Cross-Border Digital Integration: Assessing How E-Commerce Platforms Shape International Shipping Logistics – A Case Study of EMS Algeria"

Lameche Hossem [1*]

[1] Farhat Abbas University - Setif 1.
Hossem.lameche@univ-setif.dz

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Abstract:

This study analyzes the impact of cross-border digital integration on international shipping logistics, using EMS Algeria as a case study. It looks at how APIs, cloud services, and electronic data interchange, which are all advanced digital technologies, make it easier for logistics companies and e-commerce platforms to work together.

The study shows that digital transformation makes things more efficient and clear, speeds up tracking shipments, cuts down on delays, and improves communication between operations on global delivery networks. We also talk about the problems and chances that come with following the rules, building infrastructure, and making alliances. This gives good tips on how to come up with competitive digital logistics plans in new markets. The results show how important digital tools are for Algeria's long-term success in international e-commerce logistics.

Keywords: E-Commerce Platforms; International Shipping, Digital Integration.

JEL Classification Codes : L81, R41, O33

*Dr.**lameche hossem**.

1-Introduction:

E-commerce has changed the way international business works by getting rid of the traditional barriers to trade and allowing capital and goods to flow across borders in ways that have never been seen before. E-commerce has changed the way people trade by making it possible for traders all over the world to connect directly. Digital trade is different from regular trade because it depends on devices that can connect to the internet and work well with international shipping companies.

Shipping and logistics services are very important because they connect people to online platforms both in the US and around the world. When these services are quick, reliable, and up-to-date with technology, they make it easier for businesses to trade across borders and boost the economy. On the other hand, problems with international shipping logistics can slow down transactions, disrupt business flows, and hurt the overall growth of global trade.

1.2 study problem:

How well do e-commerce platforms and international shipping systems work together to make cross-border logistics operations more efficient, reliable, and competitive? Also, how far has EMS Algeria gone to make this integration a part of its strategic and operational practices?

To narrow down the research and give it a clear structure, the main research question is broken down into these sub-questions:

- How can you explain why e-commerce platforms are so important for changing how international trade works?
- How do international shipping systems help make logistics work better in international trade?
- How can digital integration tools help e-commerce platforms and international shipping systems work together more easily?
- What metrics can we use to measure how well the partnership between EMS Algeria and e-commerce platforms is improving the speed of international shipping?

The study proposes the following hypotheses based on these sub-questions:

- Platforms for e-commerce change international trade in a big way by making shipping and receiving goods easier.
- Advanced international shipping systems are very important for making international trade's logistical operations run more smoothly.
- Digital integration (APIs, cloud systems, Blockchain) makes it faster for E-commerce platforms to send orders around the world.
- We can see how well the partnership between EMS Algeria and e-commerce sites is working by looking at some performance metrics. This will speed up international shipping. Dependability and being competitive.

1.3 Research Objective:

This research seeks to achieve the following:

- The study looks at how e-commerce platforms and international shipping are related, showing how they work together and how important they are for international trade.
- Explain how e-commerce platforms have changed international trade and what digital integration needs are necessary.
- Look at conceptual frameworks (LPI, Digital Value Chain) that show how global shipping can be more efficient and reliable.
- Explain how digital integration works and how it changes delivery performance metrics like speed, accuracy, reliability, and how competitive it is.
- Check out how well EMS Algeria is using digital technology now and rate the partnerships and projects that are already in place.
- Suggest new digital tools and strategic partnerships to help EMS Algeria do better in international shipping.
- Filling in the gaps in research centers, institutions, and the Arab business world about how digital technologies are being used in international shipping.

1.4 Research Significance:

The importance of this research paper is highlighted thru the following aspects:

- Enhancing the efficiency of international shipping for global e-commerce.
- Supporting the digital transformation plan in Algeria and the logistics infrastructure.
- Bridging the knowledge gap in Arabic studies on digital integration in international shipping.
- Improving the consumer experience thru fast delivery processes and the efficiency of e-commerce platforms.
- Creating specialized jobs in the field of technology and logistics services.
- Helping small and medium-sized enterprises access global markets.
- Providing decision-makers with the necessary data to design effective strategies in the field.
- Enhancing regional cooperation and the free trade area.
- Bridging the digital divide between Algeria and developed countries.

1.5 Study method:

This study adopts a descriptive-analytical technique that comprises acquiring, classifying, analyzing, and correlating material in an attempt to explain the phenomenon under examination, with the purpose of reaching conclusions. Consequently, all matters linked to e-commerce platforms, international shipping, and digital integration between them will be studied. Field study was also employed, notably in analyzing the data and statistics collected from the EMS express mail service, which led us to provide practical and digital solutions to the research topic.

1.6 Literature Review:

1.6.1 Studies related to the variable of e-commerce platforms:

- (**Soleimani**, **2022**) The study reviewed 129 studies on trust in e-commerce platforms from 2000 to 2019. It identified four types of trust: customer trust in sellers, community trust, trust in technology, and seller trust in customers. Trust impacts transaction intention, customer retention, seller perception, satisfaction, and risk perception. The study found a significant research gap in understanding seller trust in e-commerce environments.
- A study (**Wang, 2024)** analyzed the factors influencing channel choice intentions between official online brand stores and e-commerce marketplaces, focusing on Apple electronics customers in Taiwan. The research found that cross-channel search negatively affects channel choice intention in official online stores, while brand loyalty and pricing advantage have positive effects. Channel satisfaction was found to be the strongest influencing factor in both platforms. The study also highlighted the importance of understanding customer preferences in a multi-channel environment, especially during the COVID-19 pandemic. The findings suggest that brands should enhance their sales channel strategies.

1.6.2 Studies related to the variable of International shipping systems:

- **(Amel, 2015/2016)**, The study addressed broad theoretical concepts in the logistics sector, which ensures the facilitation of international freight transport flow in Algerian ports and the efficient administration of logistical activities. It focused on developing transport methods and infrastructure, especially due to Algeria's geographical proximity to European and Asian countries, which gives it an international competitive advantage and creates opportunities and other areas to reduce freight shipping costs, thereby impacting economic development.
- **(Samir Boukhtala, 2017),** It addressed the issue of strategies and prospects for developing the transport sector in Algeria within the framework of national economic development by dividing this research paper into three main axes aimed at highlighting the importance of transport economics and the extent of the transport sector's contribution to achieving economic development. The researchers determined the necessity of developing the transport industry and the connected industries that have significant added value. Which mandates that the Algerian government investigate the varied implications of the transport sector in order to establish a specialized strategy to maximize the national economy.
- **(Tsantis, 2022)**, conducted a systematic literature assessment of 130 scientific papers to discover factors influencing shipping corporations' decisions to develop direct container shipping connections between countries, the study identified 23 major parameters divided over five primary themes: shipping networks (nautical distance and port infrastructure), connectivity, port selection criteria, trade dynamics, and alternative transport modes. The findings reveal that while trade is the key motivator for developing direct shipping ties, several other factors greatly impact this decision, the research provides an integrated theoretical framework that clarifies the bidirectional relationship between logistics and international trade.

