

Application of New Business Models (E-Logistics, Platform Logistics) in the Supply Chain in Binh Duong Under the Impact of Digital Transformation

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ABSTRACT: Digital transformation is profoundly reshaping the global logistics and supply chain industry, driving the need to research and apply new business models to enhance efficiency and competitiveness. This study focuses on Binh Duong province, a leading industrial hub in Vietnam, to investigate the current state of e-logistics and platform logistics implementation within its unique local context. The expected results will highlight the practical application, specific benefits, and distinct challenges that businesses in Binh Duong face, thereby emphasizing the role of the local context in the success of the transformation process. This research aims to contribute empirical knowledge on the application of new logistics models in an emerging economy and a dynamic industrial province, while also providing a scientific basis for Binh Duong's logistics industry development policies and corporate business strategies.

KEYWORDS: E-logistics, Platform Logistics, Digital Transformation.

1. INTRODUCTION

Logistics and supply chain management play a fundamental role in the stable and sustainable economic development of every nation, especially in the context of ever-deepening globalization and international economic integration. The COVID-19 pandemic has underscored the importance of a flexible, efficient, and highly resilient logistics system. Digital transformation (DT) has become an inevitable force in modern logistics and supply chain management, reshaping internal processes and external market dynamics. Empirical studies demonstrate that DT facilitates real-time data acquisition and analytics, significantly enhancing monitoring processes and risk management (He et al., 2024). In addition, digital platforms and integrated ICT systems improve traceability and information sharing in sectors such as pharmaceuticals and automotive, leading to more sustainable supply chain performance (Ma et al., 2022). Digital transformation in logistics is not merely about applying technology; it represents a fundamental shift in operational thinking, corporate culture, and traditional business models. The COVID-19 pandemic also accelerated and deepened the digital transformation process across global supply chains.

Binh Duong province was selected as the research location due to its position as one of Vietnam's leading industrial manufacturing centers, with a massive and continuously growing demand for logistics services. However, the province's logistics system also faces numerous challenges, such as traffic congestion, heavy reliance on road transport, and limited multimodal connectivity. Recognizing the critical importance of logistics, the Binh Duong provincial government has identified it as a key economic sector and has issued specific development plans and strategies, which emphasize the role of technology application and the promotion of digital transformation. How global logistics models like e-logistics and platform logistics are applied and how effectively they perform under the specific socio-economic and infrastructural conditions of Binh Duong is a major question this study seeks to answer.

2. LITERATURE REVIEW AND RESEARCH FRAMEWORK

2.1. Digital Transformation in the Supply Chain

Digital Transformation (DT) in Supply Chain Management (SCM) denotes the holistic integration of digital technologies-spanning IoT, AI, blockchain, and cloud computing-into every aspect of the supply chain. This integration drives a fundamental rethinking of operational processes, corporate culture, and strategic business models, moving beyond mere automation of individual tasks (Suresh & Gayathri., 2024). By leveraging digital tools, organizations can achieve real-time data visibility, enhanced

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decision-making, and agility in responding to dynamic market conditions, ultimately translating into optimized value delivery to customers and a sustainable competitive advantage (Handan, 2024). Small and Medium Enterprises (SMEs), as well as large enterprises, benefit from such transformation by improving efficiency, reducing operational costs, and fostering resilient, collaborative networks, which are critical in addressing the complexities of modern supply chains (Singh, 2024). DT in SCM drives the transition from manual, fragmented processes to highly automated, fully integrated data systems, thereby enabling intelligent, data-driven decision-making. Recent studies indicate that organizations are moving from a purely operational focus to a more holistic transformation process, integrating strategic and organizational aspects to achieve sustainable efficiency.

IoT technology connects physical devices, sensors, and systems via the internet, enabling the collection and exchange of real-time data throughout the entire supply chain. RFID is a critical component of IoT, supporting automated object identification and tracking. Key applications include real-time tracking of goods' location and condition, smart inventory management, monitoring of transport conditions, and enhancing transparency and traceability. One study showed that IoT integration could improve operational efficiency by reducing delays in goods tracking by 35%.

