



Technology-Based Operational Plan Optimization for Warehousing Startup: Secure Stash Case Study

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Abstract

This study analyzes technology-based operational planning optimization in the warehousing service industry through a case study of Secure Stash, a startup providing integrated storage services supported by Warehouse Management Systems (WMS), RFID technology, and digital collaboration with logistics partners. Although previous studies have extensively discussed warehouse operations and logistics efficiency, empirical research that specifically examines how technology integration enhances operational performance in startup-based warehousing services remains limited, particularly within emerging economies. This study addresses this gap by linking digital warehousing technologies with operational management practices in an early-stage logistics startup. The research employs a descriptive-analytical case study approach using internal operational planning documents, service flow designs, and performance projections. Data validity is ensured through source triangulation and comparison with established operational management theories. The analysis focuses on Lean operational principles, digital inventory systems, standardized operating procedures, and relationship-based service strategies. The findings demonstrate that the integration of Lean warehousing practices, RFID-based tracking, and digital operational systems contributes to measurable operational improvements, including reductions in item processing time, improved inventory accuracy, enhanced space utilization, and increased service reliability. These operational efficiencies are further supported by relationship management strategies that strengthen customer satisfaction and partner collaboration. This study contributes to logistics and operations management literature by providing practical evidence on how technology-driven operational planning can enhance efficiency and service quality in warehousing startups. The results offer valuable insights for startup managers and logistics practitioners seeking to design scalable, efficient, and digitally integrated warehouse operations.

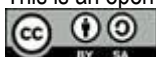
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INTRODUCTION

The logistics and warehousing industry in Indonesia has experienced significant growth in recent years, driven by rapid urbanization, increasing population density, and the expansion of e-commerce and digital services. According to data from Statistics Indonesia (Badan Pusat Statistik/BPS), the transportation and warehousing sector continues to contribute substantially to national economic growth, reflecting the rising demand for efficient logistics and storage solutions. In parallel, limitations in residential and commercial space in urban areas, combined with high mobility patterns, have intensified the need for flexible and technology-enabled warehousing services for both individuals and small businesses. These developments highlight the strategic importance of innovative warehousing models that can adapt to urban constraints while maintaining operational efficiency.

Within this context, technology-based warehousing startups have emerged as a new solution, offering integrated services that combine physical storage facilities with digital platforms. Secure Stash represents one such startup that leverages Warehouse Management Systems (WMS), RFID-based inventory tracking, and digital integration with expedition and logistics partners to deliver secure, flexible, and customer-oriented warehousing services. The adoption of these technologies introduces operational complexity, particularly in coordinating inventory accuracy, process standardization, service reliability, and customer experience within a startup environment that is still in its early growth stage.



Previous studies on operational management and warehouse optimization have emphasized the role of Lean operations, digitalization, and relationship-based service strategies in improving efficiency and competitiveness (Hamdi, 2019; Iskandar, et al., 2021). Research on logistics startups in Indonesia has also highlighted challenges related to limited system integration, suboptimal digital adoption, and operational inefficiencies during the scaling phase. However, most existing studies focus either on large-scale logistics companies or examine digital transformation and warehouse operations in isolation, with limited empirical attention given to how integrated digital technologies and operational frameworks jointly shape operational performance in startup-based warehousing services. This indicates a clear research gap, particularly regarding the application of Lean warehousing principles and relationship marketing frameworks within technology-driven logistics startups in emerging economies.

In response to this gap, this study aims to analyze how technology-based operational planning is designed and implemented in a warehousing startup context, using Secure Stash as a case study. Specifically, the objectives of this research are to examine (1) how digital technologies such as RFID and warehouse management systems support operational efficiency, (2) how Lean operational principles contribute to process optimization and service reliability, and (3) how relationship management strategies, as conceptualized in the NICE model, enhance customer value and partner collaboration. By focusing on these analytical dimensions, the study seeks to move beyond descriptive accounts and provide a structured assessment of operational outcomes and managerial implications.

