Jurnal Teknologi Transportasi dan Logistik Volume 7 No 1, Juni 2026
p-ISSN 2716-2990; e-ISSN 2745-8954

OPTIMIZATION OF PORT TERMINAL OPERATIONS: A CASE STUDY OF ANALYSIS OF EXPORT–IMPORT DOCUMENT DIGITALIZATION TO IMPROVE LOGISTICS EFFICIENCY

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ABSTRACT

The rapid development of information technology has encouraged logistics companies to adopt digital systems to improve operational efficiency. Export–import document management is one of the logistics activities that significantly benefits from digital transformation. This study aims to analyze the implementation of export–import document digitalization at PT Lini Trans Sejahtera Denpasar and formulate appropriate strategies to enhance logistics efficiency. The study employed a descriptive quantitative approach using observation, interviews, questionnaires, and documentation. Data were analyzed through comparative analysis and SWOT analysis supported by IFAS and EFAS matrices. The results indicate that digitalization improves processing speed, reduces administrative errors, enhances accessibility, and strengthens data security. The SWOT analysis generated an IFAS score of 2.81 and an EFAS score of 2.74, placing the company in Quadrant I, indicating a strong position to pursue aggressive growth strategies. Strategic priorities include optimizing Transportation Management Systems (TMS) and Warehouse Management Systems (WMS), expanding cooperation with exporters, enhancing specialized export–import services, and integrating artificial intelligence and blockchain technologies. The study concludes that export–import document digitalization positively contributes to logistics efficiency and strengthens organizational competitiveness in the logistics industry.

Keywords: digitalization; export-import documents; logistics efficiency; logistics management; SWOT analysis

INTRODUCTION

Globalization and international trade have increased the complexity of logistics operations worldwide. Efficient logistics systems are essential to ensure the smooth movement of goods, information, and financial resources across international supply chains. One of the critical components supporting international logistics activities is export–import documentation, which serves as a legal and administrative requirement throughout the trade process. Traditionally, export–import documents were processed manually, involving paper-based administration, physical verification, and repetitive data entry activities. These practices often resulted in delays, increased operational costs, and a higher risk of administrative errors. The growing demand for faster and more transparent logistics services has encouraged organizations to adopt digital technologies in document management processes.

Digitalization refers to the application of information technology to transform conventional processes into integrated electronic systems. In logistics operations, digitalization enables organizations to automate documentation processes, improve information accessibility, facilitate communication among stakeholders, and strengthen operational transparency. Nuralam et al. (2023), digital logistics systems can improve operational effectiveness while reducing inefficiencies throughout the supply chain. Djanitey (2018) reported that paperless document systems significantly improve work efficiency in export-related activities. The Indonesian logistics sector has experienced increasing pressure to modernize administrative processes due to government initiatives promoting electronic customs systems and digital trade facilitation. Platforms such as CEISA 4.0 have encouraged logistics service providers to adopt digital documentation practices. However, the effectiveness of implementation varies among

companies depending on technological readiness, organizational capabilities, and external environmental conditions.

PT Lini Trans Sejahtera Denpasar is a freight forwarding company providing export–import logistics services through sea, air, and land transportation. To support operational activities, the company has implemented several digital platforms for shipment management, customer services, customs documentation, and internal administration. Despite these developments, challenges related to technology adoption, system reliability, and human resource capabilities remain relevant. Several previous studies have discussed digital transformation in logistics. Ministry Of Education And Science Of Ukraine Artificial Intelligence As A Tool To Protect The Economy From Disinformation : Innovative Solutions And International Practices Collective Monograph (2025) highlighted the role of digitalization in improving import–export performance and supporting sustainable logistics systems. Lebid et al. (2021) also emphasized that digital customs systems contribute significantly to administrative efficiency and trade facilitation. Nevertheless, studies focusing specifically on freight forwarding companies in regional logistics environments remain limited. Therefore, this study aims to analyze the implementation of export–import document digitalization at PT Lini Trans Sejahtera Denpasar, evaluate its impact on logistics efficiency, and formulate strategic recommendations based on SWOT analysis.