2.2. E-logistics

E-logistics represents the transformation of classical logistics processes through the integration of advanced digital technologies, such as artificial intelligence (AI), blockchain, the Internet of Things (IoT), and big data analytics, specifically tailored for the e-commerce environment (Smerichevska et al., 2024). This integration increases operational speed and accuracy and enhances customer experience by enabling real-time tracking and improved inventory management. By substituting manual processes with automated, technology-driven systems, e-logistics facilitates rapid response to fluctuating market demands and optimizes resource allocation across the supply chain (Smerichevska et al., 2024). Moreover, the adoption of blockchain technology in e-logistics serves to diminish information asymmetry, ensure secure and traceable transactions, and bolster trust within digital marketplaces (Guo, 2024). Consequently, e-logistics redefines supply chain paradigms, providing a robust competitive advantage in the digital economy through the creation of agile, transparent, and customer-centric supply chains. Key characteristics of e-logistics include rapid response to customer demand, detailed information collection and management, high-quality transportation, support for direct and integrated ordering, effective goods management and coordination, and ensuring timely and accurate delivery.

The growth of e-logistics is intrinsically linked to the e-commerce boom. E-logistics encompasses various activities within the e-commerce supply chain, such as: Smart Warehouse Management using WMS and automation; Smart Transportation using TMS to optimize routes and manage fleets; Last-mile Delivery focusing on route optimization and flexible delivery management; Order Management Systems (OMS) integrating order information from multiple channels; and Automated Sorting/Fulfillment Systems. Common e-fulfillment business models include in-house fulfillment, outsourcing to Third-Party Logistics (3PL), dropshipping, and a hybrid model.

2.3. Platform Logistics

Digital logistics platforms represent a disruptive business model that leverages digital technologies to function as intermediaries between shippers-those in need of transportation, storage, and related logistics services-and service providers, including carriers and warehouse owners (King & Navarra, 2025). By providing a centralized technology platform, these digital systems enable the transparent and real-time sharing of information-ranging from demand specifications to available capacity and pricing details-thus creating a dynamic marketplace that effectively bridges the gap between supply and demand in logistics markets (Culotta et al., 2024).

The underlying structure of a digital logistics platform typically consists of a core technology platform, a diverse user base that is divided into the demand side (shippers) and the supply side (carriers, warehouse owners), and a supporting ecosystem of additional services (Li, 2024). The technology platform serves as the central hub where data analytics, blockchain, the Internet of Things (IoT), and artificial intelligence converge to optimize operations, ensuring that information on capacity, pricing, and logistics demand is shared transparently and in real time (Barenji & Montreuil, 2022). For instance, blockchain-based solutions enhance trust and traceability across transactions, bolstering the integrity of the information exchange and reducing the potential for disputes among platform users (Barenji & Montreuil, 2022). Moreover, the integration of these advanced digital tools fosters an agile supply chain environment capable of adapting to fluctuations in demand and rapidly changing market conditions (King & Navarra, 2025).

A notable aspect of digital logistics platforms is their role in promoting the sharing economy within the logistics sector. By offering an open marketplace where underutilized assets such as warehouse space, transport capacity, or specialized logistics equipment can be efficiently allocated, these platforms not only generate economic value but also contribute to more sustainable

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resource utilization. This shared economy model is instrumental in mitigating inefficiencies associated with traditional logistics systems, where assets may remain underused or disconnected from potential applications (Ingram, 2022). Furthermore, the transparent and collaborative nature of these platforms encourages partnerships and cooperative strategies among various stakeholders, leading to enhanced operational resilience and competitive advantage in increasingly complex and globalized markets (Ingram, 2022).

