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**SỰ PHÁT TRIỂN CỦA CHUỖI CUNG ỨNG LINH HOẠT THÔNG  
QUA CHUYỂN ĐỔI SỐ: NGHIÊN CỨU VỀ SHOPEE**

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**Tóm tắt**

Nghiên cứu này phân tích cách Shopee phát triển chuỗi cung ứng linh hoạt thông qua chuyển đổi số, tập trung vào các yếu tố công nghệ và vận hành thúc đẩy khả năng thích ứng trong môi trường thương mại điện tử đầy biến động. Bài viết tổng hợp các nghiên cứu và báo cáo ngành để làm rõ mô hình chuỗi cung ứng lai C2C-B2C của Shopee, hệ thống Shopee Supported Logistics và vai trò của Shopee Xpress trong hoàn tất đơn hàng và giao hàng chặng cuối. Phân tích nhấn mạnh các công nghệ tiên tiến như trí tuệ nhân tạo, máy học, big data và hệ thống IoT trong việc tạo ra tính linh hoạt trên các hoạt động hoạch định, tìm nguồn cung, hoàn tất đơn hàng, giao hàng và trả hàng. Kết quả cho thấy chuyển đổi số nâng cao ba dòng chảy cốt lõi của chuỗi cung ứng: luồng thông tin, luồng sản phẩm và luồng tài chính. Nhờ đó, Shopee giảm thiểu hàng, tăng tốc độ giao hàng, mở rộng quy mô nhanh trong các đợt cao điểm và duy trì độ tin cậy ngay cả trong điều kiện

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thị trường biến động. Nghiên cứu kết luận rằng tích hợp công nghệ sâu, mạng lưới logistics hợp tác chặt chẽ và ra quyết định dựa trên dữ liệu là những yếu tố then chốt giúp Shopee giữ vững vị trí dẫn đầu trong thị trường thương mại điện tử.

**Từ khóa:** Shopee, chuỗi cung ứng linh hoạt, chuyển đổi số, thương mại điện tử, logistics.

## **DEVELOPMENT OF AGILE SUPPLY CHAINS THROUGH DIGITAL TRANSFORMATION: A STUDY OF SHOPEE**

### **Abstract**

This study examines how Shopee develops an agile supply chain through digital transformation, emphasizing the technological and operational factors enabling its adaptability in dynamic e-commerce environments. By synthesizing recent studies and industry reports, the paper elucidates Shopee's hybrid C2C-B2C supply chain model, the Shopee Supported Logistics system, and the growing role of Shopee Xpress in order fulfillment and last-mile delivery. The analysis highlights advanced technologies such as artificial intelligence, machine learning, big data analytics, and IoT systems that contribute to agility across planning, sourcing, fulfillment, delivery, and returns. Findings reveal that digital transformation enhances three critical supply chain flows: information flow, product flow, and financial flow. These capabilities empower Shopee to reduce stockouts, accelerate delivery speed, rapidly scale during peak periods, and maintain reliability even in volatile market conditions. The study concludes that deep technology integration, collaborative logistics networks, and data-driven decision-making are key success factors enabling Shopee's high supply chain agility and sustained leadership in the fast-growing e-commerce market.

**Keywords:** Shopee, agile supply chain, digital transformation, e-commerce, logistics.

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### **1. Introduction**

In recent years, the rapid expansion of e-commerce has transformed global supply chains, necessitating more dynamic and resilient operational models. Customers now demand faster delivery, greater reliability, personalized services, and real-time order tracking, rendering traditional supply chains unsuitable for the evolving market environment (Mc.Kensey, 2025). As a result, agile supply chains, supported by digital transformation technologies such as artificial intelligence (AI), machine learning, and the Internet of Things (IoT), have become critical for sustaining competitive advantage and operational excellence.

Vietnam's e-commerce sector is among the fastest growing in Southeast Asia (Vân, 2024), propelled by platforms like Shopee, Lazada, and Tiki that have revolutionized consumer purchasing behaviors, especially during major sales events such as 9.9, 11.11, and Tet. This surge in online orders presents significant logistical challenges, including last-mile delivery complexities, warehouse congestion, and real-time inventory inaccuracies, compounded by external disruptions like the COVID-19 pandemic and fluctuating fuel prices. These challenges necessitate the development of highly agile supply chains powered by advanced digital technologies to maintain service reliability and meet escalating customer expectations.

Despite substantial investments in technology and infrastructure, achieving agility remains a significant challenge for large platforms like Shopee managing millions of SKUs and extensive delivery networks. Market shocks, flash sales, and supply chain disruptions often strain operational capacity, leading to longer lead times and stockouts that harm customer satisfaction and marketplace dynamics. This study thus investigates how Shopee's digital transformation initiatives contribute to building an agile supply chain capable of rapid response to demand variability, operational disturbances, and market volatility.

Using a qualitative case study approach, the study focuses on Shopee's Vietnam supply chain, emphasizing core logistics components such as order management, forecasting, fulfillment, transportation, and last-mile delivery. It synthesizes secondary data from academic, industry, and company sources, providing insights into the role of specific digital tools and organizational responses that enable Shopee to sustain its market leadership in a fast-evolving digital economy.

## **2. Theoretical Framework**

### ***2.1. Agile Supply Chain***

#### *2.1.1. Definition*

An agile supply chain is a dynamic and adaptable system of logistics and supply management that can swiftly respond to market fluctuations and unexpected disruptions. It emphasizes flexibility in adjusting routes, schedules, and operations to maintain efficiency. In the maritime, logistics, and supply chain sectors, agility often means reacting promptly to challenges such as adverse weather conditions, port congestion, or trade sanctions. By adopting an agile approach, shipping companies can enhance reliability, reduce costs, and improve customer satisfaction and overall competitiveness (Windward, 2023).

