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Research Article

Logistics Web Application for the Tracking of Parcels

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Abstract

Firms can save operating expenses and improve customer satisfaction by managing their logistics well. Delivering goods and services to customers with the highest standards while reducing operating costs is the aim of the logistics management philosophy. As a result, logistics management is a crucial component of the supply chain process, which also includes other tasks including organizing, directing, planning, storing, communicating, and providing support. Web applications tracking allow easy access to goods and services over the internet. It allows for easy detection of the state, location of goods and services at any given instance. This web application gives the users easy accessibility to the platform. The logistics web application for the tracking of parcels was developed using Angular Js, Node and Express Js, and MongoDB. Hosted on Heroku. The aim of the project which is to meet the demands of the users while offering real-time visibility, efficient route optimization, as well as the overall streaming of the supply chain process was achieved. With this application, users can finally be able to know the current and real time location of their packages so long as they have access to the internet.

Keywords

Logistic, Parcel, Delivery, Logistic Information System, Parcel, Location, Access

1. Introduction

The part of the supply chain process known as logistics is concerned with organizing, carrying out, and overseeing the efficient transportation and storage of products, services, and related data between the point of origin and the site of consumption. Logistics is essentially an information-driven planning process [1]. It deals with the science of planning, directing, and coordinating tasks associated with the delivery of goods or services. The integration of information, transportation, inventory, warehousing, material handling, and packaging is the responsibility of the Logistics Information System (LIS) [2].

Having no challenges in the transfer of information is critical to the accuracy and efficiency of distribution systems. The logistics information system serves as the core nervous system that coordinates the planning, coordinating, and carrying out of all aspects of logistics operations. Planning and

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coordination involve determining the characteristics and locations of customers that align with the intended products, services, and promotional efforts of the supply chain [3]. The logistics information system interconnects various logistical functions, consolidating diverse data streams, including order details, procurement specifics, production schedules, packaging timetables, transportation and storage particulars, distribution particulars, payment records, and delivery updates. Its purpose is to empower logistics professionals to access data as needed, process it within the system, and conduct thorough data analysis. LIS). LIS represents an information infrastructure that equips management with pertinent and timely insights pertinent to logistics. The incorporation of information technology in retail establishments yields a multitude of advantages within a firm. [3].

Information systems are now crucial for improving inventory control, tracking orders and commodities, and keeping an eye on resource utilization because of the global nature of logistics. Computer technologies and information systems are essential to the growth of businesses that want to comprehend and satisfy the needs and requirements of their clients. A company's capacity to optimize logistical costs and deliver superior customer service is strongly impacted by the LIS it uses. These solutions are also essential for cutting lead times and inventory levels across the supply chain. The smooth flow of information is critical to the efficacy and precision of distribution systems. The logistics information system is the cornerstone of the logistical operation, coordinating all aspects of planning, coordinating, and carrying out the operation.

An essential component of trying to plan and cordinate and is identifying kind and the place of the client that the supply chain operations want to correlate with scheduled services. Logistic which includes both the in and out operations from a source to a place of meeting customers need [3, 4].

2. Literature Review

The domain of third-party logistics has experienced a significant upsurge, gaining traction in tandem with the expansion of global markets and the advent of the Internet, particularly within the realm of e-commerce. This ascendancy has been propelled by the imperatives of global competitiveness, where companies are confronted with heightened pressure to optimize their delivery processes and service 3quality to meet the ever-increasing expectations of customers. In response, businesses have begun to adopt a strategic approach by outsourcing their logistics operations, encompassing crucial aspects such as packaging, warehousing (inclusive of inventory management), and the efficient shipping of goods to end consumers [3].

A pivotal cog in the seamless functioning of this logistics value chain is effective communication, which serves as the adhesive binding together the intricate network of activities. This interconnections and coordination are facilitated by a slew of trans-formative information technologies that have reshaped the logistics landscape [13]. Key among these innovations is electronic data interchange (EDI), the ubiquitous Internet, the expansive World Wide Web (WWW), and the trans-formative influence of e-commerce. The assimilation of these technologies into the logistics ecosystem has culminated in a marked enhancement in communication between various partners along the logistics value chain.

