurement process, and ultimately improve the performance and competitiveness of companies in the maritime and logistics industry. This study will utilize various data collection methods, including literature review, direct observation, in-depth interviews, and documentation.

The first method used is a literature study, where researchers analyze secondary data from various sources such as journals, laws and regulations, and statistical data relevant to the implementation of e-procurement in ship operations. (Umar, 2018) This study also relied on direct observation to gain insight into the implementation of e-procurement in ship operations at PT. Pertamina Trans Kontinental. This observation was conducted by directly observing the procurement process involving the e-procurement system to obtain more accurate and up-to-date data regarding the system's implementation.

In-depth interviews were also conducted with informants with knowledge and experience in implementing e-procurement. Researchers posed 39 interview questions, divided into specific guidelines based on the informants' backgrounds and positions. The informants included procurement and ICT managers, ship operational procurement coordinators, SmartGEP system managers, and HR employees. These interviews aimed to explore in-depth the various aspects of human resources' role in supporting the implementation of the e-procurement system, as well as the challenges and benefits experienced by each informant group.

Data obtained from the interviews were analyzed using a thematic analysis approach. Researchers transcribed the interviews verbatim and conducted initial coding of key words or important statements made by the informants. The coding results were then grouped into main themes, such as system effectiveness, implementation challenges, strengthening human resource competencies, and the role of information technology. Each theme was further examined to draw

conclusions that could answer the research questions and provide practical and theoretical implications for e-procurement implementation.

To clarify the analysis results, researchers also used data visualizations, such as bar charts to illustrate the frequency of occurrence of themes from each informant group. Furthermore, a thematic matrix was used to map informants' involvement with key issues, such as the role of HR, system effectiveness, and training needs. This visualization made it easier for readers to understand each informant's role in the research theme. Word clouds were also used to display the most frequently mentioned words, providing a clear picture of the focus of the discussions that occurred during the interviews.(Sugiyono, 2024).

Documentation methods were also used to support data collection in this study. Documentation refers to written or pictorial records related to events or phenomena. In this study, documentation in the form of ship operational activity reports, internal company policies, and photographs demonstrating e-procurement implementation were used to strengthen the findings from interviews and observations. The data collected in this documentary form can be further examined to ensure their validity and confirm findings obtained from other data collection methods.

This study employed qualitative descriptive analysis with NVIVO and interviews. A detailed explanation of the data processing and analysis methods is as follows:

1. Qualitative Analysis

Descriptive analysis can be interpreted as a data analysis method by describing or depicting the collected data as it is without making conclusions or generalizations.(Sugiyono, 2024)In qualitative research, data analysis must be carried out carefully so that the data obtained can be properly narrated and become a worthy research result. In this study, the use of qualitative descriptive methods aims to collect data, interpret data, direct observation in the field, analyze data and information, then compile it into an initial conclusion and then further examine it by comparing the results of calculations and available data processing. Specifically, qualitative descriptive analysis methods will be applied to explore information and conditions in the field.

2. NVIVO Analysis

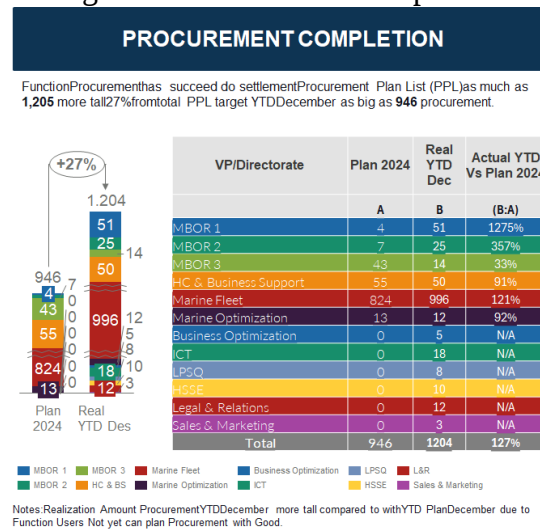
NVivo analysis begins with a structured process that includes the Planning, Conducting, and Reporting stages. In the Planning stage, researchers formulate the problem and develop research questions (RQs) that form the basis for the literature search. They also create a research protocol containing objectives, inclusion-exclusion criteria, search strategies, and article quality assessment methods. NVivo provides added value through its ability to systematically manage, code, and group qualitative data from various sources, facilitating the identification of patterns that are difficult to see through manual analysis, while saving time and increasing the accuracy of results. In the Conducting stage, researchers search for literature through databases such as Google Scholar, then organize, filter, and extract key information using NVivo according to established criteria. Next, the Reporting stage involves thematic analysis to identify patterns and themes, complemented by data visualizations such as graphs or diagrams to facilitate interpretation. A synthesis of the findings is formulated to answer the research questions and compiled into a report that can serve as the basis for policy or recommendations. This process produces conclusions that strengthen the theoretical foundation and provide direction for further research, with NVivo serving as a crucial tool that accelerates analysis, allowing researchers to focus on interpretation and synthesis of the results.(Hosea & Susilawati, 2023)

RESULTS AND DISCUSSION

Qualitative Data Results

This section presents the results of qualitative data analysis supported by quantitative data in the form of numbers and statistics. These figures provide a concrete picture of e-procurement implementation in PT PTK's ship operations, including the number of procurements, completion status, and a comparison between manual and digital procurement. This data presentation aims to strengthen understanding of the role of human resources in optimizing the e-procurement system and demonstrate the tangible impacts seen in the field.