#### *2.1.2. Principles*

One fundamental principle of agile supply chains is speed. Agile supply chains aim to significantly reduce lead times and enable rapid decision-making across all supply chain stages, allowing firms to respond swiftly to demand changes or supply disruptions (Goldman et al., 1995). This emphasis on speed enhances a company's ability to deliver products quickly, minimizing delays and inventory costs while improving customer satisfaction.

Flexibility is another vital principle. Agile supply chains are designed to be adaptable by maintaining alternative sourcing options, scalable production, and transport capacity to pivot quickly when circumstances change (Christopher, 2008). This flexibility reduces dependency on any single supplier or route, enabling smooth operations despite unexpected disruptions and helping to balance efficiency with readiness for variability and risk.

Visibility and real-time information sharing are also central to agility. The agile supply chain leverages technologies to collect, share, and analyze data promptly, providing stakeholders with accurate and timely insights (Husein, 2024). Enhanced visibility facilitates proactive decision-making and coordination, helping to anticipate problems and implement corrective actions swiftly, thus maintaining service reliability during uncertainty.

Finally, collaboration and shared responsibility among supply chain partners foster agility. Open communication, trust, and joint problem-solving enable teams across organizations to work cohesively in adapting quickly to market shifts (Issah, 2025). Such collaborative culture promotes rapid issue resolution and aligns efforts towards common goals, strengthening overall supply chain responsiveness and resilience.

## ***2.2. Digital Transformation Tools in Enhancing Supply Chain Agility***

Automation and artificial intelligence (AI) significantly increase efficiency by handling repetitive tasks such as order processing, inventory management, and demand forecasting with minimal human intervention. AI algorithms analyze large datasets to predict demand fluctuations, optimize inventory levels, and detect anomalies early, allowing proactive adjustments. Robotic process automation (RPA) is also used in warehouses for picking and packing, improving speed and accuracy while reducing errors and costs (IOSCM, 2024).

Advanced data analytics tools enhance supply chain visibility and risk management by providing actionable insights from complex datasets. Real-time monitoring through Internet of Things (IoT) devices allows companies to track assets continuously, detect bottlenecks, and swiftly address issues before they escalate. Blockchain technology contributes to transparency and traceability, ensuring data integrity and reducing fraud risks throughout the network (Nwariaku et al., 2024).

Collaborative platforms facilitate better communication and shared planning among supply chain partners. Collaborative Planning, Forecasting and Replenishment (CPFR) systems and cloud-based supply chain management hubs enable aligned operations and efficient information flow, which are essential for agility. These tools empower stakeholders to synchronize activities, rapidly respond to disruptions, and sustain resilient supply chain performances (Anastasiya, 2023; Taulia, 2025).

## ***2.3. The SCOR Model***

The SCOR (Supply Chain Operations Reference) model is a widely used comprehensive framework for managing and improving supply chain processes. It provides a standardized

language, process definitions, performance metrics, and best practices, helping organizations evaluate, optimize, and benchmark supply chain performance across internal functions and external partners. It is structured around five main components: Plan, Source, Make, Deliver and Return.

**Figure 1.** The SCOR Model



*Source: The authors*

Plan involves balancing demand and supply, developing strategies, and setting performance targets to ensure that resources are optimized and aligned with business objectives. This includes forecasting demand, inventory planning, and aligning all supply chain activities accordingly.

Source focuses on procuring goods and services to meet the planned or actual demand. This includes supplier selection, contract management, inventory control, and managing supplier relationships to ensure reliable supply.

Make refers to the production process where raw materials or components are transformed into finished goods or services. It covers production planning, manufacturing, packaging, quality control, and managing production networks and facilities.

Deliver encompasses all activities related to order management, warehousing, transportation, and distribution, ensuring products reach customers in a timely and efficient manner.

Return deals with reverse logistics, managing product returns, recycling, and repair processes, emphasizing customer satisfaction and sustainability.

The model employs a comprehensive set of performance metrics to evaluate and improve supply chain efficiency and effectiveness. These metrics are categorized into key areas such as reliability, responsiveness, agility, cost, and asset management. These metrics allow organizations to benchmark performance against industry standards and identify areas for improvement.

### **3. Agile Supply Chain of Shopee**

#### ***3.1. Overview of Shopee***

Shopee is a Singapore-based multinational e-commerce platform owned by Sea Limited, specializing in online shopping with a focus on mobile-first experiences. It operates primarily in Southeast Asia, Taiwan, and select markets in Latin America and Europe, connecting buyers and sellers through a marketplace model that includes integrated logistics, payments, and social features.

### *3.1.1. History*

Shopee was founded on February 5, 2015, in Singapore by Sea Limited (formerly Garena), initially as a mobile-centric marketplace for browsing, buying, and selling products. The platform emphasized minimal physical assets, relying on integrated logistics and payment systems to facilitate transactions. To build trust, Shopee introduced "Shopee Guarantee," an escrow service that holds payments until buyers confirm receipt of goods, and expanded from mobile to include a website version. Over the next several years, Shopee evolved its business model into a hybrid C2C-B2C structure while expanding its product offerings and seller base.