2.Theoretical Framework: of E-commerce Platforms, International Shipping Systems, and digital integration.

E-commerce platforms have grown quickly in the last ten years, changing the way producers and consumers interact around the world and having a big impact on international trade, this change has created new logistical problems that require international shipping systems that are more flexible and efficient, Digital integration is now an important link between e-commerce and shipping, this has led to better performance and a better experience for customers.

The theoretical framework examined seeks to elucidate the interactive relationship among e-commerce platforms, international shipping systems, and digital integration, proposing a holistic model that improves logistical efficiency in global e-commerce through the synthesis of diverse theories, including digital transformation, supply chain management, and information systems integration.

2.1 Introduction to E-Commerce Platforms

2.1.1 Definition of Electronic Platforms

E-commerce has significantly transformed international trade patterns in the digital age by eliminating geographical and procedural barriers, facilitating global market expansion, reducing transaction costs, and improving supply chain efficiency. Understanding the strategic role of e-commerce in global commercial and logistical integration is crucial.

E-commerce platforms are advanced digital systems that connect different groups of users (sellers, buyers, service providers, and logistical partners) in an interactive way to make it easier for people to trade and exchange services online. These platforms protect everyone's rights and make sure that business and financial transactions can be done safely and reliably **(Evans, 2016, pp. 12-14).**

2.1.2 The main components of an effective platform:

- **User Interface (User Interface):** Modern platforms make shopping easier and more fun by making user interfaces that are easy to use and look good. These interfaces let you search for products in a lot of different ways, filter them in a lot of different ways, and change the way they look to fit your needs **(Turban, 2015, pp. 234-239).**
- **Secure Payment Systems:** Platforms let you pay with different methods, like credit cards, digital wallets, and bank transfers. These systems need to be protected by robust digital encryption while adhering to international security standards such as PCI DSS **(Laudon, 2020, pp. 156-160).**
- **Integrated Logistics Services:** The online platforms work with shipping and distribution companies to offer a variety of shipping options and let customers track their orders in real time. Real-time tracking lets customers see where their goods are at all times **(Anderson, 2006, pp. 29-35)**.
- **Trust & Rating Systems:** Platforms depend on clear rating systems that let customers rate sellers and products, which builds trust between the two sides. This method uses star ratings, written reviews, and checking the person's identity **(Ba, 2002, pp. 303-310).**

- **Customer Service & Support:** Platforms offer help around the clock through a variety of channels, such as live chat, email, and phone, to quickly resolve issues and answer questions **(Anderson, 2006, pp. 89-95)**.

2.1.3 The fundamental difference between platforms and traditional e-commerce stores:

Traditional online stores, like the website of a single company, only have a small selection of products from one vendor, the company is in charge of the inventory and delivery.

There are a lot of independent merchants on e-commerce platforms who don't directly follow the platform. This means that there are a lot of different products and prices **(Parker, 2016, pp. 88-92).** Amazon started out as a regular online store that only sold books. After 2000, it became a platform that let other businesses sell their goods, making it the biggest e-commerce site in the world **(Zuboff, 2019, pp. 45-56)**.

2.1.4 Different types of e-commerce platform:

2.1.4.1 B2C Platforms (Business-to-Consumer):

B2C (Business-to-Consumer) platforms play a significant role in linking businesses and brands directly with customers, seeking to simplify and enhance the buying experience from product discovery to post-sale support **(Laudon, 2020, pp. 156-162)**. Key aspects distinguishing these platforms include transparency in pricing, user-friendly design, reliable and timely home delivery, good customer support, and easy return procedures **(Anderson, 2006, pp. 67-73).** Prominent B2C platforms globally include Amazon, eBay, and Alibaba's AliExpress, with Amazon acknowledged as the largest, servicing over 100 countries.

In the Arab area, significant platforms are Souq.com (now part of Amazon), Noon in Saudi Arabia, and Jumia, which covers African and Middle Eastern markets. B2C platforms earn money through numerous methods, including commissions (usually 5-15% per sale), adverts for product visibility, and premium services like expedited delivery or memberships **(Zuboff, 2019, pp. 89-100)**.

2.1.4.2 B2B Platforms (Business-to-Business):

B2B (Business-to-Business) platforms serve as intermediaries for wholesale transactions between corporations and factories, differentiating from B2C (Business-to-Consumer) platforms by focusing on organizational decision-makers. These platforms feature large inventories, significantly lower wholesale prices, complex commercial terms (including options like payment after delivery and lines of credit), long-term contractual agreements, and high-quality standards with precise technical requirements **(Grant, 2010, pp. 234-240).**

Examples of B2B platforms include Alibaba B2B, which links Chinese suppliers with global distributors, Worldwide Sources specializing in Asian suppliers, TradeKey for international B2B trade, and Made-in-China for accessing Chinese suppliers. The business model for these platforms primarily includes revenue from supplier subscriptions, listing fees for quotes or products, and advanced services such as corporate verification and logistical support **(Rochet, 2003, pp. 156-166)**.

2.1.4.3 C2C Platforms(Consumer-to-Consumer):

C2C (Consumer-to-Consumer) platforms encourage the direct sale of goods between individuals, allowing consumers to sell both new and used items without the necessity for formal merchant status **(Rochet, 2003)**. Key characteristics include: vendors and purchasers being ordinary individuals, negotiable price, reliance on reputation systems, and the absence of official guarantees from the platform **(Ba, 2002).**

Notable examples of C2C platforms are OLX, a popular app in the Arab world and Asia; Letgo, which concentrates on secondhand things in the US; Facebook Marketplace for local sales of secondhand goods; eBay Classifieds for classified ads; and Avito, a significant platform in the Arab region. C2C platforms are normally free for regular merchants to encourage participation, with chances for premium marketing at a cost for improved visibility, and they frequently levy buyer fees for high-value transactions.

2.1.4.4 O2O Platforms(Online-to-Offline):

O2O (Online-to-Offline) platforms merge digital shopping and online ordering with physical services and products. Key traits include immediate services, vital geolocation, pre-booking through applications, and user ratings based on real experiences **(Teece, 2010, pp. 145-156)**. Examples range from transportation services like Uber and Careem to delivery systems like Deliveroo and Uber Eats, and rental businesses such as Airbnb. The business strategy focuses on commission from services, subscription fees, advertisements, and paid services, demonstrated by Uber's commission and Amazon Prime's offerings.