Figure 1. Procurement Completion



In Figure 1, it can be seen that the procurement function as a whole has successfully completed the Procurement Plan List (PPL) for 2024 with a procurement realization of 1,204, or 27% higher than the set target of 946. This shows that the ongoing procurement process not only achieved the target, but also exceeded the planned expectations. From the data per directorate, it can be seen that most units, such as MBOR 1, MBOR 2, MBOR 3, and Marine Fleet, succeeded in carrying out procurement with very significant realization achievements, some even reaching more than 1000% compared to the initial target such as MBOR 1 which reached 1275%.

Another important finding is the disparity in performance between directorates, as seen in several units, such as HC & Business Support, Marine Optimization, and Legal & Relations, where procurement realization is relatively lower or even falls short of the target (below 100% or no realization). This indicates the need for special attention for directorates that are still lagging behind so that procurement efficiency and effectiveness can be improved evenly across all units. Overall, the successful completion of procurement that exceeds the target is a positive indicator, but a more in-depth evaluation is still needed for directorates with minimal procurement realization.

Figure 2. SLA (Service Level Agreement) Achievement

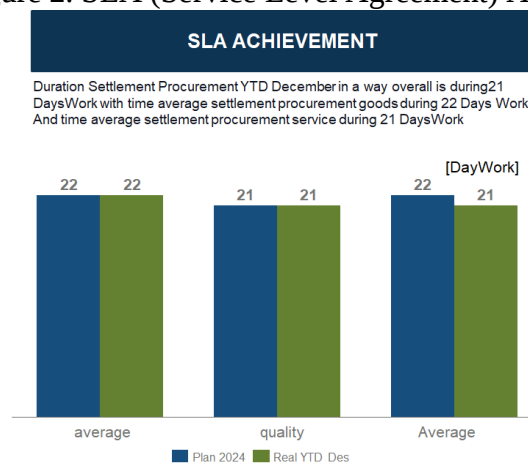


Figure 2 shows the achievement of the SLA (Service Level Agreement) for PT PTK's procurement of goods and services, which is almost in accordance with the plan, namely the average completion duration of around 21-22 working days for goods and services. This indicates that the implementation of e-procurement has been running effectively with consistent completion times between plans and realization. Competent and trained human resources play a crucial role in ensuring that the procurement process runs according to the established time standards, thus optimizing e-procurement can be achieved.

From this data, it can be seen that the role of human resources in managing and implementing the e-procurement system is key to maintaining optimal procurement performance. This success demonstrates that training, supervision, and coordination carried out by human resources can reduce procurement process obstacles, thereby consistently meeting SLA targets. Therefore, improving human resources capacity is crucial for maintaining and improving the effectiveness of the e-procurement system in PT PTK's ship operations.

Figure 3. Procurement Value and Amount

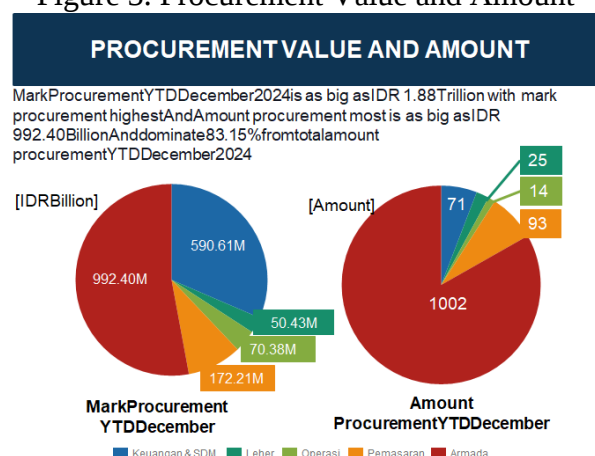


Figure 3 shows the total procurement value reaching IDR 1.88 trillion, with the highest procurement value at IDR 992.40 billion and a total of 1,002 items. This large procurement distribution demonstrates the complex operational scale and the need for careful management in

the procurement of goods and services. Human resources play a crucial role in managing this large procurement volume and value, including data management, supplier evaluation, and digital procurement process control.

The role of human resources is vital to optimizing e-procurement, particularly in ensuring data validity and the smooth running of large and complex procurement transactions. Successful procurement management, which encompasses various categories of goods and services, also reflects the ability of human resources to utilize e-procurement technology, thereby making the process more efficient and transparent. This supports the thesis that improving human resource competency can optimize e-procurement implementation at PT PTK.