In this context, the emergence of real-time information systems, prominently exemplified by web-based logistics information systems, has emerged as a pivotal linchpin in amplifying the capabilities of 3PL services. These systems, fueled by the potency of the Internet and associated technologies, offer a dynamic platform for seamless information exchange, facilitating real-time monitoring, tracking, and management of goods throughout the logistics journey. [14] The result is heightened transparency, responsiveness, and efficiency within the logistics value chain, culminating in an elevated customer experience.

A thorough case study in e-logistics is used to provide a powerful example of these concepts. This case study highlights the tangible effects that the integration of information technology—specifically, the Internet, WWW, and EDI—has on the logistics value chain's overall effectiveness. The proposal of a practical framework is the result of a thorough literature review combined with empirical knowledge from the case study. This framework is prepared to assist businesses with the complex process of designing and creating an e-logistics system that meets their particular requirements. [15]. The ultimate goal of this framework is to equip organizations with the tools and insights necessary to foster competitiveness within the contemporary business landscape.

The confluence of third-party logistics, modern information technologies, and the compelling demands of global competitiveness has engendered a trans-formative shift in the logistics domain. The ascendancy of e-commerce, catalyzed by the pervasive influence of the Internet and associated technologies, has necessitated a reevaluation of logistics practices [3]. The integration of real-time information systems, coupled with the power of web-based logistics information systems, has yielded tangible improvements in the efficacy and efficiency of 3PL services. Through a rigorous exploration of these dynamics, bolstered by a robust case study, this paper elucidates the intricate interplay between technology and logistics, culminating in the articulation of a pragmatic framework. [15, 16] This framework is poised to empower companies in their quest for enhanced competitiveness by embracing the potentials of e-logistics, thereby positioning them for sustained success in the contemporary marketplace.

Review of Related Works

Opinions on the usability of mobile apps that operate in the emerging logistics space known as "logistics in life" (LIL) was expressed [5]. The logistics startups that create

mobile applications, or "apps," to offer specialized services that target niche markets beyond the purview of conventional logistics companies, have been the main beneficiaries of the LIL sector. Usability testing was done with representative apps from Korea and other countries in order to get usability scores. Big data analytics were used to ascertain the relationship between each app's usability and user interest, and suggested enhancement tactics were then put into practice.

A Courier Tracking Management System is a cost-effective and efficient system was created using Javascript and PHP programming based on Adobe Dreamweave that the users conducted unit tests on the proposed system in the beginning [6]. With an 85% success rate, the suggested approach was determined to be effective in improving the efficiency of tracking and managing packages. A clever approach for resource scheduling and trajectory optimization in land-air collaboration. This study subsequently provides a reliable supply logistics distribution system for land-air collaboration, displaying vehicle and UAV driving paths. In the meantime, the UAV-vehicle collaboration method accomplishes energy conservation and emission reduction targets in addition to saving operational expenses as compared to traditional logistical delivery. Blockchain technology is incorporated into the logistics delivery service during the platform's unique design and implementation process to protect data and stop tampering, improving the system's efficiency and dependability [7]. Using Poland as an example, a global e-commerce market was created to examine how the SARS-CoV-2 virus pandemic affected the technological advancement of last-mile logistics services, raising the bar for "customer experience." Critical analysis of the materials gathered and participant observations were the study approaches employed. Based on an online survey, the data allowed for the conducting of a nomothetic investigation that was both descriptive and explanatory. The authors developed a diagnostic regarding the viability of using customer experience potential for the growth of businesses founded on last-mile delivery technology [8].

