

An Evaluation of Order Fulfillment Information System for Small Medium Business

¹Stdipto Araujo and ²Andersen Asha

^{1,2}Management Studies, IESE Business School, Barcelona, Spain.

¹araujo@mail.iese.edu

Correspondence should be addressed to Stdipto Araujo: araujo@mail.iese.edu

Article Info

Journal of Journal of Enterprise and Business Intelligence (<http://anapub.co.ke/journals/jebi/jebi.html>)

Doi: <https://doi.org/10.53759/5181/JEBI202202014>

Received 18 November 2021; Revised form 23 January 2022; Accepted 14 March 2022.

Available online 05 July 2022.

©2022 Published by AnaPub Publications.

Abstract – Developments in measurement for order processing and customer service are presently under development. In order to guide Small and Medium-sized Enterprises (SMEs) from their current state of capabilities to their ideal future state, encouraging measurements for order processing and customer service is essential. Customer demand initiates the supply chain and fulfilling that need in a timely and accurate manner is the first step in delivering excellent service to customers. Today, the software industry uses a method known as the Software Development Life Cycle (SDLC) to plan, create, and test new software. In this paper, the order fulfilment process and well as the Order Fulfillment Information System (OFIS) development has been discussed and postulated to need a data source to guide future iterations. Therefore, firms who have a need for such information systems have been polled to collect data about their business operations as a source of data for development. In this paper, the Order Fulfillment Information System (OFIS) is discussed and designed using Unified Modeling Language (UML) based on the previously specified business processes.

Keywords – Software Development Life Cycle (SDLC), Order Fulfillment Information System (OFIS), Small and Medium-sized Enterprises (SMEs).

I. INTRODUCTION

The capacity of entrepreneurs working in the country's Small and Medium-sized Enterprises (SMEs) to assess both their personal and their company's potential is an intriguing phenomenon. As a result of introspection, people and businesses may assess their needs, values, strengths, and weaknesses. In particular, if this is connected to the management of orders in a firm (particularly in SMEs), Supply Chain Management (SCM) relies heavily on order fulfillment [1]. The term "order fulfillment" is often used to describe the whole procedure from the customer's first enquiry at the point of sale to the moment the goods is in their hands [2]. While the term "order fulfillment" is often used to describe the specific act of distribution or the logistics function, in its wider meaning it describes how businesses react to client requests. Enhanced capability for taking orders and responding to customer support inquiries is a better metrics for performance measurement. Taking measurements is like having a road plan that shows you how to go from your current level of capability to your ideal level of capability. Delivery at the correct place, on time, and at the right price is a promise made by the firm, and it must be kept if the company is to succeed.

Order Fulfilment Process

Order fulfillment often encompasses inventory management, order processing, SCM, quality control, assistance for clients who have to report challenges or make refunds, all of which take occur at one or more distribution centers.

Order Fulfillment Information System (OFIS)

Software designed specifically for order and stock management is known as an "Order Management System." Automatically entering new stock into the system, keeping tabs on sales through channels like eBay and Amazon, and notifying you, the business owner, when stock of a specific item drops low enough for a re-order are all ways in which an order management system helps ensure more precise inventory management. The whole order-to-cash cycle may be automated with the help of an order management system, from the first client order through the final shipping. Software for managing orders is applicable to organizations of any size, whether they are B2B or B2C. Everyone from the customer support department to the accounting department to the warehouse crew and even you, the company owner, may access the same order management data. To help you keep track of your orders and inventory even while you're on the road, the finest POS systems provide

mobile apps that double as order managers. An organization's productivity and the possibility of receiving repeat business both benefit from efficient order handling. Procedure steps are shown in **Table 1** below.