Figure 4. Cost Saving Procurement of Goods/Services

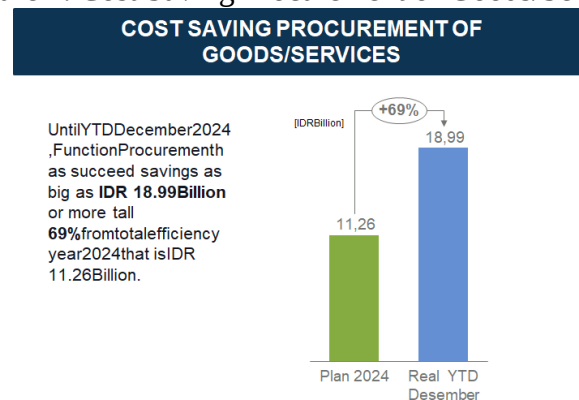


Figure 4 shows procurement cost savings of IDR 18.99 billion, 69% higher than the 2024 plan. This demonstrates the effectiveness of e-procurement in controlling and significantly reducing procurement costs. Human resources who understand the e-procurement system and procurement strategies play a crucial role in achieving these cost efficiencies, including in price negotiations and selecting the right suppliers.

These significant cost savings demonstrate the direct impact of optimal human resource management in implementing the e-procurement system. With trained human resources capable of optimizing e-procurement features, PT PTK can manage the procurement of goods and services more efficiently and effectively. This finding supports the thesis' focus that increasing human resource capacity can drive efficiency and optimize e-procurement implementation.

Figure 5. Procurement Contract Monitoring Goods/Services

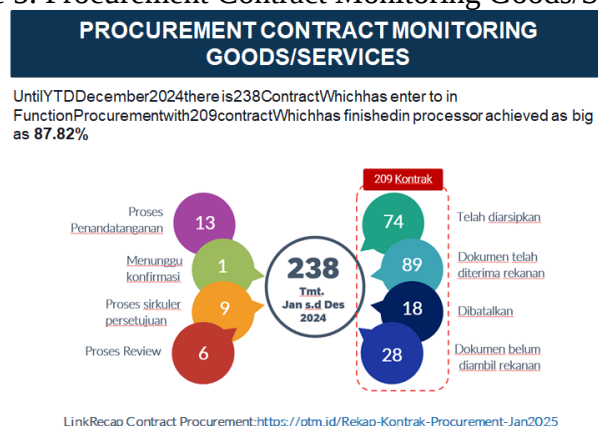


Figure 5 shows procurement contract monitoring data for a total of 238 contracts submitted to the procurement function, of which 209 (87.82%) have been processed or achieved. This data indicates that the effectiveness of contract management in e-procurement is highly dependent on the ability of human resources to digitally monitor and follow up on each contract stage.

This high contract monitoring performance confirms the crucial role of human resources in ensuring every procurement process runs according to schedule and established procedures. With sound human resource management, PT PTK is able to maintain smooth contract administration and control, leading to optimized e-procurement operations. This is relevant to the thesis that enhancing the role of human resources will strengthen e-procurement implementation in ship operations.

Table 1. Monthly Data on Total PR and PO Values and Efficiency in 2024

Month	Total PR Value	Total PO Value	Efficiency 2024 (%)	IDR
January	182,120,839,738.00	181,253,524,051.00	0.48%	867,315,687.00
February	355,842,076,409.00	354,965,300,908.00	0.25%	876,775,501.00
March	77,233,210,354.00	76,169,483,763.00	0.46%	1,063,726,591.00
April	31,127,357,212.00	30,764,879,860.00	1.16%	362,477,352.00
May	38,964,163,731.00	38,512,970,284.00	1.80%	451,193,447.00
June	221,736,063,505.97	217,744,524,343.00	1.83%	3,991,890,072.97
July	46,124,025,250.00	44,405,311,434.00	0.95%	1,718,314,046.09
August	75,293,747,439.00	72,385,261,882.00	3.76%	2,985,485,557.00
September	73,478,796,271.00	74,389,508,509.00	3.76%	1,989,287,757.00
October	44,753,616,863.00	43,833,182,228.00	2.56%	920,434,635.00
November	32,159,948,608.00	32,114,460,961.00	2.45%	1,145,487,647.00
December	715,191,333,460.00	712,493,589,819.00	1.30%	2,697,743,641.09
Grand Total	1,895,025,178,840.97	1,876,032,128,090.97	1.00%	18,993,050,750.97
USD MIO	126.34	125.07	1.00%	1.27

Table 1 displays monthly data on the total value of Purchase Requests (PR) and Purchase Orders (PO) in rupiah, along with the efficiency achieved throughout 2024 in PT PTK's ship operations. The data shows fluctuations in procurement value each month, with peaks in February and August. The efficiency percentages are relatively small but remain positive, reflecting increasingly effective procurement management efforts and cost savings in some months. This data illustrates the role of human resources in managing the procurement process to ensure it remains controlled and financially efficient.

Table 2. Procurement Completion Status Based on Number of PRs

Row Labels	Count of PR
Canceled	15
Canceled PO	1
Returned	1
Done	1224
Hold	2
On Going	57
Grand Total	1300

Procurement Completion 96%

Table 2 shows the distribution of procurement completion status based on the number of Purchase Requests (PR). Of the total 1,300 PRs, the majority (1,224) have been completed (Done), while only a few were canceled, returned, or are still in process (On Going and Hold). This indicates the effectiveness of human resources in completing the procurement process on time and minimizing obstacles, which is an important indicator in optimizing the implementation of e-procurement at PT PTK.