2.1.5 Key Characteristics of Modern Platforms:

Modern platforms demonstrate key traits like as network effects, multi-sided markets, and the utilization of big data and algorithms. Network effects show that a platform's worth grows with user numbers, as illustrated by Uber's and Facebook's valuation increases through user expansion **(Zuboff, 2019, pp. 67-72)**.

Multi-sided markets service distinct user groups that depend on one other, Platforms employ big data for tailored suggestions and dynamic pricing, improving sales dramatically. Scalability helps platforms to develop without corresponding cost increases, as shown with Airbnb and WhatsApp **(Rochet, 2003, pp. 992-998)**.

Transparency in e-commerce is handled through assessment systems and identity verification, while security measures like encryption and two-factor authentication protect sensitive user data, Compliance with legislation like GDPR underlines the need of data protection **(Lessig, 2006, pp. 98-103)**.

2.2 International Shipping Systems: Definition, Components, and Strategic Importance in International Trade:

The rising emphasis on international trade has reshaped global economic ties, presenting shipping systems as key to globalization by facilitating product flows across boundaries. Their effectiveness decreases trade costs, promotes competitiveness, and fosters economic progress.

This study aims to present a conceptual framework for international shipping systems, explore their strategic significance in world trade, and integrate theoretical insights with practical

efficiency, covering maritime, aviation, land, and multimodal transport modes to illustrate their collective impact on global commerce.

2.2.1 Defining International Shipping Systems:

International shipping systems are an integrated and complex set of physical infrastructures (ports, airports, roads), human resources (crew, operators, intermediaries), digital technologies (tracking systems, electronic platforms), and regulatory frameworks (laws, international treaties) that work in coordination to facilitate the movement of goods and services across national borders **(Rodrigue, 2020, pp. 45-55)**.

2.2.2 The fundamental components of international shipping systems:

The core components of international shipping systems contain various interrelated characteristics that allow the smooth running of global commerce movements. Physical infrastructure—such as ports, airports, and transport corridors—provides the required facilities for cargo handling and transportation. Logistics networks connect these infrastructures, facilitating coordination among carriers, freight forwarders, and distribution facilities. Technological systems, including digital tracking tools, automated terminals, and integrated information platforms, promote efficiency and transparency throughout the supply chain.

Regulatory and legal frameworks define the standards, safety protocols, and international agreements that regulate cross-border business. Finally, human capital comprising experienced professionals, operators, and technical experts plays a crucial role in controlling and optimizing these systems. Collectively, these components form a cohesive structure that sustains the global maritime environment **(Notteboom, 2021, pp. 12-19).**

2.2.3 Typology of Shipping Systems:

This section provides a detailed explanation of various shipping systems, particularly focusing on maritime, air, and land transportation modes.

2.2.3.1 Maritime Shipping Systems: Container shipping is the principal form of maritime transport, contributing about 60% of worldwide trade's value. It involves standardized containers (20 or 40 feet) that permit easy movement across ships, trucks, and trains, considerably boosting efficiency, security, and scalability. Key shipping products include electronics, machinery, textiles, consumer goods, and automotive parts. An example route is from Shanghai to Rotterdam, taking 30-35 days to deliver over 20,000 containers per journey **(Levinson, 2006, pp. 85-88).**

- **Bulk Shipping:** Deals with vast volumes of unpackaged items such as grains and oil. It is economically efficient but has hazards relating to environmental regulations and market changes.
- **General Cargo Shipping**: Involves non-standardized packed commodities like machinery and is falling owing to containerization, however remains vital for big items.
- **Tanker Shipping:** Specializes in liquid transport utilizing specifically constructed vessels, crucial for energy markets with regulations owing to environmental concerns.

2.2.3.2 Air Cargo Systems: Air cargo systems include express freight, perishable items, and high-value products, Express cargo involves time-sensitive items that require rapid delivery

(24-48 hours) and is distinguished by speed, reliability, premium pricing, and sophisticated safety procedures.
Key service providers are integrated carriers (like FedEx and UPS) and scheduled airlines (like Lufthansa Cargo), Express cargo generally conveys important commodities such as emergency medical supplies and spare components to avoid costly production delays.

Perishable commodities require stringent temperature control and must be supplied swiftly to prevent deterioration, Examples include fresh flowers, seafood, and medications. Air cargo has a key economic function, especially for developing countries, allowing them to access premium markets despite constituting only 1% by weight of the entire cargo. High-value products justify the expense of air cargo due to insurance savings, reduced theft risk, and speedier cash flow. This category contains luxury products, electronics, and medical devices, For instance, exporting high-value components like semiconductors via air is sometimes more profitable than by sea despite the higher freight costs, due to speedier delivery and reduced working capital tied up. This analysis underlines the economic usefulness of air cargo across diverse critical needs **(Doganis, 2010, pp. 455-459).**

2.2.3.3 Land Transportation Systems: Trucking, the movement of commodities using motorized vehicles, is vital for final mile delivery in supply chains. It offers door-to-door service, high frequency, and flexibility, albeit at a greater cost per ton than rail **(Rushton, 2010, pp. 123-127).**

Various truck types cater to varied shipping demands, including Full Truckload and Refrigerated Trucks. In contrast, rail freight excels in fuel efficiency and capacity, supplying huge bulk cargo but requires established routes and infrastructure, Intermodal transport combines numerous transport modes in a single journey, boosting cost-effectiveness and efficiency, however it confronts legal and infrastructure obstacles.

Overall, trucks constitutes 80% of land freight, while rail freight stresses environmental benefits and economic savings, Intermodal transport is on the rise due to increasing global trade **(Rushton, 2010, pp. 165-166)**.

2.2.4 Key Characteristics of Modern Shipping Systems:

Among the secrets to the success of the modern global shipping system, we find the following **(Christopher, 2011, pp. 24-31)** :

- **Integration**: Involves linking various transportation modes (maritime, air, land) inside the logistics supply chain, requiring coordination among carriers, port authorities, and intermediaries for efficient goods and information flow.
- **Digitalization**: Characterized by the deployment of real-time tracking technologies and electronic platforms, boosting supply chain transparency and automating procedures. AI and big data analytics promote efficiency through demand forecasting and optimized resource allocation.
- **Globalization**: Refers to the development of interconnected transport networks and standard international regulations, enabling shipping corporations to collaborate across borders for better economies of scale and smoother cross-border cargo flows.
- **Sustainability**: Focused on lowering carbon emissions and improving energy

efficiency through investments in eco-friendly vessels and operations, thereby supporting sustainable economic development.

Each of these dimensions integration, digitization, globalization, and sustainability shapes the strategic orientation of current shipping systems.

2.2.5 Supply Chain Management Theory:

The supply chain is a network of businesses and resources that makes it easier for goods to move from suppliers to end users, for long-distance transport, it depends a lot on international shipping.