Several key milestones marked Shopee's development. In 2016, the company launched Shopee University, an educational initiative aimed at training local entrepreneurs on how to establish online businesses. In 2017, Shopee Mall was introduced in Singapore and the Philippines, partnering with over 200 brands to offer authenticated products. The company later expanded into new regions including Latin America and Europe but faced challenges, eventually withdrawing from markets such as France, Spain, and India. A significant milestone came in 2019 with the opening of a six-story regional headquarters in Singapore Science Park, covering 244,000 square feet and accommodating 3,000 employees.

Shopee's growth continued despite market pressures. In 2022, facing inflation and rising interest rates, Shopee implemented cost-cutting measures across Indonesia, Thailand, Vietnam, Singapore, and China, achieving its first positive adjusted EBITDA of \$196.1 million in Q4 2022. The company has continued heavy investments in technology, marketing, and logistics infrastructure, leveraging AI, big data, and gamification to enhance shopper engagement and seller success. Initiatives such as an AI assistant, video product content, and optimized fulfillment policies highlight Shopee's innovation-driven strategy.

By 2025, Shopee has become Sea Limited's flagship e-commerce platform, contributing significantly to the group's revenue growth, including a 38.2% year-over-year increase in Q2 2025. Despite intensifying competition from Lazada, Tokopedia, and others, Shopee maintains market leadership through differentiated content-driven marketing, advanced logistics solutions, and robust seller support programs. Upcoming earnings reports are expected to demonstrate its continued dominance in gross merchandise value (GMV) and overall e-commerce market presence.

### *3.1.2. Vision, Mission and Core Values*

Shopee's vision centers on making online shopping accessible, easy, and enjoyable for everyone, a goal it strives to deliver daily through a user-friendly platform. This vision emphasizes simplicity, security, and customer satisfaction, with the company aspiring to be the region's top e-commerce destination by continually enhancing its platform (Shopee Singapore Private Limited, n.d.; Shopee Careers, 2024).

The mission of Shopee focuses on improving the lives of consumers and small businesses by leveraging technology to create a seamless, secure, and efficient online marketplace. It aims to offer a one-stop shopping experience with a wide range of products, social discovery features, and

reliable fulfillment services that connect buyers and sellers anytime and anywhere (Shopee Careers, 2024).

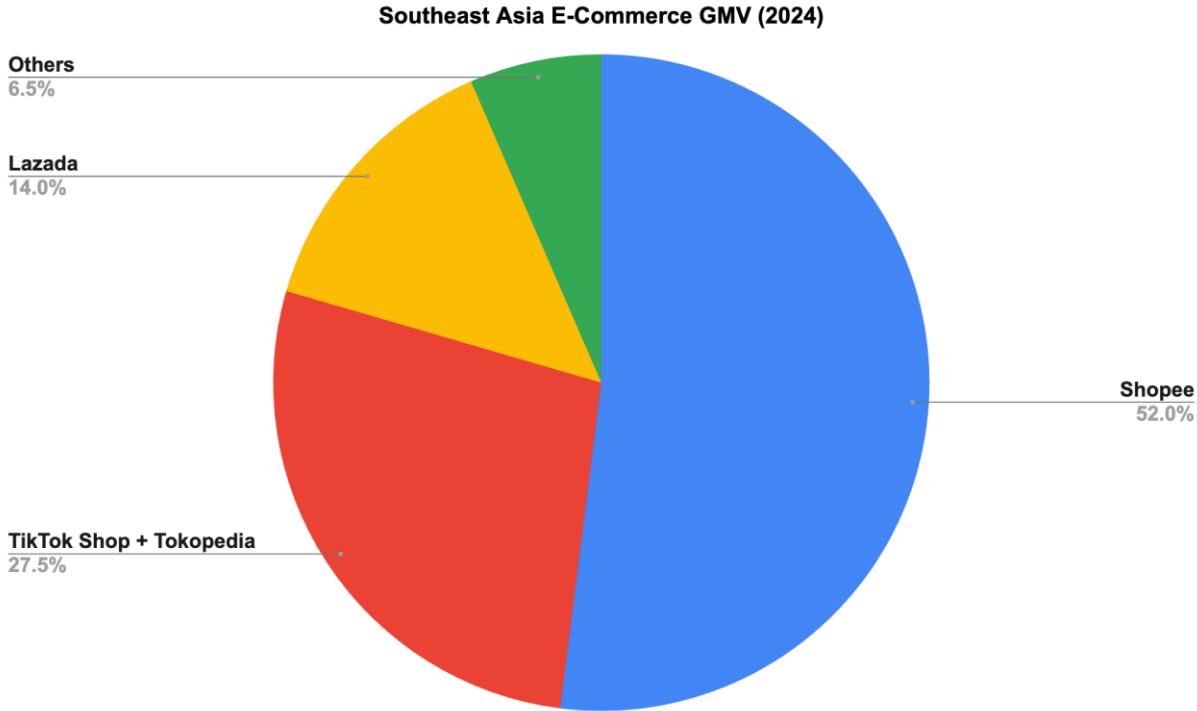
Core values at Shopee underscore customer-centricity, innovation, and the transformative power of technology to foster a connected and engaged community. These values guide the company’s commitment to building trust, ensuring convenience, enhancing user experience, and maintaining operational integrity. Shopee aims to empower its users and stakeholders alike while promoting inclusivity and sustainability in the digital commerce ecosystem (Shopee Singapore Private Limited, n.d.; Digitalforlife.gov.sg, 2024).

Overall, Shopee’s vision, mission, and core values align closely with Sea Limited’s technology-driven focus and emphasize continuous innovation, customer satisfaction, and community building as key pillars of its long-term success.