The increasing volume of international trade transactions has also intensified the demand for accurate and timely document processing. Export–import activities involve various documents such as commercial invoices, packing lists, bills of lading, certificates of origin, customs declarations, and regulatory compliance documents. Any delay or inaccuracy in the preparation and submission of these documents may disrupt cargo movement, increase storage costs, and negatively affect customer satisfaction. Therefore, logistics service providers are required to develop efficient documentation systems that can support operational continuity while maintaining compliance with national and international trade regulations. Digital technologies offer practical solutions to these challenges by enabling automated workflows, centralized databases, and real-time information exchange among stakeholders involved in logistics activities.

Furthermore, the adoption of digital documentation systems has become an important factor in enhancing organizational competitiveness within the logistics industry. Companies that successfully implement digital solutions are generally able to improve service quality, increase responsiveness to customer demands, and reduce operational inefficiencies. According to Christopher (2016), information management capability is a critical element in achieving logistics excellence and maintaining competitive advantage. As global supply chains continue to evolve, logistics organizations must continuously adapt to technological developments to remain relevant and sustainable. Consequently, evaluating the effectiveness of digitalization initiatives becomes essential for understanding their contribution to operational performance and long-term business growth.

METHOD

This study employed a descriptive quantitative approach using a case study design. The research was conducted at PT Lini Trans Sejahtera Denpasar. Data collection involved primary and secondary sources. Primary data were obtained through interviews with management and operational personnel, direct observations of export–import activities, and questionnaires distributed to respondents involved in documentation processes. Secondary data were collected

from company reports, operational records, scientific journals, regulations, and relevant literature.

To measure the effectiveness of export–import document digitalization, several operational indicators were used. These indicators included document processing time, administrative error rate, accessibility of information, operational costs, data security, and coordination efficiency among departments. Processing time was measured based on the average duration required to complete export–import documentation activities before and after digitalization. Administrative error rates were evaluated through the frequency of document revisions and corrections required during operational processes. Accessibility was assessed based on the ability of employees and customers to obtain required information quickly and accurately through digital platforms. Operational costs referred to expenses associated with document processing, printing, storage, and administrative activities. Data security was evaluated based on the existence of access control systems, backup mechanisms, and digital protection measures implemented by the company. The selection of these indicators was based on logistics performance dimensions commonly used in digital transformation studies, particularly those related to efficiency, accuracy, responsiveness, and information management. By evaluating these indicators, the study was able to identify the operational impact generated by the implementation of digital documentation systems.

The respondents involved in this study consisted of employees directly engaged in export–import activities, including documentation staff, customer service personnel, operational coordinators, and managerial employees. These individuals were selected because they possess direct experience with both manual and digital documentation processes. Purposive sampling was applied to ensure that respondents had sufficient knowledge regarding the implementation of digital systems within the company. The collected information provided valuable insights regarding operational changes, challenges encountered during implementation, and perceived benefits resulting from digital transformation initiatives.

To ensure the validity and reliability of the collected data, the study applied data triangulation by comparing information obtained from observations, interviews, questionnaires, and documentation. The use of multiple data sources enabled the researcher to verify the consistency of findings and reduce potential bias arising from a single data collection method. Information gathered from employees was cross-checked with operational records and direct observations of documentation activities to obtain a comprehensive understanding of the implementation of digital systems. This approach enhanced the credibility of the research results and provided stronger evidence regarding the operational impact of export–import document digitalization within the company.

Questionnaire responses were measured using a Likert scale to assess respondents' perceptions regarding the effectiveness of digital documentation systems. The scale ranged from strongly disagree to strongly agree and covered indicators related to processing speed, data accuracy, accessibility, coordination efficiency, operational cost reduction, and information security. The collected responses were tabulated and analyzed descriptively to identify trends and patterns associated with digitalization outcomes. The results of the questionnaire analysis were subsequently integrated with interview findings and observational data to support a more comprehensive evaluation of logistics efficiency improvements achieved through digital transformation initiatives.

