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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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Abstract: 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.

Keyword: Human Resources, e-Procurement, Optimization, Ship Operations, Procurement Digitalization.

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 across various sectors, particularly in terms of technology and process optimization, the role of Human Resources (HR) in its implementation and optimization within the maritime sector, particularly in ship operations, remains underexplored. Research by (Amanah & Naji, 2024) emphasized that e-HRM (Electronic Human Resource Management) can enhance an organization's ability to quickly adapt to dynamic environmental changes and improve operational efficiency. However, the lack of focus on HR in the context of e-procurement in maritime operations presents a significant gap that warrants further investigation. Similarly, (Fadhil & Al Husseini, 2023) highlighted the importance of e-HRM in sustainable HR management but their research focused primarily on the public sector, without considering the unique challenges HR faces in the maritime industry, which requires adaptation to technological management in ship operations.

Moreover, while technologies such as ERP (Enterprise Resource Planning) and SNA (Social Network Analysis) have been shown to improve procurement performance in various industries (Shaharudin et al., 2021), application of these technologies in the procurement of goods and services for ships at PT Pertamina Trans Kontinental has not been sufficiently addressed. Suliantoro and Ririh (2019) found that organizational values, such as polychronicity and organizational learning capacity, significantly impact e-procurement adoption, but their study primarily focused on the government sector. This further underscores the need to explore how HR can enhance the adoption and optimization of e-procurement systems at PT Pertamina Trans Kontinental, particularly in terms of HR training, organizational culture adaptation, and the improvement of technological infrastructure. (Leisthari et al., 2025) demonstrated that digital skills development within HRM strategies is essential for boosting productivity, though their research centered more on the industrial sector in general, leaving a gap in understanding the role of HR in the maritime industry's adoption of e-procurement.

There is also a limited focus on the obstacles and challenges faced by shipping companies when implementing e-procurement systems, particularly in terms of overcoming bureaucratic procurement processes. (Dixit & Agrawal, 2020) discussed procurement integration in ship projects and game theory in procurement policy, yet their research often focused on ship project management and procurement policy rather than practical applications of e-procurement technology in ship operations. Additionally, (Gurgun et al., 2024), identified barriers to e-procurement adoption in the construction sector, but similar challenges within the maritime sector have not been thoroughly explored. Research by (Faturrahman, 2024) further emphasizes the lack of studies on digital system adoption for the procurement of goods and services in the maritime industry. Therefore, the study titled "The Role of Human Resources (HR) in Increasing the Optimization of E-procurement Implementation in PT Pertamina Trans Kontinental's Ship Operations" seeks to fill this gap by exploring how e-procurement can address current constraints in procurement and improve the efficiency of ship operations. (Yuswantoro et al., 2022). This study uses a qualitative descriptive approach to provide a comprehensive and systematic understanding of e-procurement implementation, while identifying solutions to overcome challenges in the maritime procurement process. (Pudjijono et al., 2022).

METHOD

This research adopts a qualitative descriptive approach, focusing on understanding social phenomena through the analysis of the implementation of e-procurement in the operations of PT. Pertamina Trans Kontinental's vessels. According to (Suliyanto, 2020), qualitative research aims to provide an in-depth understanding of social phenomena by revealing the meanings and dynamics behind them. Rooted in interpretivism and constructivism, this research seeks to explore the perspectives of individuals or groups involved in the phenomenon of e-procurement adoption in ship operations. The study aims to optimize the procurement of goods and services

using a digital platform that enhances cost efficiency, reduces procurement delays, and improves transparency. This approach includes data collection methods such as literature review, direct observation, in-depth interviews, and documentation to ensure comprehensive analysis and findings.