Three main parts make it up: product flow (moving and distributing goods), information flow (exchanging data and orders to keep things clear), and financial flow (exchanging payments and invoices). The main goals of supply chain management are to cut costs, improve service levels, speed up delivery times, and make the market more responsive **(Christopher, 2011, p. 45–78).**

International shipping networks are very important because they connect suppliers with customers all over the world, allow for just-in-time delivery, make things more efficient, and make it possible to adapt to changing demand. This helps make global supply chains more resilient **(Bowersox et al., 2002, p. 89–115**).

2.2.6 Strategic Importance in International Trade

The transport and shipping sector contributes around 4–5% to global GDP, employing over 30 million people directly and supporting more than 100 million jobs indirectly. For every dollar spent on shipping, three to four dollars circulate in the broader economy, demonstrating a significant multiplier impact, while a 10% improvement in shipping efficiency can promote trade by 5–7% **(UNCTAD, 2020, pp. 23-29)**.

Maritime transportation is crucial for international economy, delivering over 11 billion tons of products annually and accounting for nearly $60 trillion in seaborne trade. About 80% of international trade by volume relies on sea transport, providing access for poorer nations to global markets and contributing to lower consumer costs and product diversity **(Notteboom, 2021, pp. 12-19)**. Effective maritime infrastructure promotes national competitiveness, attracting investment and boosting logistics performance, which in turn fosters economic growth **(Bank, 2018, pp. 45-52).**

Geopolitically, significant shipping chokepoints like the Suez Canal, Strait of Hormuz, and Panama Canal are essential to the global economy, with their disruption leading to potential catastrophes. Control over such chokepoints affords enormous geopolitical leverage **(Rodrigue, 2020, pp. 267-272)**. Dominance in global trade is held by entities like China, which operates seven of the ten major ports. These players considerably influence global supply chains and economic security **(Notteboom, 2021, pp. 340-342).**

China's Belt and Road Initiative, with over one trillion dollars in investments, is altering global trade dynamics and boosting its influence in development countries **(Zeng, 2019, pp. 123-128).**

In terms of globalization, modern shipping allows worldwide industrial networks, as illustrated by the huge supply chains of electronics and vehicles. It plays a vital role in cross-border e-commerce, which reached $5.2 trillion in 2021, with strong yearly increase

(Notteboom, 2021, p. 375).

Shipping also eliminates regional inequities, enabling developing nations, such as Kenya and Bangladesh, to engage in global markets **(Bank, 2018, pp. 89-91).**

Environmental considerations are essential, as shipping accounts for around 3% of worldwide CO2 emissions. Solutions focus on cleaner fuels, greater energy efficiency, and renewable energy utilization at ports (IMO, 2020). Initiatives like the IMO 2050 Strategy aim to lower shipping emissions by 50% through technology improvements and sustainable practices **(Notteboom, 2021, p. 440).**

2.2.7 Performance Measurement and Key Challenges in International Shipping:

Performance measurement in international shipping relies on key performance indicators (KPIs) to evaluate logistical efficiency. The World Bank's Logistics Performance Index (LPI) rates countries based on customs efficiency, transport infrastructure, shipment arrangement, service competency, tracking capabilities, and delivery timeliness. In 2023, Singapore led the global ranking with a score of 4.3, followed by Finland and Denmark. Additional factors include shipment durations, customs clearance periods, shipping costs, and quality indicators such as damage rates and customer satisfaction **(Bank., 2023)**

Challenges faced by the sector include port congestion, infrastructural issues in developing nations, regulatory hurdles, security threats, and climate change implications. Future trends include automation, digitalization through blockchain and AI, sustainability initiatives, and modifications in trade routes due to geopolitical and climatic changes, illustrating the shifting character of international shipping as a crucial component of global trade **(Bank., 2023)**.

2.3 Digital Integration Theory:

Digital Integration Theory presents a conceptual framework that elucidates how the interconnection and interoperability of digital systems across organizational boundaries promote efficiency, coordination, and agility. By facilitating seamless real-time data exchange and process automation, digital integration enables organizations to optimize complex workflows, reduce operational redundancies, and improve decision-making, which is particularly vital in multifaceted domains such as international trade and logistics

2.3.1 Systems Integration Theory:

The goal of Systems Integration Theory is to make sure that information systems work together smoothly so that different platforms and parts of an organization can work together. System integration that works well makes sure that different tech parts work together and communicate with each other, making it easier to share data and coordinate processes **(Alter, 2008, p. 45)**.

2.3.1.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model explains how people learn to accept and use technology. Perceived utility and perceived ease of use are two of the most important parts of TAM. They influence individuals' perceptions regarding the adoption of new technology. Organizational readiness, user education, and perceived advantages are all factors that influence the implementation of digital integration.

2.3.1.2 A Model for Success in Information Systems

This model examines the efficacy of a system by evaluating factors such as system quality, information quality, user satisfaction, and organizational impact. Users are happier when systems are of high quality and information is reliable. This also improves organizational performance and decision-making **(DeLone, 2003, p. 22)**.

2.3.1.3 Linking APIs and Cloud Computing:

Application Programming Interfaces (APIs) promote interaction across software systems, facilitating easy data transfer. Cloud computing offers scalable infrastructure that makes it easy to connect different systems. Blockchain and the Internet of Things (IoT) are two new technologies that make digital ecosystems even safer, more open, and more efficient **(Marston, 2011, p. 145)**.

2.3.2 Integrative Framework Model:

2.3.2.1 Conceptual Model:

The conceptual framework links major digital integration variables, exhibiting causal interactions and reciprocal effects across systems integration, user acceptance, and organizational performance **(Bharadwaj, 2013, p. 61).**

- **Digital Integration as Mediator**: Digital integration works as a mediating variable influencing logistics performance by boosting coordination, speed, and responsiveness across supply chain nodes.
- **Performance Indicators:** Success of digital integration is measured by measures such as operational efficiency, processing speed, cost savings, and user happiness, showing total system efficacy**.**

2.3.2.2 Supporting Theories:

- **Resource-Based View (RBV):**

RBV theory asserts that company resources and capabilities, particularly in digital technologies, produce durable competitive advantages when effectively managed and integrated**).**

- **Transaction Cost Theory:**

This hypothesis implies that digital integration reduces transaction costs by speeding communication, avoiding delays, and removing the need for intermediaries.

- **Diffusion of Innovation Theory:**

This theory discusses the process and elements regulating the spread of new technologies and innovations, highlighting adoption rates and influence of social systems on technological integration **(Rogers, 2003, p. 15).**

3.Case study:

3.1 The Emergence and Development of the Express Mail Service (EMS):

The EMS (Express Mail Service) and how it fits into Algeria's growing economy, especially in the international shipping business. It highlights Algeria's long-standing problems with supply and transit services, but it also notes that things have gotten better recently because there is more competition among transport operators.