To strengthen the theoretical foundation, this study integrates national empirical research with international literature on digital warehousing, RFID implementation, Lean logistics, and technology-driven operations management. The Lean methodology provides a framework for identifying waste reduction and process efficiency, while the NICE model offers a relationship-based perspective on value creation in service-oriented logistics. Together, these frameworks guide the analysis of Secure Stash's operational plan and clarify how technological and managerial strategies interact to support scalable and sustainable warehousing operations.

Overall, this study contributes to the logistics and operations management literature by offering empirical insights into technology-based operational optimization within a startup environment. Practically, the findings are expected to support logistics entrepreneurs and practitioners in designing efficient, digitally integrated, and customer-oriented warehousing services that align with the evolving demands of urban logistics ecosystems.

RESEARCH METHOD

This study employs a qualitative descriptive research design with a case study approach to analyze technology-based operational planning in a logistics startup. This approach is suitable for examining complex operational processes, planning strategies, and implementation mechanisms within a real-life organizational context, particularly when the boundaries between the phenomenon and its environment are not clearly defined. Secure Stash was selected as the case study due to its role as an early-stage warehousing startup that integrates digital systems, RFID technology, and collaborative logistics partnerships into its operational model.

Research Design and Data Sources

The primary data source consists of internal business plan documents of Secure Stash, specifically the operational and service planning components for the 2024–2025 period. This timeframe was selected because it represents the startup's initial commercialization and scaling phase, during which operational planning and technology integration are most critical. Secondary data were obtained from supervisory input, industry reports, and national and international academic literature related to operations management, digital warehousing, Lean logistics, and relationship marketing. The distinction between primary and secondary data allows the study to balance contextual depth with theoretical rigor.

Data Analysis Procedure

Data analysis was conducted using thematic analysis. The analytical process began with an initial familiarization stage, in which the researchers conducted a comprehensive review of all primary documents to understand the overall operational context. This was followed by open coding, where relevant statements and operational elements were identified and labeled based on recurring concepts related to standard operating procedures, warehouse security systems, service design, technology utilization, and revenue projection. These initial codes were then grouped into broader themes aligned with core operational management dimensions and the study's analytical framework.

In the interpretation stage, the identified themes were analyzed by comparing empirical findings with established theories in Lean operations, digital warehousing, and relationship-based service management. This analytical generalization process follows Yin's (2018) case study logic, allowing the findings to be linked to theoretical propositions rather than statistical generalization.

Validity, Reliability, and Bias Mitigation

To enhance construct validity, source triangulation was applied by cross-checking internal business plan data with academic literature and industry benchmarks. Potential organizational and researcher bias arising from reliance on internal documents was mitigated through critical document review and theoretical cross-referencing, ensuring that interpretations were not solely based on managerial narratives.

Reliability and dependability were addressed by maintaining a clear audit trail of data sources, coding decisions, and analytical steps, allowing the research process to be traceable and consistent. Peer debriefing with academic supervisors was also conducted to review coding logic and thematic interpretation, thereby strengthening analytical consistency and trustworthiness.

Ethical Considerations

All internal data used in this study were analyzed with the permission of the company and treated confidentially. The research focuses on operational planning and does not disclose sensitive financial or proprietary information beyond what is necessary for academic analysis.

RESULTS AND DISCUSSION

Stages of Operational Implementation of Secure Stas

Table 1. Stages of Operational Implementation of Secure Stash

No	Stage	Description	Theoretical Alignment
1	Fulfillment of Legal Requirements	Preparation of legal documents such as Deed of Establishment, Business Identification Number (NIB), Taxpayer Identification Number (NPWP), Trade Business License (SIUP), and Warehouse Registration Certificate (TDG).	Builds trust among partners and customers (Hamdi & Iskandar, 2023)
2	SOP Development	Establishing SOPs for more than 80% of core processes such as storage, inventory management, and distribution.	Efficiency and waste reduction according to Lean approaches (Zoltners et al., 2012)

Secure Stash structures its business operations systematically and incrementally, beginning with the fulfillment of legal and regulatory requirements as a fundamental basis for building a formal,

accountable, and trustworthy logistics ecosystem. The required legal documents include the Deed of Establishment, Business Identification Number (NIB), Taxpayer Identification Number (NPWP), Trade Business License (SIUP), and Warehouse Registration Certificate (TDG). This compliance aligns with the findings of Hamdi & Iskandar (2023), who emphasize that legal legitimacy in the logistics industry is a critical determinant of business partner trust and customer loyalty, particularly in the Business-to-Business (B2B) sector.