Table 3. Comparison of Manual Procurement and E-procurement (SmartGEP)

Row Labels	Count of PR
Manual	142
Smart GEP	1062
Grand Total	1204
Smart GEP Utilization	88.21%

Table 3 shows a comparison between manual procurement and procurement using the SmartGEP e-procurement system. The majority of procurement was conducted through SmartGEP (1,062 transactions), with only a small portion conducted manually (142 transactions). This indicates that PT PTK's human resources have successfully adopted e-procurement technology extensively, contributing to increased efficiency, transparency, and speed in the procurement process for goods and services in ship operations.

Table 4. Summary of Qualitative and Quantitative Data Results Related to the Implementation of PT. PTK E-Procurement (2024)

No.	Picture/ Table	Data Focus	Key Findings	The Role of HR	Implications
1	Figure 4.1	Procurement Plan List (PPL) Realization	1,204 realizations (127% of target)	HR supports the achievement of high targets in most directorates	Improvements are needed in directorates that are not yet optimal.
2	Figure 4.2	SLA (Service Level Agreement)	Average procurement time 21-22 working days	Trained human resources ensure process times are up to standard	Evidence of the efficiency and effectiveness of e-procurement
3	Figure 4.3	Total Procurement Value	IDR 1.88 Trillion, 1002 items, highest IDR 992 M	HR manages high volume, supplier evaluation, accurate data	Strengthening human resources is important for complex transactions
4	Figure 4.4	Cost Efficiency	Savings of IDR 18.99 Billion (69% above target)	Reliable human resources in negotiation & supplier selection	HR competency affects budget efficiency
5	Figure 4.5	Contract Monitoring	238 contracts, 209 (87.82%) completed	HR monitors digital contracts accurately	Contract performance improves thanks to HR oversight

6	Table 4.1	Total PR & PO Value + Monthly Efficiency	Peak in Feb & Aug, efficiency remains positive	HR manages procurement fluctuations efficiently	Demonstrates adaptive & cost-effective procurement management
7	Table 4.2	Homework Completion Status	1,224 completed out of 1,300 total PRs	HR completed the majority of procurements on time	High process effectiveness, minimal obstacles
8	Table 4.3	Manual vs SmartGEP Comparison	1,062 e-procurement vs 142 manual	HR successfully transitioned to digital systems	Digital transformation is running optimally

Results of Nvivo-Based Qualitative Analysis

The data sources used in this study come from primary data in the form of journals and scientific papers discussing the implementation of e-procurement in shipping companies. The methodology applied is a qualitative approach to gain a deep and comprehensive understanding of the phenomenon studied. The analysis process is assisted by the use of NVivo 12 software, which facilitates data management and organization. In this study, the basis of the study is to explore the role of human resources in optimizing the implementation of e-procurement in PT PTK's ship operations.

Figure 6. Word Cloud



From these words, selections were made to answer the problem formulation in the research, namely as follows.

- a. **E-procurement:** *E-procurement* E-procurement is the process of procuring goods and services electronically through the use of information and communication technology. An e-procurement system utilizes digital platforms to automate and facilitate all stages of procurement, from requirements planning and supplier selection to ordering and payment.
- b. **Internal Factors:** Internal factors of the company that contribute to the implementation of e-procurement in shipping companies.
 - 1) **Management:** the company's managerial ability to plan, organize, direct, and supervise implementation *e-procurement* This includes digital procurement strategies, internal policies, leadership commitment to digital transformation, resource allocation, and

decision-making that supports the efficiency and integrity of e-procurement systems within the shipping company.

- **Services:** the quality and reliability of the company's internal services in supporting e-procurement operations, such as procurement administration services, technical assistance, vendor responsiveness, and inter-departmental support. This also includes the speed and precision of the process of fulfilling goods/service requests through the Shipping Company's digital system.
 - **Performances :** The effectiveness and efficiency of the company's performance in implementing e-procurement, including achieving procurement targets in terms of time, cost, and quality. This includes evaluating the results of using the e-procurement system, its level of utilization by employees, and its impact on the shipping company's operations and business continuity.
 - **Maintenance :** System maintenance effortse-procurementBoth technically and administratively to ensure optimal operation. This includes software and hardware maintenance, system updates, regular HR training, and follow-up on any disruptions or repair needs in the digital procurement process.
- c. **External Factors:** External factors that contribute to the implementation of E-procurement in Shipping Companies.
- 1) **Technology and Information** : Information technology infrastructure, *Software* and hardware, as well as network systems used in e-procurement implementation. This includes the maturity level of IT systems, procurement platform interoperability, cybersecurity, and user capabilities in accessing and effectively utilizing the e-procurement system. This is highly dependent on the readiness of operational digitalization and integration with shipping/logistics systems within the shipping company.
 - 2) **Research and data:** the availability, accuracy, integrity, and utilization of data related to the e-procurement process, as well as research results or scientific studies that support the improvement of the e-procurement system. For example, logistics data, spare parts requirements, supply chain analysis, and digital procurement efficiency studies that form the basis for strategic decision-making by Shipping Companies.
 - 3) **Fraud** : Any form of irregularity, fraud, or manipulation in the E-procurement process carried out by individuals or groups both internally and externally to the shipping company, aimed at gaining personal gain or harming other parties. This includes bribery, collusion between vendors and procurement officials, document falsification, and tender arrangements that violate the principles of transparency and accountability of the e-procurement system.