The EMS, which is part of the UPU, was set up in Algeria in July 1987. In 2011, it became its own company under Algeria Poste, with the goal of providing delivery services both in Algeria and around the world. The EMS has received a lot of praise, including an award for achievement from the UPU and a ranking of 16th out of 198 members worldwide.

EMS's best features, such as fast pickup and delivery of packages, guaranteed safe deliveries, online cargo tracking, a 99% on-time rate, and great customer service. It also lists the specific services it offers, like partnerships with online stores for shipping packages, clearing customs, and prices that are about 40% lower than those of its competitors. EMS has full operating coverage in 58 provinces, which means that packages are delivered on time, usually within a week, thanks to a skilled workforce and efficient operations.

3.2 Express Mail Service Information System and Shipment Tracking Application "Track.dz":

3.2.1 EMS Express Mail Service Information System:

This section talks about the EMS (Express Mail Service) and how important it is to the changing Algerian economy, especially in the international transport industry. It talks about how Algeria has had problems with supply and transit services in the past, but it also talks about how things have gotten better lately because there are more transport companies competing with each other.

The EMS, which is part of the UPU, started in Algeria in July 1987. In 2011, it became a separate company under Algeria Poste with the goal of providing delivery services both within Algeria and around the world. The EMS has received a lot of praise, including performance awards from the UPU and a ranking of 16th out of 198 members worldwide.

The document goes into detail about EMS's best features, such as fast and safe package collection and delivery, online tracking of shipments, a 99% on-time delivery rate, and great customer service. It also lists the specific services it offers, like making deals with online stores to ship packages, clear customs, and offer prices that are about 40% lower than those of its competitors. EMS has a wide operational reach across 58 provinces, which helps ensure fast delivery, sometimes within a week, thanks to a skilled staff and streamlined processes.

FIG.1: Express Mail website page



Source: The website of the EMS Express Mail Service

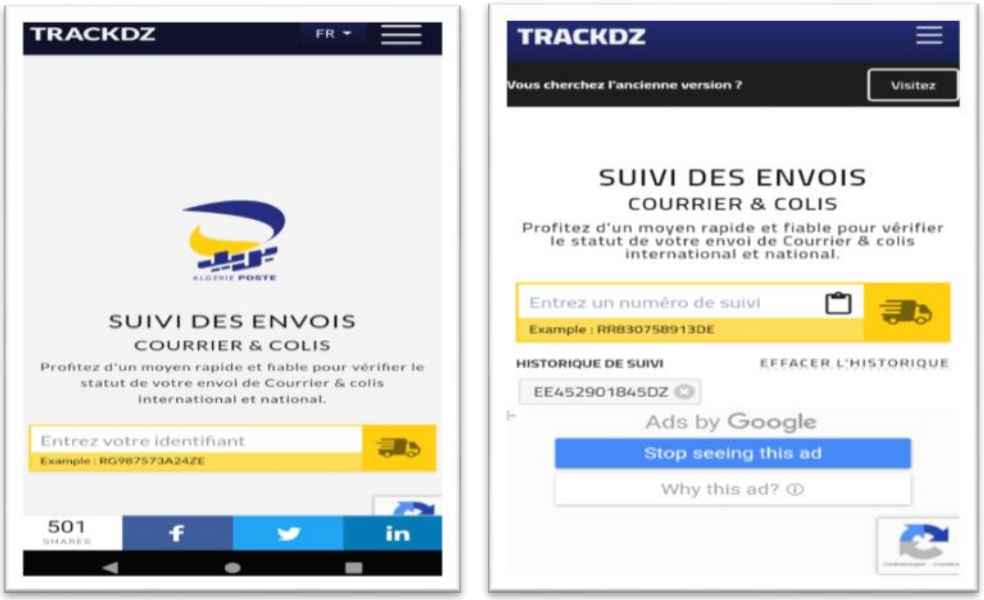
Figure 01 shows that this system lets you see in real time all the steps that postal shipments go through, from deposit to final delivery. This means that no one can keep track of their package unless they enter the information into the IPS system and update it every time it reaches a new step. This system supplies the tracking application with information and updates particular to each package, enabling customers and the distribution center to track it using an application called Track.dz.

This app is also a part of partial e-commerce and can be called B to C, which means e-commerce between the business and the client. This is because it lets people follow things from a distance and get information from a distance through an intermediary that is connected to the Web.

3.2.2 How the Track.dz app works:

When the seller makes a purchase from any website or online store, they offer the person with a tracking number that contains letters from registered mail. This number lets them track their package. Therefore, it is necessary first to enter the Algerian tracking program Trackdz, then copy the tracking number, and click on search. The website will start transmitting information on the shipment and its travel, telling the customer each time the package reaches a specified spot. The same occurs when sending a box with a shipping business; the company provides you with a tracking number that allows you to trace the package until it reaches the delivery point. And the following form represents:

Fig. 02: The main page of the Trackdz program



Source: Data provided by the institution

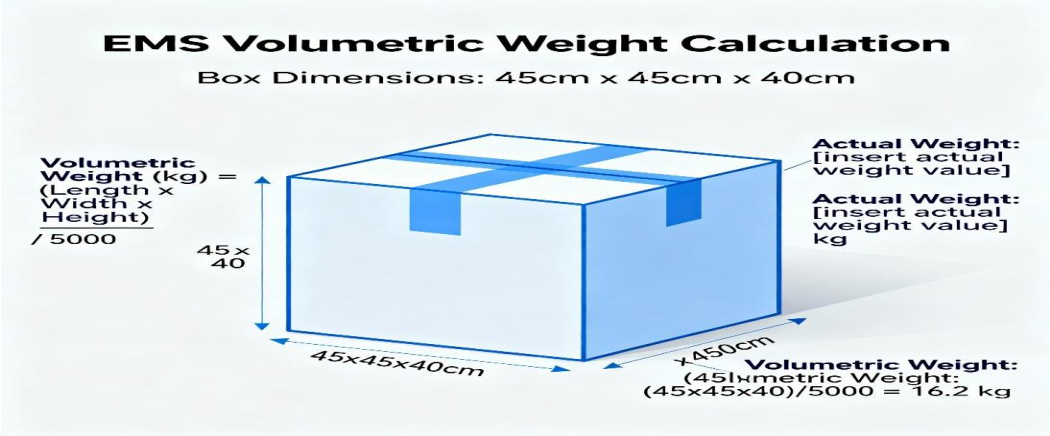
Figure (02) exhibits photographs of the homepage of the Trackdz tracking application and illustrates how to enter the information for the dispatched goods.