In the framework of digital twin-managed objects in smart cities, [9] investigated the last-mile delivery problem known as the Freight Parking Management Problem (FPMP). concentrating on the ways in which instantly updated knowledge of parking connectivity can be improved by cognitive digital twins—digital twins with improved semantic capabilities—in order to maximize logistics operations planning and urban resource allocation. Web of Things, Property Graph, and Web Ontology Language (OWL) are some of the enabling technologies and standards that enable the semantic integration of discrete logistics objects and systems into Smart Cities through the use of a four-layer architectural framework. Next, to demonstrate a practical application of the concept, Orange France uses a real-world Digital Twins platform called Thing in the future (Thing'in) in conjunction with an agent-based simulation model on AnyLogic to illustrate a case study of parcel delivery in Paris. The results suggest that enhanced heterogeneous system cooperation and enhanced delivery environment understanding can be achieved through semantics-enabled Digital Twins connectivity. This can ultimately result in improved resource utilization, reduced negative externalities, and enhanced logistics efficiency.

The effect of digitization on trade logistics in e-commerce, highlighting the importance of smart logistics for the sector was examined [10]. In order to evaluate the maturity of research in this field, the researchers looked through 288 publications that were published in the last ten years in the Scopus database. This work fills in the gaps in the literature regarding smart e-commerce logistics and gives scholars a better knowledge of the subject. It can assist e-commerce experts in using the newest technology developments in their logistics. A cutting-edge inventory control system intended to improve and expedite the administration of sales, purchase orders, and inventories within businesses was presented [11]. By utilizing contemporary web technologies, the system meets the various needs of administrators and salespeople by providing a user-friendly interface, role-based access control, and alerting features. The Django web framework, upon which the inventory control system is based, guarantees reliable backend functionality and effective data handling. Administrators and salespeople are endowed with unique capabilities by virtue of role-based permissions, which guarantee data security and streamline workflow. Many features are integrated into the system, such as product management, purchase order creation, sales order production, and notification generating. User authentication is also included. After recognizing the role and importance of inventory management in supply networks, a comprehensive analysis was carried out to identify the research gaps regarding the application of IoT to inventory management and to highlight the impact of IoT technologies on inventory management in supply chains [12]. The trend and potential uses of IoT for inventory management in the Industry 4.0 era are examined by reviewing the literature. The findings show that increasing attention is being paid to this issue in a variety of businesses.

3. System Evaluation and Design

A Use Case flowchart diagram that illustrates the relationship between the system diagram and the relevant processes can be made using the system requirements. It's also employed to describe the system's primary purpose. A flowchart diagram is created to illustrate a system's perspective, emphasizing the relationships, operations, and attribute-based processes' organizational framework. The application's NoSQL schema is in charge of storing all required data and managing authentication procedures. The schema contains the following tables;

1) Parcel [id, createdAt, UpdatedAt, UpdatedBy]
2) Shipment [id, createdAt, UpdatedAt, UpdatedBy]
3) Tracking [id, createdAt, UpdatedAt, UpdatedBy]

4) User [id, createdAt, UpdatedAt, UpdatedBy]

5) Packages [id, createdAt, UpdatedAt, UpdatedBy]