Figure 7. Coding Contribution



The implementation of an e-procurement system in PT PTK's ship operations plays a strategic role in improving the efficiency and effectiveness of goods and services procurement management. The results show that the e-procurement system not only supports time efficiency and cost reduction, but also strengthens transparency and accountability throughout the procurement process. The success of this e-procurement optimization relies heavily on a strong foundation in the form of the implementation of International Safety Management (ISM) standards and a Planned Maintenance System (PMS) that ensure all ship operational activities are carried out in accordance with strict safety and maintenance procedures. In this regard, the role of human resources is crucial as the main driver capable of operating and managing the system appropriately and adapting to the digital technology used.

Furthermore, internal and external factors within shipping companies contribute significantly to the successful implementation of e-procurement. Internal factors such as strong company management, optimal human resource services and performance, and structured ship equipment maintenance are the main foundations for a smooth procurement process. External factors, on the other hand, include the ability of human resources to maximize the use of information technology, research- and data-driven company policies, and a corporate culture committed to avoiding fraudulent practices. The combination of these factors strengthens the role of human resources in ensuring that e-procurement can be optimized sustainably, thereby supporting PT PTK's ship operations in a more effective, efficient, and transparent manner.

The findings of the NVIVO study indicate that the success of e-procurement implementation is strongly influenced by the readiness and skills of human resources in managing a digitally integrated system. This study identified that ongoing training for human resources, both in terms of understanding the e-procurement system and in terms of using the technology that supports the process, is crucial to increasing implementation effectiveness. Furthermore, knowledge of applicable regulations, such as ISM and PMS, contributes significantly to ensuring that the goods and services procurement system runs according to established safety and maintenance standards. The results also indicate that effective communication between departments and close collaboration between human resources in the technology and operational fields play a crucial role in overcoming technical and administrative challenges that arise during implementation. Therefore, improving the capacity and quality of human resources, through ongoing training and the use of appropriate technology, is the main key to optimizing e-procurement implementation at PT PTK.

Interview Results

This section will present the results of interviews conducted with key informants regarding the implementation of e-procurement in the ship operations of PT Pertamina Trans Kontinental (PT PTK). The first informant is the Procurement Manager, who has 9 years of experience in the procurement of goods and services for ship operations. Holding a Master's degree in Management, he has a deep understanding of the implementation of e-procurement in ship operations and how the system can improve efficiency and transparency in the procurement of goods and services. The second informant is the ICT (Information and Communication Technology) Manager, who is competent in information systems and technology used to support e-procurement. With 7 years of experience in the field of information technology, he holds a Master's degree in Information Technology and plays a key role in the development and implementation of an effective e-

procurement system in the company.

The third informant is the Ship Procurement and Operations Coordinator, who has 6 years of experience in managing the procurement of goods and services for ship operations. Holding a bachelor's degree in Management, he provides practical insights regarding ship operational management related to procurement, as well as how the e-procurement system supports the smooth operation of ships. The fourth informant is the SmartGEP (Smart Government e-procurement) Management Staff, who is competent in managing the e-procurement system used by the company. With 6 years of experience in the field of e-procurement management, he holds a bachelor's degree in Information Systems and provides perspectives regarding the implementation of technology in the e-procurement system, as well as the challenges and benefits obtained during its implementation.

The interviews aimed to explore the understanding, experiences, and challenges faced by human resources in implementing the e-procurement system, including their role in supporting the effective and efficient procurement of goods and services. The information obtained from these interviews is expected to strengthen the findings from NVIVO and provide a realistic picture of the actual conditions on the ground. The following is a summary of the research results:

Table 5. Interview Results

Respondents	Summary of Answers
Procurement Manager (Informant 1)	1) HR plays a very important role in operating an integrated e-procurement system from PR to PO and contracts. 2) There are no significant challenges because the system is already integrated. 3) HR determines the procurement method according to needs. 4) The HR team's performance is very good in using e-procurement. 5) The role of HR has changed significantly to become more effective, efficient and transparent.
ICT (Information and Communication Technology) Manager (Informant 2)	1) The IT division is responsible for developing and maintaining e-procurement applications. 2) Technologies such as the OnePro application are used, with regular training as the system is frequently updated. 3) Technical challenges such as trial and error require adequate technical knowledge. 4) The IT team plays a very important role in system management. 5) There are patch plans to address bugs and errors.
Ship Procurement and Operations Coordinator (Comparative Informant)	1) Key roles in identifying needs, selecting suppliers, negotiating, ordering, and supervising deliveries. 2) <i>e-procurement</i> facilitate better communication and collaboration between procurement, operations, and HR teams. 3) HR is directly involved in e-procurement increasing efficiency, transparency, and accountability compared to traditional methods. 4) Adaptation difficulties related to understanding systems, changes in work culture, and complex data. 5) HR plays a crucial role in improving long-term operational effectiveness and performance.
SmartGEP Manager (Informant from the Technology Implementation Side)	1) SmartGEP supports ship operations and HR management in e-procurement. 2) The main feature is Project request (purchase request). 3) Human resource training is carried out in stages for effective utilization. 4) The main challenges are limited internet access and technology infrastructure on ships, as well as hardware limitations.