3.2.3 The phases of the shipment process in EMS:

The following steps are part of the EMS shipping process:

- The customer goes to the nearest postal center that offers express mail.
- The packages are checked to see if they contain fragile items, valuable items, or items that are not allowed.
- The workers at the express mail service weigh the envelope or package to find out how much it will cost based on its weight. First, you need to figure out the volumetric weight and the actual weight and compare them. This is because the box may not be very heavy, but it takes up more room on the plane or ship. So, the actual weight and the volumetric weight are compared to see if the package is heavier or bigger, which means it takes up more room. Then, the package's destination is checked. The next picture shows how to get the volumetric weight at EMS.

Fig.3: EMS volumetric weight calculation



Source: (UPU, 2023, p. 45)

The volumetric weight calculation law adopted by international transport institutions

Volumetric weight = length * width * height / 5000.

- This equation helps people figure out how much it will cost to ship something.
- You can get to the right information system based on where the shipment is going, whether it's local or international, and then you enter the following information:
  - Information about the sender (name, last name, phone number, email address, postal code, etc.);
  - Information about the recipient (name, last name, place of residence, postal code, etc.);
- Payment can be made by cash or credit card, and then the invoice is sent;

- Keeping the sender and recipient information, as well as the tracking number, date of dispatch, time, and tracking number in the record;
- You need to fill out the CN23 customs invoice if the package is going to cross a border. Along with the weight used to figure out the cost and price, which is then put on the package, this invoice has the sender's and recipient's information, postal code, phone number, address, and a full list of what is in the package.
- There is an information card on the package that has the names and addresses of both the sender and the recipient, as well as the tracking number.
- For international shipping, all of the above information is entered into the EBS system, all steps and processes are finished, and the required paperwork is made. After that, the information is put into the international IPS system, which keeps track of the sender and recipient's name, address, phone number, or email address, as well as the package's tracking number.
- The customer can find out where their package is after they enter the information into the international IPS system. They will see that their package is at the distribution center it was sent to once they enter the information. Every night, the employee in charge takes all the packages to the sorting center in Algiers, where they are reentered into the system so that their owners can see where they are and how they are getting there before they are sent by air.

3.3 The standing of EMS Express Mail Service in the Algerian market for international shipping:

The EMS Express Mail Service is well-known around the world. Its national and international networks have strong logistical capabilities and cover all 58 provinces in the country. With the option of getting customs clearance for imports and exports (working with Algerian and foreign customs). This encouraged an increase in international traffic volume and the segmentation of the international transport market, with the establishment of appropriate pricing at both the local and international levels.

3.3.1 The transit movement for international shipping (exports, imports):

Goods in the field of international trade are subject to formal procedures, whether in the exporting or importing country, as goods are often the most common items that cross borders. Therefore, the transit movement of international shipping ensures the easy and swift transport and delivery of goods to their final destination without undergoing customs clearance procedures, which is considered one of the services provided by the EMS Express Mail Service

thru cooperation with Algerian and foreign customs. And this encourages Increasing trade exchanges by increasing the volume of fast shipments on one hand, and the volume of international movement on the other hand.

3.3.1.1 Comparative Analysis of Express Shipment Volumes (Exports and Imports) between EMS Algeria and Competing Logistics Providers:

The number of fast-exported and imported shipments by a group of active institutions in the field of express shipping witnessed development during the period 2021-2023. The following table reflects these developments.

Table.1 Express Shipment Volumes (Exports/Imports) in Comparison with Competitors

Unit: Delivered Parcel

	Export Shipment Volume			Import Shipments Volume		
	2021	**2022**	**2023**	**2021**	**2022**	**2023**
EMS	31361	34876	42734	9255	36477	91007
DHL	97005	92733	94540	542239	463806	644040
FALCON	6898	38699	10774	9147	27711	19120
CONEXLOG	1861	-	3650	24535	-	16400
ARAMEX	-	-	146	-	-	20606
TOTAL	137125	166308	151844	585176	528054	773173

Source: Prepared by the researcher based on data from the Postal and Electronic Communications Regulatory Authority.

Table 1 indicates that EMS ships more express packages than its competitors. DHL has the best performance for both export and import shipments since it has a robust worldwide logistics network. However, EMS has been growing steadily, especially in imports. This is a sign of steady advancements in international connectivity and digital integration. Other competitors have inconsistent or limited participation during the three years.

Table.2: Annual Volume of International Traffic (2021–2023)

Unit: Delivered Parcel

	Export Shipment Volume		
	2021	**2022**	**2023**
EMS	40616	71351	133741
DHL	639244	556593	738580
FALCON	16045	66470	29894
CONEXLOG	26045	-	2005
ARAMEX	-	-	2752
TOTAL	722301	694362	925017

Source: Prepared by the researcher based on data from the Postal and Electronic Communications Regulatory Authority.

The table below shows important developments in the number of international parcel shipments from 2021 to 2023. DHL had the most share of the market the whole time, peaking at nearly 738,000 parcels in 2023. During this time, EMS grew a lot, with its volume more than tripling. FALCON's exports went up a lot in 2022 and then went down a lot in 2023. CONEXLOG and ARAMEX sent substantially lesser amounts, while CONEXLOG's data showed big drops. In 2022, the whole market went down, but in 2023, it came back strong. This dynamic reflects both shifting market dynamics and external impacts on international logistics services.

3.3.1.2 The segmentation of the international shipping market in Algeria.

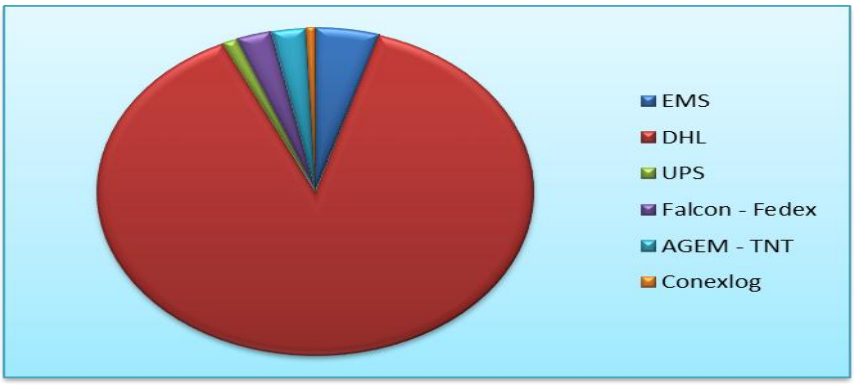
The international transport market in Algeria is characterized by a diversified mix of private enterprises and official institutions, providing clients with the chance to choose services that best match their needs and provide satisfaction and security. Each corporation holds its own market share, shaped by numerous circumstances and impacted by various assessment criteria. As a result, the market shares differ greatly among companies. The following are the most active and well-known companies functioning in the sector as:

- EMS Champion Post
- DHL International Algérie
- UPS Algérie
- Falcon Express Algérie
- Alliance Globale Express Messagerie - TNT
- Fedex Express Algérie
- Conexlog

3.3.1.3 Market share relative to transit volume:

Market share is positively correlated with transit volume, reflecting the number of shipments such as parcels and envelopes handled by a company. A larger customer base generally translates to higher export and import volumes, indicating operational effectiveness and market presence. The shipment data in the Algerian international transport market exemplifies this relationship and highlights companies' roles in the sector.