The next phase focuses on the development of Standard Operating Procedures (SOPs) covering more than 80% of core processes, including storage workflows, inventory management, and distribution logistics. The implementation of SOPs is part of the adoption of Lean Operations—a managerial approach aimed at maximizing customer value by reducing waste, simplifying processes, and building sustainable efficiency. This concept aligns with Zoltners et al. (2012), who state that clear and documented operational standards are essential for creating responsive, measurable, and adaptive work systems.

Furthermore, Secure Stash's Operational Plan emphasizes the integration of technology as the backbone of its operations. The use of Warehouse Management Systems (WMS), Internet of Things (IoT) devices, and Radio Frequency Identification (RFID) enables real-time monitoring, reduces human error, and increases service transparency. This implementation is reinforced by service blueprints that map the customer journey from booking to distribution, allowing the company to anticipate operational risks on critical service points. From an infrastructure perspective, the warehouse layout is designed flexibly through two main storage models—box storage for small-scale items and room storage for household or SME needs. This approach enhances space efficiency while attracting a broader range of market segments.

Technology Systems and Operational Efficiency

Table 2. Technology Components and Operational Efficiency of Secure Stash

No	Component	Operational Function	Theoretical Alignment
1	WMS & RFID	Real-time item tracking, reduction of manual errors, improved distribution efficiency	Digital logistics (Çizmecı & Ercan, 2015)
2	Vertical warehouse layout	Maximizes warehouse capacity, speeds up item retrieval	Lean facility design (Heizer & Render, 2016)
3	1080p CCTV and sensor alarms	Ensures item security and operational transparency	Visual control & safety in logistics (Zoltners et al.)

Secure Stash employs Warehouse Management Systems (WMS) and Radio Frequency Identification (RFID) technology as the core elements of its operational design. These systems provide significant benefits in real-time stock tracking, minimizing manual input errors, and improving efficiency in receiving and dispatching goods. This reflects best practices in logistics digitalization as emphasized by Çizmecı & Ercan (2015), who state that digital integration within warehouse operations can enhance speed, accuracy, and overall customer satisfaction.

Additionally, the company optimizes warehouse layout by using vertical racking systems to maximize space capacity and streamline workflow. This is further supported by advanced security systems such as 1080p CCTV and sensor-based alarm systems, ensuring that operations remain efficient, secure, and well-monitored. These approaches align with Lean Logistics principles, where workspace design is intended to strengthen visual control, improve space utilization, and accelerate material handling processes (Heizer & Render, 2016). This emphasis is also supported by Waluya, Iqbal, & Indradewa (2019), who assert that operational system quality significantly influences customer satisfaction and perceived value.

Beyond WMS and RFID, Secure Stash implements service blueprinting to map customer interaction flows, from bookings to final item delivery. This allows the company to identify critical service points and anticipate bottlenecks. To ensure service continuity, a digital pest control system is scheduled periodically to maintain storage quality. This demonstrates that technology is utilized not only for operational efficiency but also for customer experience enhancement.

Furthermore, operational efficiency is strengthened through integration with expedition partners for last-mile delivery, allowing the company to avoid the high cost of maintaining its own fleet. This strategy aligns with Lean principles by reducing fixed asset investments and enabling the company to focus on its core competencies. Thus, Secure Stash's technological system provides not only efficiency but also flexibility, allowing the company to scale operations in line with market demand fluctuations.