The analysis consisted of two stages. First, a comparative analysis was conducted to evaluate differences between manual and digital document management systems. The comparison focused on processing time, error rates, operational costs, accessibility, and data security. Second, SWOT analysis was applied to identify internal strengths and weaknesses as well as external opportunities and threats affecting the implementation of digital systems. Internal factors were evaluated using the Internal Factor Analysis Summary (IFAS), while external factors were analyzed using the External Factor Analysis Summary (EFAS). The resulting scores were plotted into a SWOT Cartesian diagram to determine the company's strategic position and formulate suitable development strategies.

RESULT

Implementation of Export–Import Document Digitalization

PT Lini Trans Sejahtera Denpasar has implemented several digital platforms to support export–import operations. Internal systems are utilized for document uploads, invoice preparation, shipment monitoring, and administrative reporting. In addition, customers can access external platforms to track cargo movements and obtain shipment information in real time. The company also utilizes CEISA 4.0 for customs administration, including Export Declarations (PEB), Import Declarations (PIB), and manifest processing. Digital platforms are further used to support quarantine-related documentation and compliance requirements.

Operational Changes After Digitalization

The transition from manual documentation procedures to digital systems has generated substantial changes in daily operational activities. Prior to digitalization, employees were required to manually prepare, print, verify, and archive large volumes of export–import documents. The process often involved multiple stages of document handling, resulting in delays and duplication of administrative work. Following the implementation of digital platforms, document preparation and submission activities became significantly more streamlined. Information entered into the system could be automatically integrated into multiple forms and reports, reducing repetitive data entry activities. Employees also gained the ability to access documentation records electronically, eliminating the need for extensive physical archives. Digitalization has also improved coordination among departments involved in export–import operations. Documentation staff, customs personnel, customer service officers, and management can access relevant information simultaneously through shared systems. This capability supports faster decision-making and minimizes communication delays that previously occurred under manual procedures.

Impact on Service Performance

The implementation of digital documentation systems has positively influenced service performance. Customers are able to obtain shipment information more quickly through online tracking systems, which improves transparency and customer satisfaction. The availability of real-time information enables customers to monitor shipment progress without requiring frequent communication with company representatives. In addition, digital systems facilitate faster customs processing because documents can be submitted electronically and verified more efficiently. This capability contributes to shorter cargo clearance times and improves overall logistics responsiveness. As a result, the company can provide more reliable services while maintaining compliance with export–import regulations. To evaluate the effectiveness of digitalization, a comparison was conducted between the previous manual system and the current digital system.

Table 1.
Comparison Between Manual and Digital Systems

Aspect	Manual System	Digital System
Processing Time	Slow	Fast
Error Rate	High	Low
Operational Cost	Lower	Higher
Data Security	Poor	Good
Accessibility	Limited	Good

Table 1 indicates that digital systems outperform manual systems in most operational aspects. The most notable improvements are observed in processing speed, data accuracy, accessibility, and information security. Although digital systems require greater investment and maintenance costs, the operational benefits contribute substantially to overall logistics efficiency.

SWOT Analysis Results

The analysis of internal factors produced a total IFAS score of 2.81, while the evaluation of external factors generated an EFAS score of 2.74. These results suggest that PT Lini Trans Sejahtera possesses strong internal capabilities and favorable external opportunities.

Table 2.
Internal Factors (IFAS)

Strengths
Faster administrative processes
Reduced data entry errors
Better coordination among divisions
Improved transparency and auditing
Weaknesses
Technical system disruptions
Limited employee digital competencies
Continued dependence on some physical documents
High implementation and maintenance costs

The internal analysis shows that operational efficiency and information accuracy represent the company's primary strengths. However, technical reliability and employee readiness remain challenges requiring continuous improvement.