The study first conducted a literature review to analyze secondary data from relevant sources such as journals, laws, regulations, and statistical data regarding the implementation of e-procurement in maritime operations (Umar, 2018) Additionally, direct observations of the procurement process at PT. Pertamina Trans Kontinental provided real-time insights into the e-procurement system’s effectiveness and challenges. In-depth interviews were conducted with key informants, including procurement and ICT managers, ship operational procurement coordinators, and HR staff, using 39 specific questions tailored to each informant’s role. These interviews were analyzed using thematic analysis, which involved transcribing responses verbatim, coding key phrases, and grouping them into main themes such as system effectiveness, challenges, and HR competencies. Data visualizations, including bar charts and word clouds, were employed to illustrate recurring themes and improve the understanding of interview results (Sugiyono, 2024)

NVIVO software was utilized for data analysis, enabling the systematic management, coding, and categorization of qualitative data. According to (Hosea & Susilawati, 2023) NVIVO's analytical process involves three stages: Planning, Conducting, and Reporting. During the Planning stage, research questions were formulated, and criteria for data collection were established. In the Conducting stage, literature was gathered and organized using NVIVO to extract key information. Finally, the Reporting stage used thematic analysis and data visualizations to identify patterns and draw conclusions. This method allowed for a more efficient and accurate analysis, ultimately providing valuable insights into the role of HR in optimizing e-procurement implementation in PT. Pertamina Trans Kontinental’s ship operations, contributing to the improvement of procurement processes and competitiveness in the maritime sector.

RESULTS AND DISCUSSION

Qualitative 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.

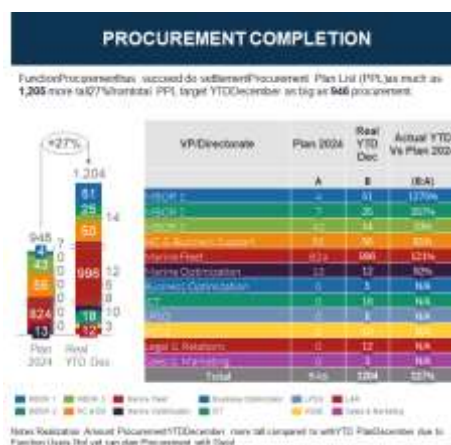


Figure 1. Procurement Completion

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.

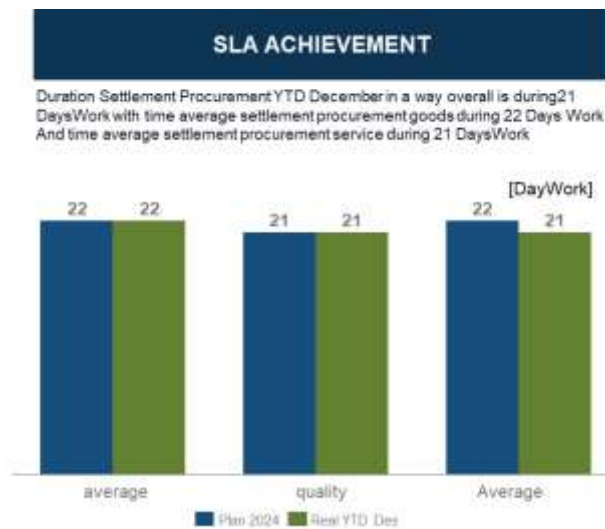


Figure 2. SLA Achievement

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.

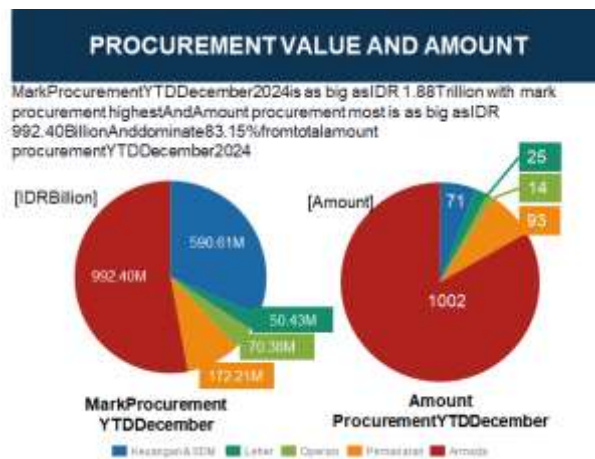


Figure 3. Procurement Value and Amount

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.

This supports the thesis that improving human resource competency can optimize e-procurement implementation at PT PTK.