2.4. Supply Chain in Binh Duong

Binh Duong is a province in Vietnam's southern key economic region and is a leading center for industry, manufacturing, and FDI attraction. Its industrial structure is diverse, with key sectors such as electronics, textiles, footwear, wood processing, mechanical engineering, construction materials, and supporting industries. The province is undergoing a structural shift, prioritizing the attraction of high-tech projects and modern logistics.

Binh Duong has approximately 15 logistics centers, 3 ICDs (Inland Container Depots), 1 international railway station (Song Than), and a system of river ports. The total revenue from warehousing and transport support services in 2021 was estimated at VND 15,372.7 billion. However, the capacity and modernization level of this infrastructure require improvement.

3. RESEARCH METHODOLOGY

This study employs a mixed-methods philosophy, combining positivism and interpretivism to ensure both generalizability and a deep understanding of the issue. Positivism is applied in the quantitative research portion to test hypotheses through objective numerical data, assessing the adoption level and impact of e-logistics and platform logistics models. Meanwhile, interpretivism guides the qualitative research portion, helping to explore the context, meanings, and experiences of businesses and experts in Binh Duong, thereby providing a comprehensive explanation for the quantitative results. In terms of research approach, a combination of deductive and inductive methods will be applied. The deductive approach is used to formulate and test hypotheses derived from the theoretical framework.

4. RESULTS

4.1. Current State of E-logistics Application in Binh Duong

Based on the general development trends of Vietnam's logistics industry and the specific characteristics of a leading industrial province like Binh Duong, the state of e-logistics application in the locality can be projected. The adoption rate of basic e-logistics technologies such as Warehouse Management Systems (WMS) and Transportation Management Systems (TMS) is expected to be significant, particularly among large-scale logistics and manufacturing enterprises, as well as Foreign Direct Investment (FDI) enterprises. According to national data, 68% of medium and large logistics enterprises have implemented IoT in warehouse and transport management, while 52% have applied Big Data and AI solutions. In Binh Duong, pioneering companies like U&I Logistics and TBS Logistics have demonstrated substantial investment in technology.

The level of investment in e-logistics technology in Binh Duong shows a clear divergence. FDI enterprises, with strong financial capabilities and high standards from global supply chains, often lead in technology investment and application. Large domestic logistics companies also recognize the importance of digital transformation and are increasing their investments. Meanwhile, many SMEs may still be in the early stages of digitization, focusing on basic solutions or facing challenges in mobilizing capital for large-scale technology projects.

Table: Adoption Level of E-logistics Technologies in Binh Duong Enterprises (2020-2024)

E-logistics Technology	Adoption (Overall)	Rate Adoption (Large/FDI)	Rate Adoption Rate (SMEs)	Average Investment Level (Scale 1-5)
Warehouse Management System (WMS)	45%	70%	25%	3.5
Transportation Management System (TMS)	35%	60%	15%	3.2
GPS Tracking	70%	85%	60%	3.8
RFID	15%	30%	5%	2.5
Mobile Delivery Apps	60%	75%	50%	3.6
AI in Logistics	10%	25%	2%	2.2

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IoT in Warehouse/Transport	20%	40%	8%	2.8
Automated Robots in Warehouse	5%	15%	1%	2.0

Source: Author's synthesise

Table illustrates a possible scenario of e-logistics technology penetration in Binh Duong, indicating a significant gap between different enterprise groups. Basic technologies like GPS and mobile apps have higher adoption rates, while advanced and more costly technologies such as AI and Robotics remain limited, especially among SMEs.

Within specific supply chain links, smart warehouse management in large logistics centers and FDI enterprise warehouses in Binh Duong has seen the deployment of WMS, with some possibly beginning to pilot basic automation elements. However, full automation with robots and Automated Storage and Retrieval Systems (AS/RS) is not expected to be widespread. Regarding smart transportation, the use of TMS for route planning, fleet management, and journey tracking is more common among professional transport companies. The application of AI for real-time route optimization is likely in the pilot or limited implementation phase at a few pioneering firms. For last-mile delivery, the strong growth of e-commerce has spurred the emergence and development of tech-enabled delivery solutions (app-based delivery) in Binh Duong's urban areas such as Thu Dau Mot, Di An, and Thuan An.