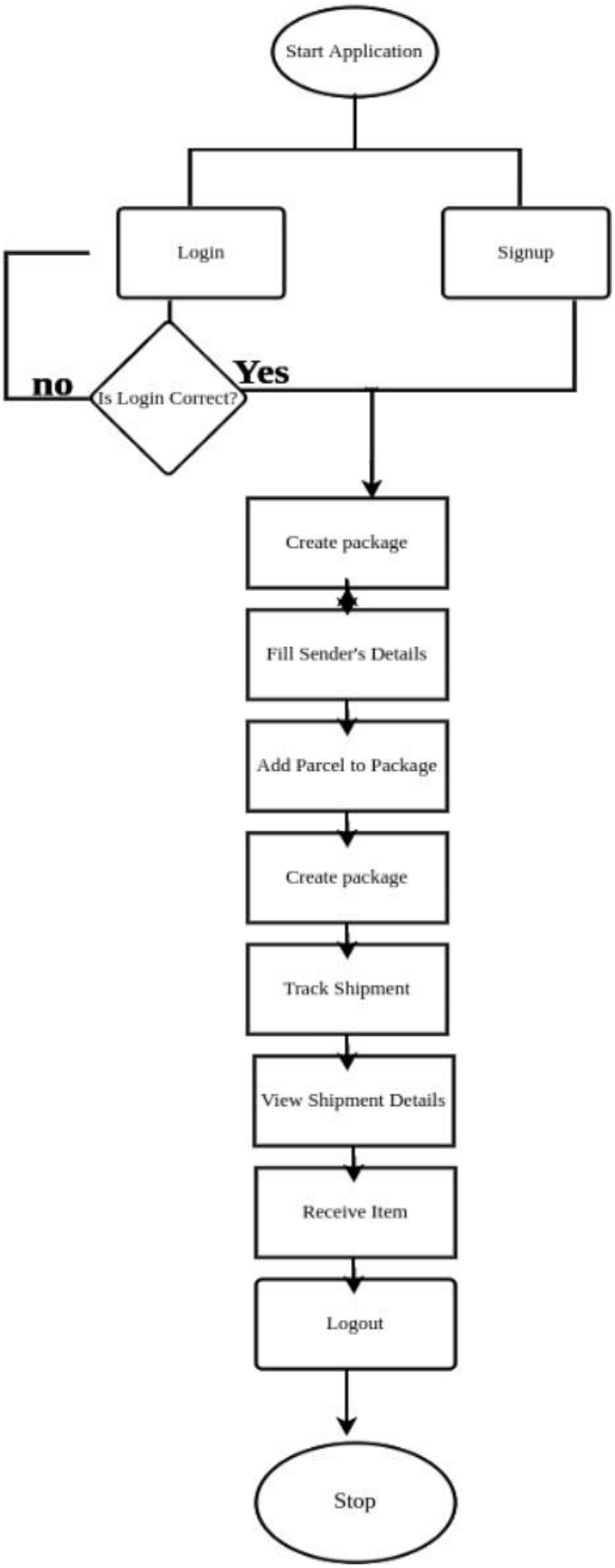

Figure 1. *System flowchart.*

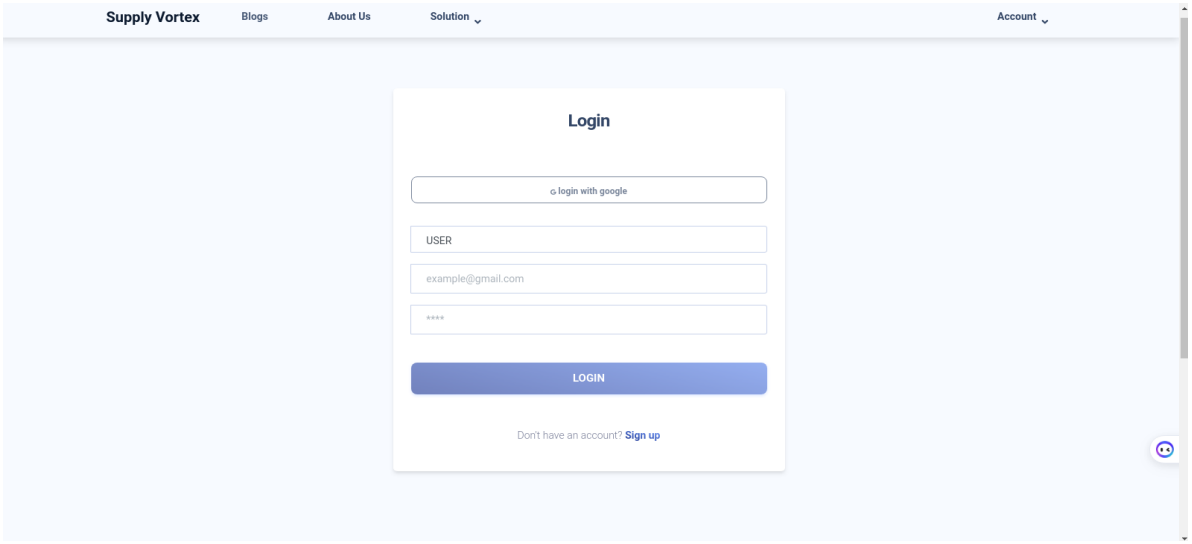

Figure 2. *Login form.*