Respondents	Summary of Answers
	5) The evaluation shows potential for increased transparency and accountability through SmartGEP.

The interviews above indicate that HR plays a central role in the operation and management of the integrated e-procurement system, from the purchase request process to the contract. Procurement managers stated that HR's role has become more effective, efficient, and transparent thanks to the integrated system, eliminating significant operational challenges. The IT division supports the system by developing and maintaining applications, while also conducting regular training to address emerging technical challenges, such as bugs and errors. Procurement HR is also directly involved in the process of identifying needs, selecting suppliers, and overseeing deliveries, aided by the ease of communication and collaboration between teams through e-procurement.

However, while e-procurement brings increased efficiency and accountability, several challenges remain, particularly in terms of human resource adaptation to changing work cultures and data complexity. From a technological perspective, limited internet access and infrastructure on ships are key challenges affecting system optimization, such as the use of the SmartGEP platform. Nevertheless, evaluations of this technology's use demonstrate significant potential for improving the transparency and effectiveness of procurement and human resource management. Therefore, incremental training and infrastructure improvements are key recommendations to support the sustainability and optimization of e-procurement in ship operations.

In addition to the main respondents, the researcher also interviewed six related employees to compare the management of goods and services before and after SmartGEP. The procurement employees interviewed included Purchasing (5 years, Bachelor's degree in Management/Logistics), Receiving (3 years, Bachelor's degree in Management/Logistics), and Contract (3 years, Bachelor's degree in Law/Management). From the Human Capital (HC) department, the interviewees were Quality (5 years, Bachelor's degree in Psychology/HR), HC Operation (3 years, Bachelor's degree in Management/Psychology), and Business Partner (4 years, Bachelor's degree in Management/Psychology). These interviews provided perspectives on management changes following the implementation of SmartGEP.

Table 6. Employee Interview Results

Aspect	Conditions Before e-procurement	Conditions After e-procurement	Evaluation & Recommendations
Procurement Process	Manual, lots of paper documents, slow, long approval process	Faster, neater, easier to track, clear responsibilities	The process is more transparent, faster, more accurate and easier to monitor.
HR Challenges	Difficult coordination, delays, missing documents, non-transparency	Adaptation is not yet even, technical constraints, training is still lacking	Need regular training, clear guidance, mentoring new users
Work System & Communication	Face to face, phone, email; often asynchronous and inefficient	Centralized data, easy communication, faster and more efficient collaboration	Periodic evaluation and collaboration between divisions need to be strengthened

Aspect	Conditions Before e-procurement	Conditions After e-procurement	Evaluation & Recommendations
The Role of HR	Administration, record keeping, coordination between teams	Focus on system monitoring, user training, ensuring SOPs	Focus on developing digital skills and improving competencies
HR Training	Limited, usually internal or direct work experience learning	Regular training, workshops, system socialization	Further training and mentoring for new users is essential.

The interview results above indicate that before the implementation of e-procurement, the procurement process was conducted manually, using numerous paper documents, resulting in slow processes and frequent delays in approvals. Work and communication systems still relied on face-to-face meetings, phone calls, and emails, which were often asynchronous, resulting in ineffective coordination between teams. The role of HR focused more on administration, record-keeping, and coordination, with limited training generally based on hands-on experience.

After SmartGEP was implemented, the procurement process became faster, more organized, and easier to track, with clear responsibilities. The work system shifted to centralized data, simplifying communication and streamlining collaboration between departments. The role of HR became more strategic, focusing on system oversight, user training, and ensuring compliance with SOPs. Regular training and outreach are crucial for improving HR competency. However, HR adaptation to the new system remains uneven, and technical challenges persist. Therefore, the main recommendations are regular training, providing clear guidance, and providing intensive support for new users, as well as evaluating and strengthening collaboration between departments to maximize SmartGEP implementation.

Discussion of Research Results

The success of e-procurement is also reflected in the consistent achievement of Service Level Agreement (SLA) with an average completion duration of around 21-22 working days, indicating that the procurement process is running effectively and according to the established time standards. The procurement value reached IDR 1.88 trillion with a procurement volume of 1002 items, indicating a large and complex scale of operations. Human resources play a vital role in managing data, evaluating suppliers, and controlling this complex procurement process digitally. In addition, cost savings of IDR 18.99 billion or 69% higher than the plan confirms the effectiveness of e-procurement in controlling costs, where the role of human resources who understand the procurement system and strategy is the key to successful price negotiations and selecting the right supplier.

Contract monitoring also showed positive results with 87.82% of the total 238 contracts having been processed, indicating the effectiveness of contract management through a digital system that is highly dependent on human resource capabilities. Other quantitative data shows that the majority of procurements have been completed on time with few cancelled or delayed transactions, as well as the dominance of the use of the SmartGEP system compared to manual procurement. This indicates that PT PTK's human resources have successfully adopted and optimized e-procurement technology to increase transparency, speed, and accuracy of the procurement process, while maintaining financial and operational efficiency that supports the smooth operation of the ship.