3.1.3. Market Share

Shopee dominates the Southeast Asian e-commerce market with approximately 52% of the region's gross merchandise volume (GMV) in 2024, up from 48% in 2023, totaling around \$66.8 billion (WolfOfHarcourtStreet.com, 2025). This solidifies Shopee's position ahead of competitors like Lazada and Tokopedia. Shopee’s growth is supported by its extensive hyperlocal delivery networks, broad product assortment, integrated digital payment systems, and innovations such as live commerce and AI-driven personalization.

Figure 2. Southeast Asia E-commerce GMV in 2024



Forecasts for 2025 indicate that Shopee will continue its dominance, targeting 20–25% GMV growth, sustained by improving unit economics and strong user engagement (WolffHarcourtStreet.com, 2025). Despite competition from players like Lazada, which focuses on premium goods, and TikTok Shop emerging as a wild card, Shopee’s scale, ecosystem, and profitability give it a durable competitive edge as Southeast Asia’s leading e-commerce platform.

#### *3.1.4. The Supply Chain*

Shopee operates one of Southeast Asia’s largest hybrid marketplace supply chains, combining consumer-to-consumer (C2C) and business-to-consumer (B2C) models. The supply chain is centered on efficiently connecting millions of sellers and buyers across multiple countries via an integrated logistics network. Shopee’s approach leverages third-party partners, its in-house Shopee Xpress logistics arm, and digital platforms to optimize sourcing, warehousing, and fulfillment. By segmenting supply flows into inbound (supplier deliveries) and outbound (customer fulfillment), Shopee sustains agility and scalability while meeting the fast-changing demands of e-commerce in the region.

Shopee’s supply chain consists of several core components that support its marketplace operations and efficient fulfillment of customer orders.

**Supplier:** The supplier is the source of the products in the supply chain. They may be manufacturers, producers, wholesalers, or brand owners who create or provide goods that sellers will later list and sell on Shopee. Their role is to ensure product availability and deliver items to sellers or fulfillment centers.

**Seller:** The seller is a merchant who lists products on Shopee’s platform. They manage inventory, pricing, and product listings, and may choose to store goods themselves or use Shopee Fulfillment services. Sellers are responsible for preparing and handing off orders unless Shopee handles fulfillment on their behalf.

**Warehousing & Fulfillment Centers:** This stage includes storage and order processing, either in Shopee Fulfillment Centers or the seller’s own warehouse. Here, products are stored, picked, packed, and prepared for shipping. The focus is on efficient order handling to ensure fast and accurate deliveries.

**Distribution Centers & Sorting Hubs:** After fulfillment, packages move through distribution centers and sorting hubs operated by Shopee or logistics partners. These hubs receive, scan, and sort parcels by route or region, enabling efficient transportation and last-mile delivery. This step ensures that each parcel moves quickly toward its destination.

**Customers:** Customers are the final recipients of the products. They receive the parcel through home delivery, pickup stations, or lockers. Once the order is delivered, customers confirm receipt in the Shopee app, completing the transaction and releasing payment to the seller.

**Figure 3.** The Supply Chain of Shopee



*Source: The authors*

### 3.1.5. Supply Chain Strategies

Shopee employs a series of agile, technology-centric supply chain strategies designed to maximize flexibility, speed, and scalability.

**Dynamic, Multi-layered Planning:** Shopee employs tiered planning across long-, medium-, and short-term horizons to forecast demand and allocate resources efficiently. This ensures stock availability and timely delivery during major sales events while minimizing costs and avoiding stockouts, enabling rapid response to shifting market demand.

**Technology Integration and Automation:** Shopee uses AI, big data analytics, and automation tools like WMS and TMS to optimize warehouse operations, routing, and inventory management. These technologies enable real-time monitoring and smarter resource use, reducing delivery times and errors.

**In-house and Outsourced Logistics:** Combining its Shopee Xpress network with third-party logistics, Shopee maintains flexibility and regional control over fulfillment. Local distribution centers in key markets help speed order processing and last-mile delivery tailored to country-specific needs.

**Multi-sourcing and Regional Production:** Shopee sources products from diverse local and international suppliers, especially in China and Southeast Asia. This multi-sourcing strategy mitigates risks, reduces cross-border costs, and ensures quicker customer fulfillment.

**Customer-centric and Data-driven Optimization:** Shopee uses customer feedback and data to refine supply chain processes and improve service, including flexible return policies. AI-driven demand forecasting adapts fulfillment to changing consumer preferences, boosting satisfaction and retention.

**Sustainability and Cost Control:** Shopee incorporates eco-friendly packaging, order consolidation, and digital solutions to reduce waste and emissions. These sustainability efforts, paired with cost optimization in sourcing and logistics, help keep prices competitive while supporting responsible operations.

### 3.1.6. Supply Chain Flows

Shopee's supply chain flows operate through three integrated channels: information, product, and financial flows.

**Information Flow:** Shopee leverages advanced digital systems to enable seamless, real-time communication across suppliers, sellers, logistics partners, and customers. This includes order tracking, inventory updates via APIs, and demand forecasting powered by AI algorithms that analyze consumer behavior and campaign data. Features like Shopee's group shipping consolidate multiple orders for cost efficiency, while centralized databases ensure accurate and timely data sharing to minimize logistics errors and enhance operational visibility.

**Product Flow:** Physical goods flow from suppliers, through regional warehouses (including Shopee Xpress hubs), to end customers. Inbound shipments are managed by third-party logistics or Shopee's own fleet, followed by picking, packing, and last-mile delivery operations. The flow also incorporates reverse logistics such as returns management and product reconditioning, which support customer satisfaction and sustainability goals.