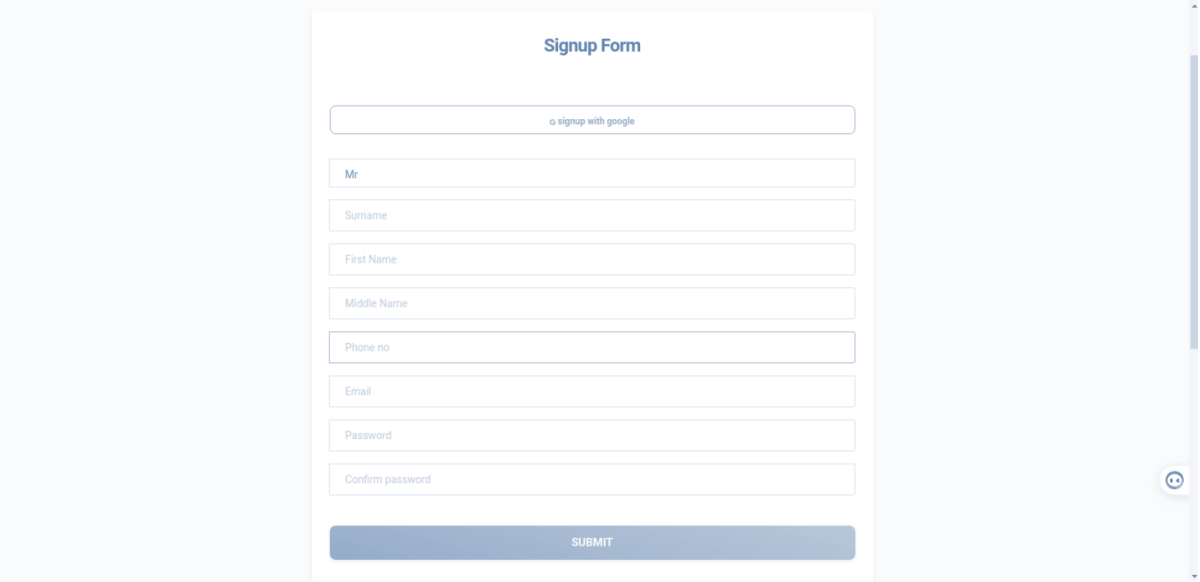

Figure 3. *Sign up dashboard.*

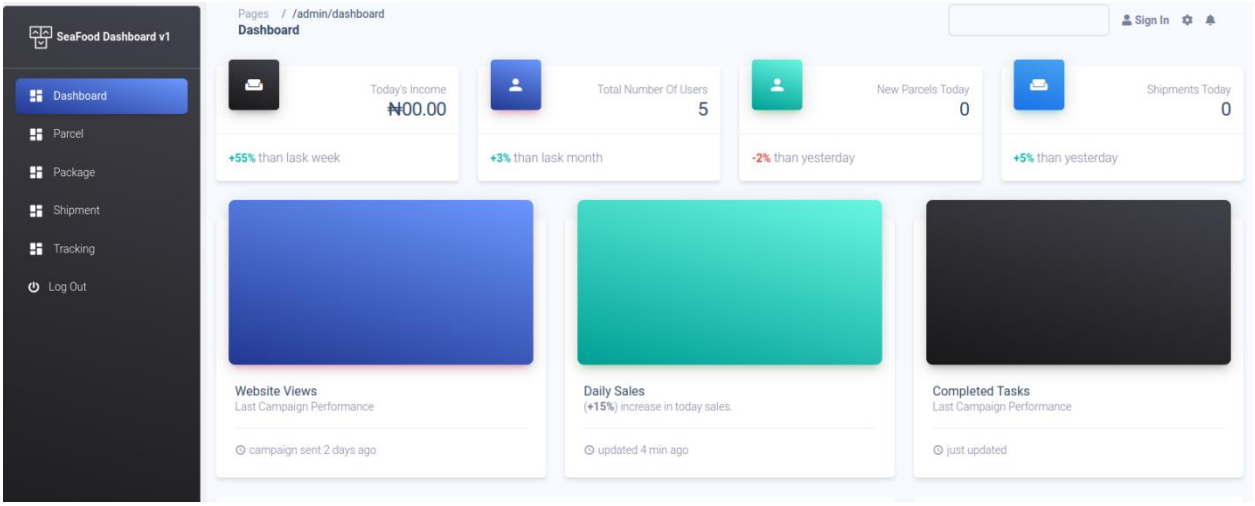

Figure 4. *Admin dashboard.*