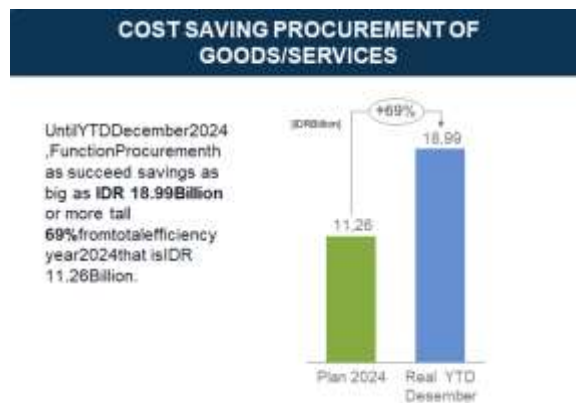


Figure 4. Cost Saving Procurement of Goods/Services

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

Bulan	Total Nilai PR	Total Nilai PO	Efisiensi 2024		
			%	Rp	
January	182,129,839,738.00	181,213,524,051.00	0.48%	907,315,687.00	
February	355,842,035,409.00	354,965,300,868.00	0.25%	876,735,541.00	
March	77,334,210,354.00	76,549,483,764.00	1.88%	1,004,726,589.00	
April	31,127,917,212.00	30,754,879,665.00	1.18%	363,037,547.00	
May	38,364,163,731.00	38,112,370,394.00	1.12%	401,793,337.00	
June	211,114,803,595.00	211,744,754,613.00	1.80%	3,091,950,977.00	
July	46,114,025,750.00	44,465,713,354.00	1.73%	1,718,312,396.00	
August	75,281,947,419.00	73,345,291,882.00	3.88%	2,936,655,537.00	
September	73,478,795,271.00	71,489,508,687.00	2.71%	1,989,286,584.00	
October	44,753,656,863.00	43,833,183,228.00	2.08%	920,473,635.00	
November	61,139,948,608.00	57,034,460,965.00	3.41%	1,145,487,643.00	
December	713,181,185,460.00	712,489,289,813.00	0.38%	2,007,743,647.00	
Grand Total	Rupiah 3,889,025,178,840.00	3,876,032,138,096.00	1.02%	18,093,050,730.87	
	1293 MRD	1296 MR	125.07	1.18%	1.18%

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
Batal	15
Batal PO	1
Dikembalikan	1
Done	1224
Hold	2
On Going	57
Grand Total	1300
Penyelesaian Pengadaan	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
Utilisasi SMART GEP	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/ Tabel	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	Tabel 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	Tabel 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	Tabel 4.3	Manual vs SmartGEP Comparison	1,062 e-procurement vs 142 manual	HR successfully transitioned to digital systems	Digital transformation is running optimally

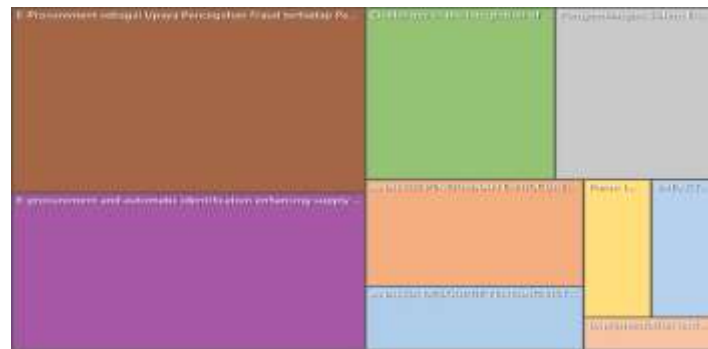


Figure 7. Coding Contribution

The implementation of an e-procurement system at PT PTK plays a vital strategic role in enhancing the efficiency and effectiveness of goods and services procurement management in ship operations. The system contributes to time efficiency, cost reduction, and strengthens transparency and accountability throughout the procurement process. Its success is closely tied to the implementation of International Safety Management (ISM) standards and a Planned Maintenance System (PMS), which ensure that ship operations are conducted in compliance with strict safety and maintenance procedures. Human resources play a critical role in managing and operating the system effectively, ensuring that the digital technology used is properly adapted to the company's needs. Internal factors such as strong company management, optimal human resource services, performance, and structured equipment maintenance contribute to a smooth procurement process, while external factors, such as IT readiness and research-driven policies, further strengthen the system.