**Financial Flow:** Transactional processes involve secure payment systems where buyer payments are held in escrow by Shopee until order fulfillment is confirmed. Seller commissions, logistics fees, and refunds are managed transparently to support smooth cash flow across the ecosystem. Recent fee adjustments have enabled reinvestment in logistics infrastructure and technology upgrades, balancing cost control with service quality in emerging markets.

Together, these integrated flows form a robust, responsive supply chain network that enables Shopee to deliver fast, reliable, and customer-centric e-commerce experiences across Southeast Asia and beyond.

### ***3.2. Digital Technologies Adopted to Enhance Agility***

#### ***3.2.1. Plan***

**AI and Machine Learning:** Shopee uses AI-powered forecasting systems such as deep learning and clustering algorithms to predict demand at the Stock Keeping Unit (SKU), regional, and campaign levels. These systems process vast quantities of historical sales data, real-time clicks, web traffic, social trends, competitor pricing, and external factors (e.g., local holidays, weather). These advanced forecast models allow for granular sales projections per region and product, scenario analysis for large-scale events such as double-day or end-of-month sales, as well as instant detection of changing trends and short-term demand surges.

**Big Data Analytics and Predictive Insights:** Shopee's big data platform ingests massive streams of user actions, sales, fulfillment activity, partner feeds, and supply-side data into a centralized cloud system engineered for speed and scalability. Predictive analytics then continuously mine this rich data to spot emerging micro-trends by analyzing transactions, seasonality, and campaign effects. These data-driven processes also inform pricing and promotional decisions, tailoring offers or bundles to current demand signals and user behaviors, and ultimately boosting conversion rates while avoiding overstock or stockouts.

**Cloud-Based Collaboration and Automation:** Shopee relies on cloud-based planning dashboards and integrated collaboration platforms to keep its supply chain teams and external

partners in sync, leveraging real-time infrastructure for high scalability and efficiency. These digital systems enable procurement, logistics, marketing staff and suppliers to access up-to-date forecasts, monitor supply or fulfillment constraints, and collaboratively adjust operational plans. Workflow automation engines and instant notification features significantly streamline communications and approval processes between departments.

### *3.2.2. Source*

**E-Procurement Platform:** Shopee's sourcing starts with a comprehensive, cloud-based e-procurement platform that automates the supplier selection, onboarding, and purchase order (PO) process. This platform maintains an up-to-date digital catalog of certified suppliers and their offerings, enabling fast product discovery and seamless order creation. Automated PO generation and approval workflows minimize manual intervention and human error, while digitized records provide immediate traceability and auditability for each sourcing activity.

**Supplier Integration Tools:** Beyond basic procurement automation, Shopee leverages supplier integration solutions such as API connectors and electronic data interchange (EDI). These tools facilitate direct, real-time data exchange between suppliers' enterprise systems and Shopee's central procurement and inventory platforms. Inventory levels, order statuses, shipping schedules, and compliance documents are automatically synced, reducing time lags and improving supplier responsiveness.

**Vendor Performance Analytics:** To continuously optimize sourcing quality and reliability, Shopee applies big data analytics and AI to track and evaluate the performance of its suppliers. KPIs such as lead time, order accuracy, quality defect rates, and on-time delivery are measured and benchmarked over time. Predictive analytics then highlight suppliers at risk of delays or compliance issues, and advanced reporting tools suggest corrective actions or alternative vendor options when red flags are detected.

### *3.3.3. Make*

**Automated Sortation Systems:** Shopee has heavily invested in automated parcel sortation technology at its regional and national fulfillment centers. These systems use conveyor belts, barcode scanners, and robotics to quickly identify, classify, and direct parcels to their appropriate lanes or delivery partners based on destination, size, and service type. Automation replaces most of the manual sorting work, enabling fulfillment centers to handle millions of parcels daily with minimal human error and much shorter processing times.

**Data-Driven Warehouse Management Systems (WMS):** Shopee's WMS is a digitally orchestrated system coordinating every step in the fulfillment workflow, from inbound receipt and storage to picking, packing, and outbound dispatch. Using real-time tracking and analytics, the WMS optimizes inventory placement inside the warehouse, manages allocation of manpower and equipment, and integrates seamlessly with Shopee's order management and logistics systems. This level of orchestration ensures swift, accurate order fulfillment and dynamic reallocation of stock between warehouses as well as minimizes picking errors.

**IoT-Enabled Inventory Tracking and Automation:** Shopee uses Internet of Things (IoT) devices and sensors installed throughout its fulfillment centers to continuously monitor inventory movements, environmental conditions, and equipment performance. These sensors feed real-time data to Shopee's WMS and analytics platforms, triggering automated alerts for low stock, equipment issues, or deviations from storage standards.

#### *3.3.4. Deliver*

**Hyperlocal Delivery Management Platform:** Shopee's SPX Express utilizes a sophisticated, cloud-based logistics platform that integrates neighborhood-level collection points, micro-hubs in public spaces, family-run shops, and gig workforce management into a single digital ecosystem. Parcel drop-off and pick-up locations are strategically embedded within communities, allowing Shopee to collapse delivery times to next-day for 90% of domestic parcels, and within two days for half of orders region-wide.

**AI-Driven Route Optimization:** SPX Express employs advanced AI algorithms that dynamically compute optimal delivery routes based on traffic conditions, delivery volume, and geographic challenges unique to Southeast Asia. These algorithms adjust routes in real time, balancing workload among thousands of couriers and micro-hubs, and enabling sorting centers to process up to 400,000 parcels daily without bottlenecks.