The results of data analysis showing the successful implementation of e-procurement at PT

Pertamina Trans Kontinental (PT PTK) align with previous research findings that emphasize the importance of HR in optimizing digital systems in the procurement sector.(Amanah & Naji, 2024) emphasized that e-HRM supported by competent human resources can improve operational performance, including in the procurement of goods and services, as clearly seen from the achievement of procurement targets that were higher than planned. Furthermore,(Shaharudin et al., 2021)also shows that the use of ERP in procurement management can increase the transparency and efficiency of the procurement process, which is relevant to the achievement of Service Level Agreements (SLAs) and significant cost savings at PT PTK.(Suliantoro & Ririh, 2019)also stated that the ability of human resources in managing technology and data is very important in controlling costs and managing contracts effectively, as reflected in the management of contracts that have been effectively processed through the SmartGEP digital system.(Fadhil & Al Husseini, 2023)He added that effective e-HRM implementation not only improves procurement but also supports sustainable human resource management, which plays a role in enhancing procurement competencies and strategies. Therefore, trained and competent human resources are key to maximizing e-procurement's potential in improving operational efficiency and effectiveness in the maritime sector, as has been the case at PT PTK.(Maemunah et al., 2023)

Research by PT PTK shows a significant improvement in procurement performance after implementing an e-procurement system, with transactions exceeding targets by up to 27% and some units even achieving outstanding results. These findings align with the Asli study.(Gurgun et al., 2024) which states that the integration of e-procurement procedures in the construction supply chain requires strong synergy between technology and human resources (HR) so that the process can run effectively and efficiently. Competent HR capabilities are a key factor in optimizing digital systems so that procurement targets can be achieved optimally, while also addressing performance disparities between units, as also emphasized by(Kumaladewi et al., 2015)

The analysis using NVivo shows that internal company factors contribute significantly more to the success of e-procurement implementation than external factors. Data collected from coding revealed 65 items related to internal factors, such as company management, HR performance, and system maintenance, while external factors, such as technology, research data, and fraud prevention, accounted for 52 items. This indicates that managerial aspects and internal resource management are key factors in determining the effectiveness of e-procurement, including the role of leadership and internal policies in driving sustainable digital transformation.(Firmansyah & Maemunah, 2021)

Human resource performance has emerged as one of the most dominant variables influencing the success of e-procurement. Skilled and trained human resources are able to optimize the use of digital systems, making the procurement process more efficient and accurate. Conversely, a lack of human resource capabilities will create obstacles in the implementation of this system. Furthermore, responsive company management committed to human resource development and adequate resource allocation are also vital. Routine system maintenance and ongoing training are essential components to ensure e-procurement remains adaptive to technological changes and operational needs.(Maemunah & Pasha, 2021)

From an external perspective, information technology and research data integrity were also key concerns in the NVivo analysis. Adequate IT infrastructure and a robust oversight system are necessary to prevent fraud and increase transparency in the procurement process. The analyzed data emphasized the need for real-time monitoring and the use of security technology to maintain system reliability. These findings reinforce the importance of synergy between internal and external aspects in implementing e-procurement, with specific recommendations for human

resource capacity development and sound technology management as key foundations for successful implementation in shipping companies.

The analysis results show that internal company factors, particularly management, HR performance, and system maintenance, have a greater contribution to the success of e-procurement implementation, in line with findings from previous studies that emphasize the important role of HRM in digital transformation. As explained by Naji and Amanah (2024), good e-HRM enables organizations to improve strategic agility and adapt to change, which is crucial in the context of implementing e-procurement in the ship operations sector. Furthermore, research by Fadhil and Al Husseini (2023) confirms that sustainable HR development and effective e-HRM implementation play a significant role in achieving organizational sustainability and efficiency goals, which is relevant to the findings regarding the importance of HR skills in managing e-procurement systems. Research by Shaharudin et al. (2021) also shows that ERP integration into procurement systems contributes to improved supply chain performance, which aligns with findings demonstrating the need for regular system maintenance to keep e-procurement adaptive to technological changes. Furthermore, the importance of information technology and data security in e-procurement, as mentioned in the NVivo analysis, is also supported by Suliantoro and Ririh (2019), who emphasized the need for robust IT infrastructure and strict oversight to prevent fraud and increase transparency. Finally, research by Leisthari et al. (2025) stated that skilled digital skills in human resources are a key factor in increasing productivity in implementing digital systems, including in the context of efficient e-procurement management.

The results of the qualitative analysis using NVivo confirm the finding that internal company factors, particularly human resource management, play a dominant role in the success of e-procurement implementation. This is consistent with the results of a study by Idrees (2022) using the Structural Equation Model (SEM) and confirming the significant positive influence of e-procurement on procurement practices and performance, with trained human resources as the primary mediator in optimizing technology and business processes. The role of human resources, which is not only technical but also strategic in supplier selection, cost control, and contract monitoring, as seen at PT PTK, is clear evidence of the importance of human resources in digital systems.