Partner and Customer Relationship Strategy (NICE Model)

Table 3. NICE Strategy Components of Secure Stash

Component	Secure Stash Implementation	Strategic Objective
Networking	Participation in logistics exhibitions & industry associations (ALFI, GAPPI)	Building industry networks and strengthening market trust
Interaction	Intensive communication with shareholders, customers, suppliers, and vendors	Establishing continuous two-way communication
Common Interest	Collaboration in efficiency, item security, and customer loyalty	Creating shared value and long-term competitive advantage
Experience	Digital service design: online booking, real-time tracking, responsive service	Enhancing satisfaction and perceived service quality

Secure Stash adopts the NICE strategy—Networking, Interaction, Common Interest, and Experience—as its core approach in managing relationships with customers and business partners. This strategy positions the company not merely as a storage service provider, but as a strategic collaborator within the broader logistics ecosystem. It fosters collaborative bridges between the company and SMEs, logistics vendors, leasing providers, and industry associations such as ALFI (the Indonesian Logistics and Forwarder Association) and GAPPI (the Indonesian Warehousing Association).

Networking is established through active participation in industrial exhibitions and logistics associations, enabling Secure Stash to expand its industry network and strengthen its legitimacy in the national logistics ecosystem. This approach enhances the company's reputation and credibility among stakeholders.

Interaction is developed through structured and continuous communication with key stakeholders, including shareholders, customers, vendors, and support service providers. Such interactions serve as the foundation for building trust, addressing service needs, and creating sustainable business solutions.

Common Interest emphasizes the achievement of mutual benefits, particularly in terms of operational efficiency, item security, and customer retention. By aligning goals with partners and customers, Secure Stash is able to generate shared value that strengthens long-term competitiveness and loyalty.

Experience focuses on delivering seamless, transparent, and digitally driven services. This includes user-friendly online booking interfaces, real-time item tracking, and responsive customer support. The emphasis on customer experience ensures consistent service quality and strengthens positive perceptions of the brand.

The implementation of the NICE model supports the relationship marketing approach advocated by Yanuar Rahmat Syah & Pusaka (2018), who emphasize that strong and continuous interactions are key to building loyalty in B2B markets. Accordingly, Secure Stash's NICE framework represents a synergy

between technology, trust, and shared value—essential ingredients for sustainable growth in the modern logistics sector.

Long-Term Projection and Innovative Development

Table. 4 Long-Term Growth Targets and Digital Innovation Strategies

Year	Growth Target	Innovation and Digitalization Strategy
Year 2	Rental of > 400 box units	Strengthening the WMS-based ordering system and RFID-enabled tracking
Year 3–4	Warehouse capacity expansion and increased customer visits	Service area expansion, active CRM implementation, and participation in industry events
Year 5	> 1,200 customers and development of the second warehouse facility	Development of an operational dashboard, mobile application, and quarterly performance evaluation

Secure Stash's long-term projection emphasizes scalability, innovation, and sustainable operational expansion in line with contemporary logistics and warehousing development trends. By integrating technology-driven processes with Lean operational principles, the company seeks to enhance operational efficiency, reduce waste, and strengthen its competitive position in Indonesia's rapidly growing logistics and warehousing sector (Brigham & Houston, 2009; Hamdi, 2020). Prior studies have shown that technology-enabled warehousing, supported by digital inventory systems and process standardization, plays a critical role in improving service reliability and scalability in logistics startups (Iskandar et al., 2021; Wamba et al., 2020). Accordingly, Secure Stash's long-term projection is structured around three strategic pillars: capacity expansion, digital innovation, and the development of strategic partnerships, which are widely recognized as key drivers of sustainable logistics performance (Christopher, 2016).