**Real-Time Tracking and Automated Notifications:** Shopee's logistics app ecosystem provides end-to-end transparency for buyers, sellers, and delivery staff. Customers and merchants receive instant updates at every stage (dispatch, in transit, arrival at micro-hub, delivery), while couriers and support teams use the real-time dashboard to resolve exceptions or address delays. These automated notifications, paired with GPS-integrated tracking, reinforce reliability and customer trust.

#### *3.3.5. Return*

Shopee's returns management is streamlined and customer-centric, powered by a suite of digital innovations that increase flexibility, speed, and confidence for buyers across Southeast Asia.

Central to its approach is the app-integrated 15 Days Free Returns program, allowing users to return items within 15 days of delivery for a full refund, even for "change of mind" decisions. Through the Shopee app, users initiate returns by selecting their order, stating the reason, and following step-by-step digital instructions for packing and shipping. Users can either opt for free doorstep pickup via Shopee Supported Logistics or drop off parcels at local SPX Express or other outlets with courier choices and time slots managed directly in the platform for maximum convenience. Automated notifications and status updates are delivered via the app, keeping buyers informed at each stage (request, pickup, approval, and refund), while sellers and Shopee customer service can resolve disputes and exceptions through integrated chat and dashboard features.

### **3.3. Evaluation of Shopee's Digital Technologies**

#### **3.3.1. Achievements of Shopee after Applying Digital Technologies**

**Enhanced Delivery Speed and Market Dominance:** Shopee's investment in logistics automation, real-time tracking, and AI-powered route optimization has resulted in remarkable delivery speed and reliability across its main markets. As of 2024, 90% of Shopee parcels in Singapore are delivered the next day, and about 25% of all regional parcels move through its SPX Express hyperlocal network. Shopee processes up to 400,000 parcels a day at a single sortation center alone, demonstrating scalable and resilient operations even during massive sales surges (Poh and Tan, 2025).

**Optimized Inventory and Reduced Stockouts:** Shopee's implementation of big data platforms, predictive analytics, and IoT-enabled warehouse systems has led to more precise demand forecasts and inventory optimizations, with AI models capable of reducing demand planning errors by up to 50% compared to traditional approaches (Dmytro and Chupryna, 2025). Dynamic allocation across thousands of SKUs and fulfillment centers ensures Shopee minimizes overstock and avoids lost sales from stockouts. These efficiencies have contributed to record-setting e-commerce revenue, with Shopee's logistics arm generating \$799 million in services revenue in 2024, up 14% YoY (Poh and Tan, 2025), as fulfillment becomes both smarter and more cost-effective.

**Superior Buyer Experience and Loyalty:** Digital automation offers Shopee's customers end-to-end transparency: 88% of users report that real-time delivery tracking is essential for a positive experience, and Shopee's dashboard flags and resolves exceptions rapidly, such as delays or failed deliveries (Anchanto, 2023). Survey results across Southeast Asia indicate 74% of online shoppers expect delivery within two days, and Shopee's hyperlocal courier model delivers next-day or two-day fulfillment for the vast majority of parcels, supporting both buyer expectations and repeat purchasing (Capital One Shopping, 2025).

**Empowerment of Sellers and Local Brand:** Shopee's agile digital supply chain allows thousands of sellers to benefit from fast onboarding, simplified e-procurement, and data-driven support. Sellers using Shopee's infrastructure can leverage the SPX Express drop-off network and dashboard analytics to monitor delivery speed and minimize late shipment rates. Shopee's platform further drives seller growth by handling logistics and fulfillment, letting entrepreneurs focus on scaling up their offerings without supply chain bottlenecks. These improvements have contributed to the company's retail, logistics, and e-commerce revenue growing toward a projected \$13.4 billion in 2024, up 36.6% year-over-year and reaching \$3.1 billion in Q1 2025 alone, up 28.7% YoY (Techinasia.com, 2025).

**Scalability, Resilience, and Financial Growth:** Digital supply chain agility has enabled Shopee to ramp up capacity rapidly during major events, such as flash sales and double-day campaigns, with its logistics army processing 10.9 billion orders in 2024, an increase of 33% YoY (Techinasia.com, 2025). The resilience built through automation, micro-hub expansion, and diverse

courier management allowed Shopee's parent company, Sea Ltd., to report annual revenue of \$16.8 billion in 2024, an increase of 28.8% YoY (Techinasia.com, 2025). This financial leap highlights how supply chain digitalization is now a core driver of both Shopee's operational performance and shareholder value in Southeast Asia's rapidly growing e-commerce market.

### *3.3.2. Key Success Factors*

**Deep Technology Integration:** Shopee leverages a robust tech stack that spans every stage of supply chain operations, from AI-driven demand forecasting and big data analytics in planning, to IoT-enabled real-time inventory tracking, API-integrated warehouse and inventory management systems, and GPS-based route optimization for delivery. This seamless tech integration ensures real-time information flows, visibility, and rapid detection of changes or disruptions, enabling swift, data-backed responses and minimizing errors or bottlenecks.

**Responsive and Collaborative Infrastructure:** Regional production and distributed fulfillment centers across Southeast Asia allow Shopee to localize supply, minimize shipping time, and dynamically reallocate resources where needed. Integrated digital collaboration with suppliers and third-party logistics (3PL) partners using real-time dashboards, automated alerts, and Service Level Agreement (SLA) monitoring tools keeps all nodes aligned and enables proactive adaptation to demand surges or disruptions.