The NVIVO study highlights that the success of e-procurement is heavily influenced by the readiness and skillset of human resources in managing the integrated digital system. Ongoing training is essential for enhancing HR's understanding of the e-procurement system and the supporting technologies. Knowledge of regulations like ISM and PMS is also crucial for maintaining safety and operational standards in the procurement process. Effective communication between departments and close collaboration between human resources in the technology and operations fields are key in addressing challenges during implementation. The findings indicate that improving the capacity and quality of human resources through continuous training and the use of appropriate technology is fundamental to optimizing the implementation of e-procurement at PT PTK.

Interview Results

This section presents the results of interviews with key informants regarding the implementation of e-procurement in PT Pertamina Trans Kontinental's (PT PTK) ship operations. The first informant, the Procurement Manager, has 9 years of experience and a Master's degree in Management, providing valuable insights into how e-procurement improves procurement efficiency and transparency. The second informant, the ICT Manager, holds a Master's degree in Information Technology and has 7 years of experience in supporting e-procurement through technology. The third informant, the Ship Procurement and Operations Coordinator, with 6 years of experience and a Bachelor's degree in Management, shared practical insights into how the e-procurement system supports ship operations. The fourth informant, the SmartGEP Management Staff, brings 6 years of experience in e-procurement management and a Bachelor's degree in Information Systems, offering perspectives on the system's challenges and benefits. These interviews aim to explore the experiences, understanding, and challenges faced by human resources in implementing the e-procurement

system, providing a realistic picture of its impact on the procurement process, and complementing the findings from NVIVO analysis.

Table 5. Interview Results

Respondents	Summary of Answers
Procurement Manager (Informant 1)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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. 5) The evaluation shows potential for increased transparency and accountability through SmartGEP.

The interviews highlight that HR plays a central role in managing and operating the integrated e-procurement system, improving efficiency, transparency, and collaboration from the purchase request to the contract stage. HR is actively involved in identifying needs, selecting suppliers, and overseeing deliveries, with support from the IT division in system development and maintenance, including regular training to address technical issues. However, challenges such as adapting to new work cultures, data complexity, and limited internet access on ships hinder system optimization. Despite these issues, the potential of the SmartGEP platform to improve procurement transparency and effectiveness is evident, and recommendations include ongoing training and infrastructure improvements to support e-procurement's sustainability and optimization 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.

Tabel 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
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

The implementation of e-procurement at PT Pertamina Trans Kontinental (PT PTK) has proven to be highly successful, reflected by the significant improvements in procurement performance and efficiency. The procurement process has met the Service Level Agreement (SLA) with an average completion time of around 21-22 working days, demonstrating its effectiveness and adherence to time standards. With a procurement value of IDR 1.88 trillion and 1002 items procured, PT PTK has demonstrated a large and complex scale of operations, where human resources play a crucial role in managing data, evaluating suppliers, and controlling the procurement process digitally. The cost savings of IDR 18.99 billion, 69% higher than the planned target, further underline the effectiveness of the e-procurement system in controlling costs. The key to successful price negotiations and supplier selection lies in the human resources who are well-versed in the procurement system and strategy (Amanah & Naji, 2024)

Moreover, the effective contract monitoring system at PT PTK is evident, with 87.82% of the total 238 contracts processed, highlighting the successful implementation of contract management through digital systems. This success is also visible in the timely completion of the majority of procurements, with few cancellations or delays. The dominance of the SmartGEP system over manual procurement methods reinforces the efficiency of digital systems and demonstrates how PT PTK's human resources have effectively adopted and optimized the system. This shift has increased transparency, speed, and accuracy, while maintaining financial and operational efficiency, which is essential for the smooth operation of the ships (Shaharudin et al., 2021)

These results align with the findings from previous studies on e-procurement, emphasizing the importance of human resources in optimizing digital systems in procurement. For instance, research by (Suliantoro & Ririh, 2019) found that the ability of human resources to manage technology and data is pivotal for controlling costs and managing contracts effectively. Similarly, (Fadhil & Al Hussein, 2023) highlighted that effective e-HRM implementation not only improves procurement but also enhances sustainable human resource management, a critical factor in improving procurement competencies and strategies (Maemunah et al., 2023). The integration of e-procurement systems, as demonstrated in PT PTK's case, supports the claim that competent human resources are key to maximizing the potential of digital procurement systems in improving operational efficiency and effectiveness in the maritime sector.