From an expansion perspective, Secure Stash plans to increase its warehouse capacity and operational coverage to at least three metropolitan areas within the next five years. This strategy is aligned with empirical findings indicating that demand for micro-warehousing and flexible storage solutions is increasing among small and medium-sized enterprises, e-commerce sellers, and urban households due to space constraints and last-mile delivery pressures (Wang et al., 2021; Wamba et al., 2020). The expansion plan also includes infrastructure upgrades through modular warehouse units, which enable operational flexibility and rapid scalability while minimizing fixed investment risks. Modular and scalable warehouse designs have been shown to support efficient capacity adjustment and responsiveness to fluctuating customer demand in urban logistics environments (Bartholdi & Hackman, 2019; Gu et al., 2010).

In terms of technological development, future innovation will center on automation, more advanced IoT integration, and predictive analytics. The company intends to deploy an AI-based Warehouse Management System capable of forecasting storage demand, optimizing layout arrangement, and providing predictive maintenance alerts on warehouse equipment. These advancements align with the direction of digital logistics transformation as described by Hamdi & Iskandar (2023), who argue that data-driven decision-making and automation significantly strengthen operational reliability and cost efficiency.

Strategic partnerships play a central role in Secure Stash's long-term operational projections, particularly in building an integrated digital logistics ecosystem. The company aims to deepen collaboration with logistics service providers, e-commerce platforms, and financial institutions to enhance service interoperability and value creation. Such partnerships enable service diversification through bundled shipping arrangements, digital escrow mechanisms for stored goods, and integrated insurance coverage, which collectively improve customer trust and service reliability. Collaborative business models

of this nature are widely recognized as essential for logistics startups operating in digitally networked environments, as they facilitate shared value creation, risk sharing, and long-term relationship sustainability (Christopher, 2016; Hamdi, 2020). These strategic collaborations are consistent with the NICE relationship framework, which emphasizes networking, interaction, common interests, and emotional engagement as foundations for sustainable business relationships (Iskandar et al., 2021).

In addition to partnership-driven strategies, Secure Stash plans to develop innovative financial and operational models to respond to the evolving needs of SMEs and users in the flexible economy. Subscription-based storage packages, pay-per-use pricing schemes, and integrated last-mile delivery options are designed to increase affordability, flexibility, and service accessibility. Prior studies indicate that flexible pricing and service modularization enhance customer adoption and operational scalability in technology-enabled logistics services (Wamba et al., 2020; Gu et al., 2010). To support these innovations, Secure Stash also emphasizes the strengthening of internal operational capabilities through continuous employee training, refinement of standard operating procedures, and ongoing process evaluation. Such internal capability development is critical for ensuring operational consistency, service quality, and sustainable performance in growing logistics organizations (Bartholdi & Hackman, 2019).

Overall, Secure Stash's long-term projection shows a strategic roadmap that prioritizes digital transformation, operational sustainability, and market expansion. These directions are reinforced by empirical findings from Putri, Hamdi, & Indradewa (2024), Purnama et al. (2024), and Gultom, Hamdi, & Iskandar (2025), which highlight that startups integrating measured risk management with technological innovation tend to achieve higher competitiveness and long-term resilience in the logistics sector.

CONCLUSION

This study concludes that the integration of digital technologies, standardized operational procedures, and customer-oriented strategies plays a critical role in optimizing the operational planning of technology-based warehousing startups such as Secure Stash. In line with the study's research objectives, the findings demonstrate that the implementation of warehouse management systems, RFID-based tracking, and Lean operational principles contributes to improved process efficiency, service reliability, and operational scalability, while the application of the NICE relationship model strengthens both B2C and B2B interactions through enhanced trust, collaboration, and long-term value creation. These results highlight how technological and relational strategies jointly support operational effectiveness in an early-stage logistics startup. Nevertheless, this study is subject to limitations, as it relies on a single case study and internal organizational data, which may limit the generalizability of the findings to other logistics contexts or regions. Future research is therefore encouraged to apply similar analytical frameworks across multiple warehousing startups or comparative industry settings and to incorporate quantitative performance indicators to further validate the operational impacts of digitalization and relationship-based strategies. Practically, the findings of this study may serve as a reference for logistics practitioners and startup managers seeking to design scalable, digitally integrated, and customer-centric warehousing operations in rapidly evolving urban logistics environments.

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