**Advanced Logistics and Last-Mile Solutions:** The use of Shopee Xpress, smart lockers, self-pickup hubs, and a mobile-first app ecosystem gives Shopee fine-grained control and flexibility over last-mile delivery. AI-driven route and batch optimization, live status updates, and digital proof-of-delivery tools drive efficient, on-time order fulfillment is the key to maintaining end-customer satisfaction under rapidly changing demand.

**Accurate Forecasting and Data-Driven Decision-Making:** Forecasting technology enables Shopee to predict and pre-allocate volumes before campaigns or peak periods, avoiding both understock and overstock. Data analytics facilitate real-time adjustments to inventory, delivery routes, and promotional strategies, helping Shopee stay ahead in a volatile and competitive market climate.

### *3.3.3. Challenges When Applying Digital Technologies*

**Logistics Partner Tensions and Changing Standards:** Shopee's extraordinary growth in Southeast Asia requires continuous evolution of logistics practices and benchmarks. This evolution, however, places sustained pressure on third-party logistics partners regarding stricter service standards, compliance metrics, and shifting delivery cutoffs like the Fast Handover Rate. Each time Shopee rolls out new operational mandates, last-mile providers, couriers, and warehouse partners must rapidly adapt their routing, staffing, and reporting. While these measures aim to raise quality and speed, they often create confusion, resource strain, and sometimes friction between Shopee and its logistics allies. When partners fail to meet KPIs, they risk penalties or even losing contracts, which can erode long-term relationships and introduce instability into Shopee's fulfillment network.

**High Capital and Resource Requirement in Logistics Expansion:** Building Shopee’s in-house logistics network, including Shopee Xpress and regional fulfillment hubs, gives Shopee greater control and speed but demands enormous, ongoing investments in capital, technology, and skilled labor. The cost of expanding automated sortation centers, warehouse facilities, delivery vehicles, and supporting digital platforms is immense, especially in dynamic markets with fragmented infrastructure.

**Geographical and Infrastructure Constraints:** With remote rural settlements, islands, and varied infrastructure quality, Southeast Asia’s geography makes logistics complex and costly. Poor road networks, limited access to remote communities, and the need for slow maritime routes complicate last-mile delivery, raising both costs and fulfillment times. Shopee must rely on a combined model of in-house and local partners to reach such areas, but coverage gaps remain. Furthermore, differences in delivery address systems, dense urban congestion, and unreliable power or network connectivity continue to challenge digital logistics platforms.

**Seller and Customer Experience Challenges Amid Rapid Change:** Shopee’s frequent adjustments to seller fees, operational requirements, and fulfillment policies can strain relationships with marketplace merchants, especially smaller, less resilient businesses. Sellers must stay abreast of changing rules to avoid incurring penalties for delayed shipments, incorrect listings, or non-compliant products. These frequent changes may thin margins and push some sellers out, making seller retention more challenging over time. At the same time, customer expectations for speed, reliability, and service quality are rising rapidly, fueled by competition and digital convenience. Poor communication or delivery bottlenecks can harm reputation and market share, especially when rivals offer compelling alternatives.

#### *3.3.4. Comparative Insights*

**Lazada:** Lazada has established a robust supply chain network supported by its extensive fulfillment centers across Southeast Asia, complemented by significant investments in warehouses, sorting centers, and digital technologies. It emphasizes reliability, leveraging AI-driven tools for smarter product listing, marketing, and operational efficiency. Lazada targets middle- and upper-income consumers, with a strong focus on branded, premium products and verified sellers via LazMall, positioning itself slightly differently from Shopee’s broader, price-sensitive marketplace. Its logistics incorporate “free-touch” last-mile delivery services and smart lockers, designed to improve delivery speed and customer experience. Despite stiff competition, Lazada maintains a loyal user base, sustained by steady infrastructure investment and regional adaptation.

**Tokopedia:** Tokopedia, a leading Indonesian player now part of GoTo Group, centers its supply chain strategies on localized fulfillment solutions, leveraging micro-hubs and partnerships with a variety of local couriers to extend reach into Indonesia’s diverse archipelago. Tokopedia balances between marketplace and direct sales, with a strong emphasis on supporting SMEs and local brands through streamlined onboarding and financing tools. Its logistics strategy focuses on cost-effective last-mile delivery across Indonesia’s complex geography, employing digital tracking

and AI for dynamic route optimization. Challenges include infrastructure limitations and regulatory compliance, yet Tokopedia has scaled considerably by tailoring supply chain solutions to unique local market conditions.

**Comparison with Shopee:** Shopee’s supply chain success rests on a unique combination of scale, technology integration, and customer-centric agility surpassing regional counterparts. Shopee’s hyperlocal delivery network (SPX Express) and heavy investment in automated fulfillment centers allow it to process hundreds of thousands of parcels daily with rapid, reliable next-day delivery in major markets, outpacing Lazada’s “free-touch” logistics and Tokopedia’s locally distributed courier models. Shopee’s broader marketplace focus, extensive digital marketing, and financing products enable it to engage a more price-sensitive audience, including a larger C2C segment, yielding dramatically higher gross merchandise. Furthermore, Shopee’s integrated supply chain tech stack, from AI-powered demand forecasting through IoT-enabled warehouse monitoring to GPS-based last-mile optimization, combined with data-driven seller tools, provides exceptional operational visibility and agility. Whereas Lazada emphasizes premium experiences and Tokopedia prioritizes local market customization, Shopee’s model excels in rapid scalability, technological innovation, and ecosystem expansion.