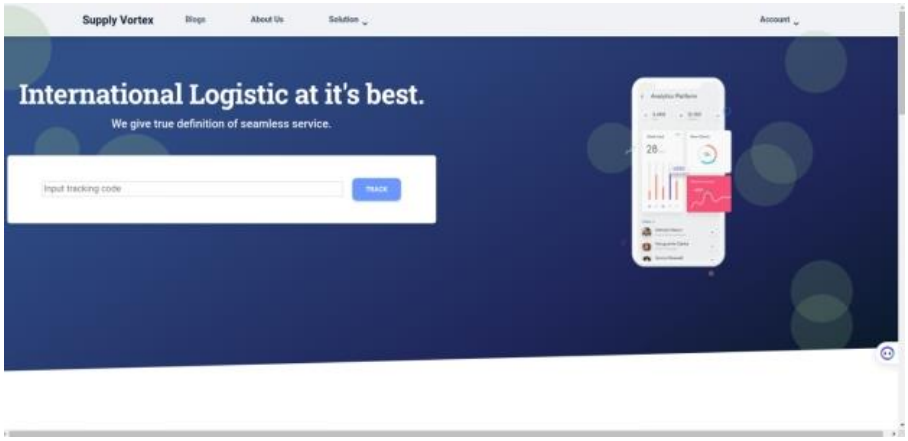

Figure 5. User dashboard.

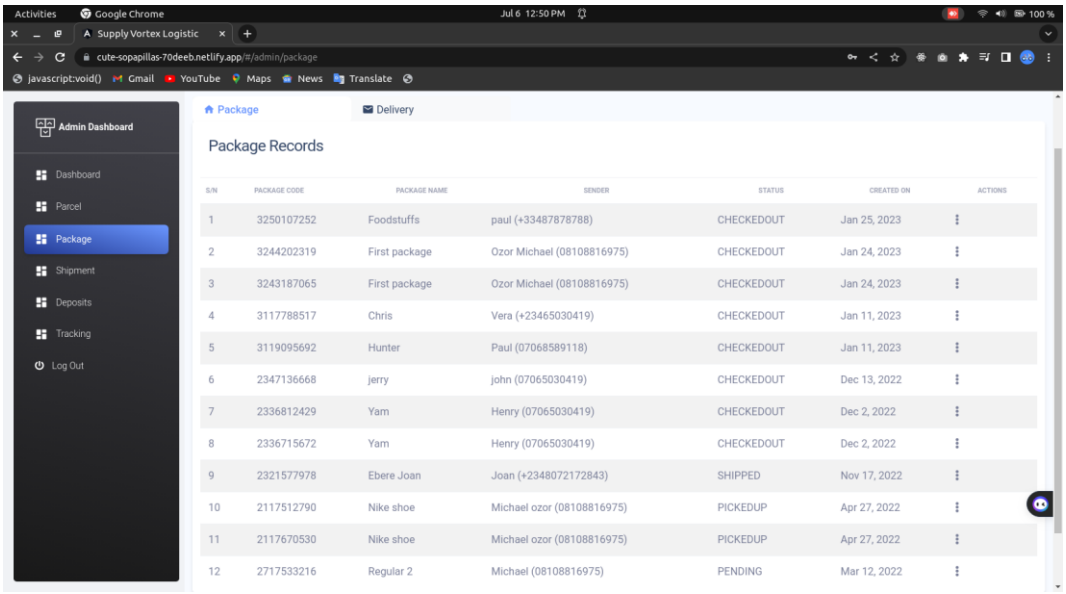

Figure 6. Package records.