Table 3
External Factors (EFAS)

Opportunities
Faster customs clearance
Integration with logistics platforms
Government support for digitalization
Development of AI and blockchain technologies
Threats
Cybersecurity risks
Vendor dependency
Regulatory changes
Resistance to organizational change

External factors indicate substantial opportunities for digital development, although cybersecurity concerns and regulatory uncertainties remain significant threats.

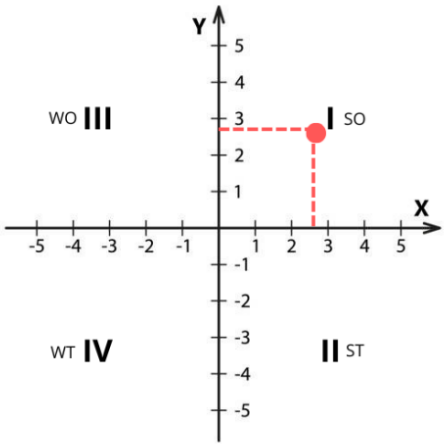

Figure 1. SWOT Position of PT Lini Trans Sejahtera Denpasar

The SWOT diagram places the company in Quadrant I, indicating an aggressive strategic position characterized by strong internal capabilities and favorable external conditions.

Table 4.
SWOT Strategic Matrix

Strategy Type	Strategic Recommendation
SO	Optimize TMS and WMS systems
SO	Expand cooperation with exporters
SO	Enhance specialized export–import services
SO	Integrate AI and blockchain technologies
WO	Conduct regular technical training
WO	Develop backup systems
ST	Strengthen cybersecurity measures
WT	Conduct routine security audits

DISCUSSION

The findings demonstrate that digitalization plays an important role in improving logistics efficiency. The results of this study indicate that digitalization contributes not only to administrative efficiency but also to broader supply chain integration. Modern logistics systems require continuous information exchange among shippers, freight forwarders, customs authorities, warehouse operators, and customers. Digital document management facilitates seamless information flow between these stakeholders, reducing delays caused by fragmented communication channels. According to Chopra and Meindl (2016), supply chain performance depends heavily on information visibility and coordination among participants. By digitalizing export–import documents, PT Lini Trans Sejahtera can improve information sharing and strengthen collaboration throughout logistics operations. Enhanced visibility enables stakeholders to identify potential disruptions earlier and implement corrective actions more effectively. Digital integration also supports greater operational flexibility. Changes in shipment schedules, customs requirements, or customer requests can be communicated and processed more rapidly through electronic platforms. Consequently, the company becomes more responsive to dynamic market conditions and customer expectations.

The implementation of digital systems significantly reduces document processing time compared with traditional manual procedures. This result aligns with Odo & Ekeins (2025), who found that paperless office systems contribute positively to operational performance and administrative efficiency. The reduction in data entry errors is another major benefit observed in this study. Automated validation mechanisms help prevent inaccuracies that frequently occur

in manual documentation processes. Similar findings were reported by Nwinyokpugi (2015), who emphasized that digital systems improve accuracy and reliability in export–import operations.

The accessibility of information has also improved substantially. Employees and customers can access shipment information in real time, facilitating better communication and faster decision-making processes. According to Ezekiel Onyekachukwu Udeh et al. (2024), enhanced information visibility is one of the primary advantages of digital logistics systems because it supports supply chain coordination and operational transparency. Despite these advantages, digital transformation requires considerable investment. Successful digital transformation is not solely dependent on technology adoption. Human resource readiness plays a crucial role in ensuring that digital systems operate effectively. Employees must possess adequate digital literacy, technical skills, and adaptability to new working procedures. Several respondents indicated that learning new software platforms initially required additional training and adjustment periods. This finding is consistent with Laudon and Laudon (2016), who emphasized that organizational success in digital transformation depends on the alignment between technology, people, and business processes. Continuous training programs are therefore necessary to strengthen employee competencies and minimize resistance to change. Organizations that invest in workforce development are more likely to achieve sustainable benefits from digital transformation initiatives. Software licenses, system maintenance, hardware procurement, and cybersecurity infrastructure contribute to higher implementation costs. Nevertheless, the long-term benefits generated through increased efficiency and reduced administrative errors are expected to offset these expenditures.