Fig.4: Segmentation of Market Share Among International shipping Companies Based on Shipment Volume"



Source: Data provided by EMS Express Mail Service.

The data indicate that most international shipping companies operating in the Algerian market are experiencing stagnation in their activities, except for one company that dominates the majority of the market. As a result, there is a significant disparity in market shares, with one company holding over 75% of the market while another holds merely 1%. According to EMS Express Mail Service's reported turnover and export-import volumes, its market share is estimated at approximately 7%, a relatively small proportion compared to DHL, which controls the largest share of Algeria's international transport market. Despite EMS being the second-largest competitor, its market share remains weak relative to DHL due to several factors that EMS can identify by analyzing its own strengths and weaknesses as well as those of its competitors.

3.4 Contribution of E-commerce Platforms to Enhancing EMS International Shipping Activities:

E-commerce has rapidly expanded, especially during the COVID-19 pandemic, as consumer behavior shifted towards online shopping. EMS's extensive logistics network across Algeria, along with customs clearance cooperation, has facilitated international trade and boosted e-commerce shipment volumes.

Table.3: Volume of E-commerce Shipments by Month During the Years 2021-2023

Unit: Algerian dinar

	2021	**2022**	**2023**
January	1308	2800	1575
February	1418	2286	3158
March	1419	2423	2324
April	4805	3026	1259
May	6556	2467	967
June	3929	1715	505
July	1099	1925	1099
August	607	2057	2073
September	1155	2001	2081
October	1837	2521	2209
November	3951	2988	2207
December	4745	3227	2648
Total	**20270**	**29886**	**38535**

Source: Data provided by the Authority for the Regulation of Post and Electronic Communications

The table illustrates the overall volume of e-commerce shipments for each year. In 2021, the cargo amount varied for the first 10 months, then climbed in November and December to reach 20,270 shipments. The EMS Express Mail Service saw a considerable rise in total shipments in 2023, reaching 38,535 shipments compared to 29,886 shipments in 2022. This growth is linked to the influence of the COVID-19 issue on demand for expedited mail services, with 32% of shipments made through e-commerce. EMS provides extensive national and international networks, personalized services tailored to customer needs, a parcel tracking system via the website, guaranteed and secure home delivery, proof of delivery, and the best preferential pricing in the market, offering up to 40% discounts on express services.

3.4.1The relationship between the EMS Express Mail Service and e-commerce platforms:

The EMS Express Mail Service forms several agreements and partnerships, comparable to any profit-oriented commercial enterprise. Many Algerian enterprises largely rely on it for mailing their goods and postal envelopes carrying documents.

Among the companies it has agreements with are:

- SATCOM OPERATOR ATS
- Groupe SAIDAL
- AIGLE AZUR
- Hilton HOTELS & RESORTS
- BANQUE DALGERIE
- LG
- Ministry of Justice
- HYPROC SHIPPING COMPANY
- LEXMARK
- Colissimo

Additionally, EMS maintains partnerships with various airlines and air freight companies it depends on for parcel delivery, including :

- AIRFRANCE
- Lufthansa
- AIR ALGERIE

Air Algerie is considered the major partner EMS relies on significantly for sending its clients' parcels internationally or even domestically when the consignment is bound for the Sahara region.

All these firms have contracts with EMS, in addition to numerous partnerships with local and international e-commerce platforms and retailers, with which EMS collaborates with roughly 25 electronic platforms, including:

- **NESPRESSO**: Nestlé's platform for coffee machines and capsules, which was started in 1986 in Lausanne, Switzerland.
- **Dikoriko**: A Turkish home decor brand with stores in Algiers and Oran Province, known for its high-quality products.
- **Batolis Platform**:Samir Bouazabia started this Algerian online store on June 1, 2015. It has a lot of different products to make shopping easier for all Algerians.
- **KRONE Platform**: This company ships agricultural machinery and commercial vehicles.
- Cirta Retail Platform: This platform is all about selling European goods in Algeria.
- **AMIRA Riaa Platform**: The first Algerian platform just for women's clothing, with home delivery and safe payment after delivery.
- **Jumia Platform**: This online store opened in 2013 and is known for having a wide range of products, a cash-on-delivery service, and policies that are good for customers.
- **Ali Express**: An international e-commerce site run by the Chinese Ali Baba Group. Since it opened in April 2010, it has been known for its low prices and wide range of products.
- **Shipping Dynamics**: Customers can pick the shipping company they want to use for their orders on Jumia and AliExpress. Because of the COVID-19 pandemic, people relied more on online stores.

The EMS recorded 62,700 shipments in 2023, with e-commerce platforms contributing to a 32% rise in the number of shipments.

Table.4: Shipments from e-commerce platform through EMS for the year 2023

Platform	Number of shipments
JUMIA	33000
DEKOREKO	16000
BATOLIS	4200
CIRTA SHOP	6800
OTHER PLATFORMS	2700
TOTAL	62700

Source: Data provided by the Authority for the Regulation of Post and Electronic Communications

The table displays the distribution of shipments from various e-commerce platforms through EMS in 2023. JUMIA accounted for the largest portion with 33,000 shipments, indicating its supremacy in utilizing EMS services. DEKOREKO follows with 16,000 shipments, while CIRTA SHOP and BATOLIS provide 6,800 and 4,200 shipments respectively. Shipments from additional smaller platforms collectively total 2,700. This distribution indicates a considerable concentration of shipments among a few main platforms, demonstrating varying levels of participation with EMS logistics services. The data emphasizes the importance of these important platforms in boosting e-commerce logistics and represents varying customer volumes that EMS must handle within its operational plan.

3.5 Digital integration networks in EMS:

EMS relies on many digital integration networks to integrate e-commerce platforms with overseas shipping operations. These include:

- A trustworthy Track & Trace system for real-time cargo monitoring.
- Web portals that provide seamless interaction between online businesses and shipment processing.
- Extensive national and international logistical networks reaching 43 wilayas in Algeria through local agencies.
- Digital payment systems supporting cash on delivery and electronic card payments.

These digital infrastructures have contributed to tremendous development in EMS's e-commerce parcel transactions, supported by nearly 4,300 internet-connected postal stations nationwide. The link allows greater cargo tracking accuracy, simpler customs declarations, faster processing times, and improved customer satisfaction.