Interviews with key informants indicate that human resources (HR) play a central role in the operation and management of the integrated e-procurement system, from the Project Request (Purchase Request) process to the Purchase Order (PO) and contract. According to the Procurement Manager, the integrated system makes HR's role more effective, efficient, and transparent without facing significant operational challenges. The Information Technology Division is responsible for developing and maintaining the e-procurement application, including providing regular training to address technical challenges such as bugs and errors. The role of HR in procurement is very significant in the process of identifying needs, selecting suppliers, and monitoring deliveries, with ease of communication and collaboration between teams supported by the digital system.

Despite this, several challenges remain, particularly related to human resource adaptation to changing work culture and data complexity in e-procurement. From a technological perspective, limited internet access and infrastructure on board ships are major obstacles to system optimization, particularly in the use of the SmartGEP platform. However, evaluations indicate that this technology has significant potential to improve transparency and accountability in procurement management and the role of human resources. Therefore, gradual training and infrastructure improvements are important recommendations to support the sustainability and

optimization of e-procurement implementation.

Interviews with employees also revealed significant changes in the management of goods and services before and after the implementation of SmartGEP. Prior to e-procurement, procurement processes were manual, with numerous paper documents, slow processes, and frequently delayed approvals. Work and communication systems relied on face-to-face meetings, phone calls, and emails, which lacked synchronization and ineffective coordination. After SmartGEP was implemented, processes became faster, more structured, easier to track, and responsibilities became clearer. Communication shifted to centralized data, facilitating collaboration between departments. The role of HR shifted from an administrative focus to system oversight, user training, and strengthening SOP compliance. Despite progress, uneven human resource adoption and technical challenges still require attention. Therefore, regular training, clear guidance, and intensive mentoring are highly recommended to maximize the benefits of SmartGEP and strengthen collaboration between departments.

Interviews with key informants indicate that human resources (HR) play a key role in the implementation and management of an integrated e-procurement system, encompassing processes from Project Requests to Purchase Orders (POs) and contracts. Research by Naji and Amanah (2024) demonstrates that effective HR management through e-HRM can improve efficiency and transparency in organizational operations, a finding also evident in the implementation of e-procurement, which facilitates communication and collaboration between teams at PT PTK. Furthermore, Fadhil and Al Hussein (2023) emphasize the importance of continuous HR competency development to support more effective procurement management, which aligns with the findings of this study, which demonstrate the importance of regular training to address technical challenges on the SmartGEP platform. However, Shaharudin et al. (2021) revealed that technological constraints such as limited internet access and inadequate infrastructure on ships remain major obstacles to optimizing the use of digital platforms, a finding also identified in this study.

Further research by Suliantoro and Ririh (2019) also noted that organizational values that are adaptive to changes in work culture significantly influence the successful adoption of e-procurement, as reflected in the finding that changing from a manual procurement system to a digital system requires significant adaptation time for human resources. Therefore, gradual training and infrastructure improvements are highly recommended to overcome this obstacle. Similar findings were also expressed by Leisthari et al. (2025), who showed that digital skills in human resources are crucial to maximizing the benefits of technology, as seen in the faster and more structured changes in the procurement management system after the implementation of SmartGEP. Human resources in PT PTK need to continue to be provided with intensive training and mentoring to ensure the sustainability and optimization of e-procurement implementation, especially in sectors that face infrastructure challenges and work culture adaptation.

Interviews at PT PTK revealed challenges adapting to work culture and technology infrastructure, particularly limited internet access on ships. This parallels the findings (Budiman, 2019) and (Hilmy, 2020) which identified technical barriers and work culture as inhibiting factors in optimizing e-procurement in the shipping and ship procurement industry. Recommendations for ongoing training and infrastructure improvements are key to ensuring sustainable digital transformation and ensuring e-procurement truly improves procurement transparency, speed, and efficiency in maritime companies.

CONCLUSION

The implementation of e-procurement in PTK vessel operations has shown significant results in accelerating the procurement process and improving work efficiency. By integrating digital platforms such as SmartGEP, PTK has successfully automated the entire procurement process from purchase requests to contract management, directly increasing transparency and accountability. Furthermore, the achieved efficiencies have also reduced operational costs and enabled better budget control, ultimately contributing to cost savings. Although several technical challenges remain, such as limited technological infrastructure on board vessels and challenges in adapting human resources to digital changes, the implementation of e-procurement has had a positive impact on the smooth operation of vessels. Therefore, PTK needs to continue to focus on strengthening infrastructure and training human resources to overcome these challenges and strengthen and optimize this system in the future.

Human resources play a crucial role in the successful implementation of e-procurement in PTK, both in system operation and in supporting the implementation of work culture changes that occur during the digital transition. The competence of trained human resources in managing e-procurement is key to maintaining procurement efficiency and accuracy. Their role extends beyond data input and contract implementation oversight, but also ensures that all procurement stages follow established procedures. Furthermore, human resources act as a liaison, facilitating communication and collaboration between divisions, which is crucial for creating better integration between various parts of the organization. Therefore, developing human resource capacity through regular training and digital skills enhancement is essential. Therefore, PTK must strengthen its human resource development policies, including providing ongoing training, direct mentoring, and ensuring that all employees have the ability to adapt to ever-changing technological developments. The success of e-procurement implementation in PTK depends heavily on the extent to which human resources can manage and maximize the use of this technology optimally.

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