The SWOT analysis reveals that PT Lini Trans Sejahtera possesses strong competitive advantages. The company has successfully developed digital capabilities that improve operational performance while creating opportunities for future innovation. Government support for customs digitalization and the emergence of advanced technologies such as artificial intelligence and blockchain provide additional opportunities to strengthen competitiveness. However, several challenges remain. Cybersecurity threats continue to increase alongside greater dependence on digital infrastructure. Logistics companies must therefore invest in data protection systems, employee awareness programs, and regular security audits. In addition, employee resistance to technological change may hinder successful implementation if not addressed through continuous training and organizational support.

Based on the SWOT position in Quadrant I, the most appropriate strategy is the Strength–Opportunity strategy. The company should focus on maximizing existing strengths to capitalize on external opportunities. Optimization of Transportation Management Systems and Warehouse Management Systems can further improve operational efficiency. Likewise, integrating artificial intelligence and blockchain technologies could enhance transparency, traceability, and security throughout export–import processes.
The findings of this study contribute to the growing body of literature regarding digital transformation in logistics by providing empirical evidence from a freight forwarding company operating in Indonesia. The results highlight that digitalization is not merely a technological initiative but also a strategic tool for enhancing organizational competitiveness and operational excellence. From a managerial perspective, the findings provide several important implications for logistics service providers. First, investment in digital documentation systems should be viewed as a long-term strategic initiative rather than merely a technological upgrade. Although implementation costs may initially increase, the resulting improvements in efficiency, accuracy, and service quality can generate substantial organizational benefits over time. Second,

companies should prioritize cybersecurity measures alongside digital expansion efforts. As logistics operations become increasingly dependent on electronic systems, the protection of sensitive business information becomes critical. Investments in cybersecurity infrastructure, employee awareness programs, and regular security audits are essential to mitigate potential risks. Third, management should continuously evaluate emerging technologies such as artificial intelligence, blockchain, and advanced analytics. These technologies offer opportunities to further improve document verification, shipment visibility, predictive decision-making, and overall supply chain performance. Organizations capable of integrating these innovations effectively will be better positioned to maintain competitive advantages in the rapidly evolving logistics industry.

CONCLUSION

The implementation of export–import document digitalization at PT Lini Trans Sejahtera Denpasar has positively contributed to logistics efficiency. Digital systems improve processing speed, reduce administrative errors, enhance information accessibility, and strengthen data security compared with traditional manual systems. The SWOT analysis generated an IFAS score of 2.81 and an EFAS score of 2.74, positioning the company in Quadrant I. This indicates that PT Lini Trans Sejahtera should pursue aggressive growth strategies by utilizing its strengths to capitalize on available opportunities. Strategic priorities include optimizing TMS and WMS systems, expanding partnerships with exporters, improving specialized export–import services, and integrating advanced technologies such as artificial intelligence and blockchain. Future efforts should focus on strengthening cybersecurity measures, improving employee digital competencies, and continuously evaluating technological performance to ensure sustainable digital transformation.

The findings suggest that digitalization of export–import documentation is not only capable of improving internal operational performance but also supports the development of a more integrated and responsive logistics system. As digital technologies continue to evolve, logistics companies are encouraged to adopt innovative solutions that enhance information flow, strengthen collaboration among stakeholders, and improve service quality. Therefore, continuous investment in digital infrastructure, employee capability development, and technological innovation will be essential to maintain operational sustainability and strengthen competitiveness in the increasingly dynamic logistics industry.

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