Table.5:Digital integration mechanisms in EMS

Digital Integration Mechanism	Description	Key Statistics and Facts
Track & Trace System	Real-time tracking and reliable feedback system (IPS Track & Trace)	Enables customers to track shipments globally with high accuracy; reduces parcel loss and improves delivery reliability. EMS uses a 13-character tracking code, covering all shipments.
Web Merchant Portals	Online portals connecting e-commerce platforms and EMS	Facilitates fast data exchange and a personalized customer experience for merchants; over 4,300 transactions monitored daily via these portals.
National and International Logistics Network	Broad network coverage with 43 regional offices across Algeria and international connections	Comprehensive service coverage across all 43 wilayas in Algeria with strong logistics capacity; capable of handling high shipment volumes efficiently.
Digital Payment System	Electronic payments including cash on delivery and card payments (e.g., EDHABIA card)	Electronic payment transactions increased by approximately 185% from 2022 to 2024, reflecting rapid digital payment adoption driven by COVID-19 and fintech growth in Algeria.

Source: EMS official website and recent operational data from EMS Algeria.

In 2024, EMS Algeria exhibited major breakthroughs in its digital integration methods, favorably improving operational efficiency and customer satisfaction:

- The Track & Trace system achieved a prompt delivery rate above 98% domestically, permitting real-time tracking for shipments to over 185 countries, which is among the greatest regional rates.
- Web merchant portals facilitated exchange of shipping data, contributing to a reduction in processing and delivery delays, supported by a network spanning 43 regional offices covering the whole Algerian area.
- EMS's national and international logistics network includes over 50 branches and 4,300 connected postal connections, enabling home deliveries within 24 to 48 hours for local shipments.
- Digital payment systems, including e-payment and cash-on-delivery options, increased significantly with a transaction growth rate reaching 185% between 2022 and 2024. The adoption of cards like EDAHABIA and mobile payments further strengthened this trend amidst increased e-commerce penetration in Algeria.

These data confirm that EMS's success in maintaining a competitive position within the global express mail sector, including ranking 10th worldwide in 2024, is strongly linked to these digital advancements empowering seamless integration between e-commerce platforms and international shipping networks.

This integrated digital environment helps EMS to efficiently handle increasing cargo volumes while ensuring excellent customer service standards and timely deliveries. These connection methods significantly improve EMS's capacity to supply dependable, rapid, and transparent international shipping services, effectively tying e-commerce platforms to global logistics networks.

4. Testing the Hypotheses:

After addressing both the theoretical and practical elements, we may test the previously provided hypotheses, which are as follows:

- The validity of the first hypothesis may be confirmed, which argues that e-commerce platforms are an alternative to traditional retailers that can be accessible at any time and place via the internet. Thru these platforms, commodities can be bought and sold, whether they are products, services, or information. E-commerce systems are also built on three basic types: B2C, B2B, and C2C, C2C.
- Advanced international shipping systems are vital for enhancing the efficiency of global trade operations by reducing delivery times and costs. These technologies increase supply chain management through real-time tracking, automated customs clearance, and optimal routing, ensuring faster and more dependable delivery. They also help economic growth by enabling enterprises to expand into new areas, improve consumer satisfaction, and sustain competitive advantages.
- Digital integration tools like APIs, cloud systems, blockchain, Track & Trace System, Web Merchant Portals, National and International Logistics Network, and Digital Payment System make e-commerce logistics better by speeding up order processing and global fulfillment, cutting down on mistakes and delays, and making international shipping faster and more reliable. EMS Champion Post Algeria, which is ranked 14th in the world and 1st in North Africa, is a great example of how to run a business. They deliver 85% of the time and respond to customers 98% of the time. This is because it knows how to use digital tools well and has good relationships with other countries.
- Recent performance metrics from EMS Algeria support the fourth hypothesis. Working with e-commerce platforms has helped shipping speed up by 15%, delivery accuracy stay high at 98%, and market share grow to about 7%. These numbers show that the partnership speeds up international shipping while keeping the company reliable and competitive in the market. These metrics will become even more important to their strategic alliance and operational success if they are constantly improved and watched.

5.Conclusion:

It can be verified that digital integration constitutes a vital foundation for boosting the efficiency and reliability of international shipping operations. The study highlighted how digital integration tools such as APIs, cloud computing, and blockchain technology contributed to expediting order and shipping processes, and minimizing errors and delays.

The experience of EMS Algeria underscores the importance of investing in digital transformation and strategic partnerships to achieve growth and competitiveness in the international shipping market, while highlighting the challenges and opportunities of digital transformation that require continuous development and ongoing monitoring.

6. Study Results:

The study reached the following results:

- The rise of e-commerce platforms as an alternative to traditional stores has gotten rid of geographical distance and many other problems that used to keep customers and businesses apart. This happened especially after the health crisis in 2019.
- It has been proven that using e-commerce platforms to integrate digital technology

makes international shipping operations much faster, more accurate, and more reliable.

- Data showed that EMS Algeria's digital partnerships with e-commerce sites sped up shipments by a lot, raised on-time delivery rates to over 85%, and made customers very happy, with 98% saying they were happy.
- EMS had issues relating to digital infrastructure and customs operations, but many of them were handled trough modernizing digital systems and implementing current technologies like blockchain to give transparency and security.
- An integrative model has been constructed to explain how various elements of digital integration (APIs, cloud computing, e-commerce) affect the performance of international logistics services.
- The results demonstrate that EMS's investment in digitization and strategic alliances increases its competitive position at both the regional and international levels and supports its future expansion.

These results provide a good platform for launching broader digital strategies to boost international shipping services in Algeria and the region.

7. Study Recommendations:

Based on the examination of cross-border digital integration with EMS Algeria, the following suggestions can be drawn:

- **Enhancement of digital integration tools**: Invest in modern APIs, cloud computing, and blockchain to further automate and secure data interchange between e-commerce platforms and shipping providers.
- **Strengthen strategic partnerships**: Foster deeper connections between EMS Algeria and worldwide e-commerce platforms, payment providers, and customs authorities to speed order fulfillment and customs clearance.
- **Upgrade digital infrastructure**: Improve digital tracking systems, real-time cargo visibility, and customer communication platforms to boost transparency and user experience.
- **Focus on capacity building**: Train staff and stakeholders in digital competences and new technologies to maximize benefits from digital tools.
- **Expand performance monitoring**: Develop comprehensive KPIs and analytics dashboards to regularly review logistic efficiency, delivery performance, and customer happiness.
- **Address operational bottlenecks**: Use data-driven ways to identify and resolve delays in customs, last-mile delivery, and cross-border cooperation.

These ideas aim to utilize digital transformation for a more efficient, dependable, and competitive international shipping service, building on EMS Algeria's current capabilities.

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