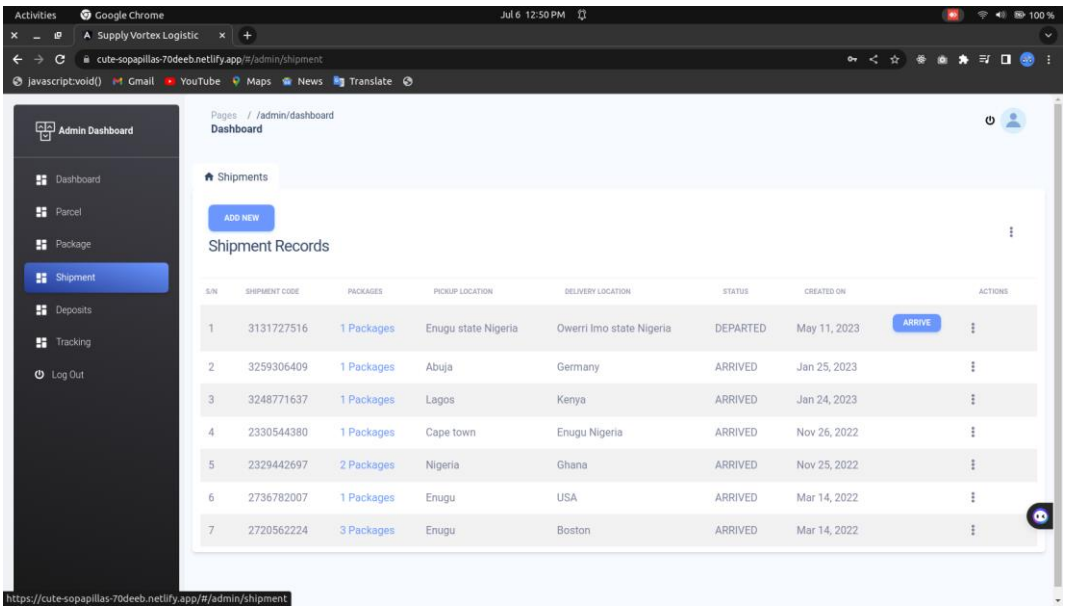

Figure 7. Shipment records.

4. Conclusion

Logistics plays a crucial role in world's socioeconomic development as it serves as a catalyst for job creation and a significant contributor to foreign exchange earnings outside of the oil sector. While logistics is a distinct sector within the national economy, the trade of goods and food products is expanding rapidly. It holds great importance in both developing and developed countries, leading to notable changes in trade structure. The unfavorable trade balance in logistics can be attributed to various factors and may have negative consequences. This further reinforces the notion of a reciprocal relationship between logistics exports and economic growth in the country. Additionally, there is belief that feedback causality exists between the real effective exchange rate (REER) and economic growth.

In conclusion, our study supports the hypothesis that logistics export-driven economic growth is beneficial for Nigeria. Conversely, an excessive reliance on logistics imports can hinder economic growth. To achieve a favorable trade balance in logistics, Nigeria should promote the growth of the domestic logistics and discourage imports of goods that can be processed domestically at a lower cost. This approach would reduce dependence on foreign foods and products.

Based on these findings, the study recommends the following actions: the government should incentivize and promote logistics by establishing funds to finance and facilitate medium-scales start-ups. Additionally, there is a need to align research institutions, as research and advancements in technologies like Artificial Intelligence are widely recognized as essential for improving logistics in the country and overseas.

Conflicts of Interest

The authors declare no conflict of interest.

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