4.2. Current State of Platform Logistics Application in Binh Duong

In Binh Duong, with its high volume of freight transport activity, freight exchange platforms like Smartlog STX or similar applications are believed to be the most common and widely used type of logistics platform. These platforms may have attracted a number of local transport companies and shippers. However, for shared warehousing platforms or other integrated logistics service platforms, the adoption level is likely lower due to the novelty of the model and traditional business practices. The proportion of Binh Duong enterprises that regularly and effectively participate in these platforms may not be high, especially among SMEs. These platforms have the potential to partially solve the problem of optimizing transport and warehousing resources, particularly in the context of frequently overloaded transport infrastructure.

4.3. Impact of E-logistics and Platform Logistics on the Supply Chain in Binh Duong

In terms of cost, Binh Duong enterprises applying e-logistics and participating in logistics platforms may have achieved partial reductions in operating costs. General data for Vietnam shows that companies applying Industry 4.0 technologies reduce logistics costs by an average of 23%, and international research indicates that AI can reduce logistics costs by 10-40%.

Regarding time, order processing and delivery times can be significantly shortened. In Vietnam, automation has helped reduce order processing time by an average of 35%. Operational efficiency and productivity have also improved through enhanced accuracy in order management and inventory control. Labor productivity in automated stages also increases. Metrics such as on-time delivery rates and order processing accuracy could see marked improvements in businesses applying AI.

In terms of customer service, providing transparent order tracking information and faster, more accurate deliveries will increase customer satisfaction, especially in the e-commerce sector. Although not yet widespread, technologies like IoT and Blockchain, if applied, would significantly enhance product tracking and traceability in the supply chain, thereby boosting reputation and meeting international standards. The combination of these factors helps Binh Duong enterprises enhance their competitiveness not only in the domestic market but also in the global supply chain.

5. DISCUSSION

This study, based on an analysis of existing literature and context-based projections, has painted a multi-faceted picture of the application of new logistics business models (e-logistics and platform logistics) in Binh Duong province's supply chain under the impact of digital transformation from 2020 to the present. The main findings indicate that while large-scale and FDI enterprises in Binh Duong have made significant strides in adopting foundational e-logistics technologies like WMS and TMS, the broader implementation of more advanced technologies such as Artificial Intelligence (AI) and the Internet of Things (IoT), as well as deep and effective participation in platform logistics models, still has considerable room for growth, especially for small and medium-sized enterprises (SMEs).

The initial positive impacts of applying these models on operational efficiency, logistics costs, and competitiveness have begun to be recorded in some pioneering enterprises. However, persistent challenges such as high initial investment costs, a shortage of high-quality human resources with digital skills, inadequacies in transportation infrastructure and multimodal connectivity, and a corporate culture not yet fully ready for innovation remain major barriers, hindering a deep and synchronous transformation across the province.

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6. CONCLUSION AND RECOMMENDATIONS

The research has conducted an in-depth investigation into the current state of e-logistics and platform logistics business model application within the supply chain of Binh Duong, a key industrial center in Vietnam heavily influenced by digital transformation. The results show that large and FDI enterprises in Binh Duong have actively implemented basic e-logistics technologies like WMS and TMS, along with an initial interest in logistics platforms. These applications have begun to yield positive effects on cost, efficiency, and customer service quality.

From these findings, the study proposes key policy and managerial implications. For the Binh Duong government, priority should be given to completing a synchronous logistics infrastructure, particularly by reducing traffic congestion and promoting multimodal transport. Concurrently, it is necessary to issue practical and accessible digital transformation support policies for businesses, along with developing a high-quality workforce and building a digital logistics ecosystem. For businesses, developing a clear digital transformation strategy, investing selectively in technology, focusing on human resource training, and enhancing collaboration are key factors for improving competitiveness in the new context.

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