In conclusion, though all three platforms grapple with challenges like rising logistics costs, regulatory complexity, and market saturation, Shopee’s superior digital infrastructure and hyperlocal logistics stand as critical differentiators. This underpins Shopee’s current market leadership and sets a high competitive bar for its Southeast Asian rivals in 2025 and beyond.

## **4. Conclusion and Recommendations**

### **4.1. Conclusion**

This study empirically examines the impact of agile supply chain practices and digital technology adoption on Shopee’s operational performance and market leadership. The analysis highlights several key determinants of Shopee’s success: logistics automation, AI-powered forecasting, hyperlocal delivery networks, real-time tracking, and data-driven decision-making.

The findings reveal that Shopee’s investment in digital supply chain innovations has significantly enhanced delivery speed and reliability, with next-day delivery achieved for 90% of parcels within Singapore and SPX Express handling about 25% of regional deliveries. These capabilities helped Shopee capture a dominant 52% share of gross merchandise value (GMV) in 2024, surpassing rivals like TikTok Shop and Lazada. Automated warehouse systems and IoT-enabled inventory tracking reduced forecasting errors by up to 50%, minimizing stockouts and optimizing inventory across thousands of SKUs.

Shopee’s customer-centric digital approach improved buyer experience and loyalty through transparent, real-time tracking and streamlined returns, contributing to strong user growth and repeat purchases. Meanwhile, sellers benefiting from Shopee’s infrastructure experienced delivery rates with late shipments under 10%, enabled by comprehensive dashboard analytics and the SPX drop-off network. These ecosystem improvements fueled Shopee’s retail and logistics revenue

growth, reaching projected annual revenues of \$13.4 billion in 2024 with continued expansion into 2025.

Overall, the evidence supports that Shopee's agile digital supply chain is a critical competitive advantage that drives operational excellence, market leadership, and scalable financial growth. Its success underscores the transformative potential of integrated technology and responsive logistics in the fast-paced Southeast Asian e-commerce landscape, providing a model for sustainable growth amid rising regional competition.

## **4.2. Recommendations**

### *4.2.1. For Vietnamese Enterprises*

**Strengthening Digital Foundations for Supply Chain Visibility:** Vietnamese enterprises should begin by reinforcing their digital infrastructure, as this is the prerequisite for agility. Companies need to implement cloud-based ERP or WMS systems, apply barcode/RFID inventory tracking, and digitalise information flows across purchasing, warehousing, and logistics. These technologies increase transparency, reduce manual errors, and allow managers to monitor stock levels, order status and capacity constraints in real time. When operations become digitally synchronised, firms are better positioned to handle demand fluctuations and orchestrate rapid responses to market changes.

**Advancing Analytics and Forecasting Capabilities:** Enterprises should adopt data-driven forecasting tools to anticipate market shifts more accurately. The use of AI-enabled demand sensing, predictive analytics and real-time dashboards allows firms to detect emerging consumption patterns, seasonal peaks, or campaign-driven surges and adjust stock levels accordingly. This capability reduces stockouts, prevents overstocking, and enables more efficient allocation of resources during peak periods. Applying analytics across procurement, inventory planning, and fulfilment also supports quicker decision-making, which is essential for maintaining agility in competitive e-commerce environments.

**Enhancing Fulfilment and Supplier Collaboration for Responsiveness:** Vietnamese enterprises must modernise fulfilment operations and strengthen supplier coordination to boost responsiveness. This involves adopting IoT-enabled monitoring within warehouses, redesigning fulfilment centres to allow flexible scaling, and using micro-fulfilment hubs or partnerships with third-party logistics providers that offer automated routing and real-time tracking. At the same time, firms should collaborate digitally with suppliers through API/EDI platforms that synchronise order updates, delivery schedules and performance metrics. A resilient supplier network combined with efficient fulfilment operations ensures that enterprises can respond rapidly to disruptions or demand spikes.

### *4.2.1. For Policymakers and Government Agencies*

**Enhancing National Digital Infrastructure and Logistics System:** The government should prioritise strengthening Vietnam's digital infrastructure to support agile supply chain development.

This includes expanding nationwide high-speed internet and 5G connectivity, investing in secure national data centres, and improving digital logistics platforms that link customs, transportation, and warehousing systems. Upgrading transport infrastructure such as key highways, intermodal hubs and distribution centres will further reduce bottlenecks and complement digitalisation efforts, enabling faster and more predictable goods movement across the country.

**Establishing Support Mechanisms and Incentives for Digital Transformation:** To accelerate enterprise-level adoption of digital technologies, the state should introduce financial and regulatory support mechanisms. These may include tax incentives for investing in WMS, TMS, ERP and automation technologies, low-interest loans for SMEs undertaking logistics digitalisation, and grant programmes supporting R&D or pilot projects in warehouse robotics and IoT applications. Through targeted incentives, the government can lower the entry barriers that currently hinder many Vietnamese firms, especially smaller retailers and manufacturers, from pursuing digital transformation.

**Standardising Data Governance and Developing Digital-Ready Workforce:** The government needs to implement national data governance frameworks to promote interoperability and secure information exchange between enterprises, logistics providers and e-commerce platforms. Establishing common data standards will reduce fragmentation and strengthen trust across the supply chain ecosystem. In parallel, Vietnam should prioritise workforce development by integrating supply chain analytics, automation, and digital operations training into university programmes and vocational curricula. National reskilling initiatives for workers in logistics and manufacturing will help build a talent pool capable of operating advanced digital systems and contributing to long-term supply chain agility.

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