Furthermore, PT PTK's experience with e-procurement confirms the significant improvement in procurement performance, with some units achieving outstanding results, exceeding procurement targets by up to 27%. This finding is consistent with the research by (Gurgun et al., 2024) which stresses that the integration of e-procurement procedures in supply chains requires strong synergy between technology and human resources to achieve effective and efficient operations. Competent human resources are crucial in optimizing digital systems to meet procurement targets and addressing performance disparities across different units (Kumaladewi et al., 2015)

The qualitative analysis using NVivo has shown that internal company factors, such as management, HR performance, and system maintenance, contribute more significantly to the success of e-procurement than external factors like technology and fraud prevention. In particular, leadership and internal policies have played a crucial role in driving digital transformation and ensuring the effectiveness of e-procurement systems. Human resource performance is one of the dominant variables influencing the success of e-procurement, as skilled and trained human resources are able to optimize the use of digital systems, making the procurement process more efficient and accurate (Firmansyah & Maemunah, 2021)

Despite the positive results, some challenges remain, particularly concerning human resource adaptation to new work cultures and the complexity of managing data in e-procurement systems. Technological challenges such as limited internet access on ships also pose barriers to optimizing the system. However, research by Shaharudin et al. (2021) emphasized that these barriers can be overcome with ongoing training and infrastructure improvements. PT PTK's experience mirrors these findings, as the company has been able to address these issues through regular training and system maintenance, which is vital to ensuring that the e-procurement system remains adaptive to technological changes and operational needs (Suliantoro and Ririh (2019),

In interviews with key informants, it was revealed that human resources play a critical role in the management of the integrated e-procurement system. From project requests to purchase orders and contracts, HR has become increasingly effective and efficient, thanks to the SmartGEP platform. The role of HR has shifted from traditional administrative tasks to system oversight, user training, and ensuring compliance with standard operating procedures (SOPs). However, challenges related to the adaptation of work culture and infrastructure

limitations still need to be addressed, and continuous training, clear guidance, and intensive mentoring are necessary to maximize the benefits of SmartGEP (Fadhil & Al Husseini, 2023).

Interviews with employees at PT PTK highlighted significant improvements in procurement management since the implementation of SmartGEP. The manual procurement processes, which were previously slow and dependent on paper documents, have been replaced with a more structured, faster, and easier-to-track digital system. The shift has made responsibilities clearer and communication more centralized, which has facilitated collaboration across departments. While the adoption of e-procurement has been successful, uneven human resource adoption and technical challenges remain, necessitating further support through training and mentoring (Maemunah & Pasha, 2021)

Finally, interviews with key informants emphasized that human resources are central to the success of integrated e-procurement systems at PT PTK. As demonstrated by previous research, effective HR management through e-HRM leads to improved efficiency and transparency in procurement processes (Naji & Amanah, 2024). However, technical constraints, such as limited internet access and inadequate infrastructure, continue to pose challenges to full optimization of the system. Ongoing efforts to overcome these challenges through infrastructure improvements and comprehensive HR training are necessary to ensure the sustainability and effectiveness of e-procurement in maritime operations (Budiman, 2019)And(Hilmy, 2020)

CONCLUSION

The implementation of e-procurement in PTK vessel operations has significantly accelerated the procurement process, improved work efficiency, and enhanced transparency and accountability by automating the entire process, from purchase requests to contract management, through platforms like SmartGEP. This transformation has also led to reduced operational costs and better budget control, resulting in substantial cost savings. However, challenges such as limited technological infrastructure on board vessels and the need to adapt human resources to digital changes remain. Therefore, PTK must continue strengthening its infrastructure and focus on human resource development, including regular training and digital skills enhancement. The success of e-procurement largely depends on the competence of trained human resources in managing and optimizing this technology, ensuring procurement efficiency, and facilitating seamless integration across the organization. This will require ongoing mentoring and training to enable staff to adapt to evolving technologies and ensure the continued success of the system.

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