Table 1. Steps followed in the order fulfilment process

Procedure steps	Details of the steps
Receiving Inventory	Suppliers, internal departments, warehouses, pipelines (for oils, petroleum, water, or some other fluid resource), databases, and computers are all potential points of origin for products. For this reason, it is essential that every incoming material be counted, inspected, and documented in an inventory system. Products with SKUs or barcodes are easier to process while receipt and storage, as well as afterwards when retrieving items from internal storage.
Inventory Storage	Items obtained at a distribution centre are recorded in an inventory management system before being sent out or kept in storage. Rather than stocking up in expectation of future demand, goods should be kept on hand for as little time as possible to ensure their efficient distribution for continuing sales.
Order Processing	Each individual order from a customer is processed through a management system that specifies what needs to be done in terms of picking and packing the products ordered. With the help of order management software, ecommerce websites can immediately begin processing orders placed through their shopping carts.
Picking	Products listed on a packing slip are collected from storage by a "picking staff" or "automated picking robots." Information about the order, such as the Stock Keeping Unit (SKU) number, product brand, color, dimension, quantity, and fulfillment center storage location, are all included on the packing slip.
Packing	By multiplying the package's dimensions (length + width + height), a packing team or automated order fulfilment robots can determine the optimal combination of packing materials to achieve the desired dimensional weight. DIM weight should be kept to a minimum since delivery trucks only have so much storage room for packages. This would facilitate faster deliveries and save money. In the event that a client has to make a return or exchange, the packing team will often provide the necessary return shipping materials and labels.
Shipping	Once the order has been packed, it is forwarded to a shipping node or transportation channel so it can be delivered to the customer. The precise package weight or the dimensional weight, whichever is larger, is used by airline companies, freight lines, FedEx, the US Postal Service (USPS), UPS, and many other carriers to determine freight chargeable charges. Even if an item like a T-shirt may only contain a few ounces, it is still desirable to package it in the lowest DIM conceivable so that the shipping doesn't contribute too much weight to the whole cargo. As an added note, most shipping companies have packaging regulations in place to maximize their own profits from the space they have available for shipments. If carriers reject the order because it doesn't meet their standards, delivery times will increase.
Delivery	Multi-carrier shipping routes are the norm. For instance, FedEx might collect a package from the warehouse before handing it off to the U.S Postal Service for delivery to the client's residence. These mixed transport strategies are used for a variety of reasons. To give just one example, the United States Postal Service (USPS) often makes deliveries to outlying areas where other commercial shippers do not. Using the U.S. Postal Service for the final leg of delivery is the most efficient option.
Returns Processing	In order to begin processing returns, packaging materials and a reference number are included in the original client purchase. The procedure for accepting product returns for refunds or exchanges must be meticulously carried out to guarantee the safety of restocking the item. Obviously, if the product has a serious flaw, it will not be possible to replenish supply. Likewise, a dirty thing cannot be used. Processing returns requires checking items for defects and repackaging them into their original categories. Returned goods are either restocked, sent back to the manufacturer or supplier for a refund or credit, or sent to a recycling center.

The order fulfillment process plays a critical role in SCM. Customer demand initiates the supply chain, and fulfilling that demand in a timely and accurate manner is the first step in delivering excellent service to customers. In the fulfilment process, a system has to be developed as a data source. OFIS development integrates data source to guide future development. Therefore, firms who have a need for such information systems have been polled to collect data about their business operations as a source of data for development. In this paper, the OFIS is analyzed and designed using Unified Modeling Language (UML) based on the previously specified business processes [3]. The remaining part of the paper has been organized as follows: Section II presents a background analysis of this paper with definition of key terminologies such as Management Information Systems, Supply Chain Management; and Order Fulfilment. Section III presents a literature review on the order fulfilment process in the SMEs. Section IV presents a proposal of a methodology known as the Software Development Life Cycle (SDLC). Section V presents a result and discussion of this paper; starting with a review of known theoretical details about order management; secondly, provides an analysis of the order fulfillment process; and a conceptual framework of the current order fulfillment system. Lastly, Section VI draws conclusions about the research.

II. BACKGROUND ANALYSIS

Management Information System

The main focus of any MIS is the transformation of raw data into useful insights for management. Management information systems are used by any system that feeds data into an organization's management processes. Management Information Systems (MIS) are simply computerized administrative frameworks. In order to plan, direct, and control the activities over which they have authority, managers at all levels and in all functions need access to a system that transforms data from internal and external sources into information and disseminates that information to them in a timely manner and in a form that they can use. Some people, however, restrict its use. Their perspective is that it is a data analysis and reporting system. The product's goal is to aid managers in resolving organized difficulties.

Supply Chain Management (SCM)

SCM is the process of controlling the interactions between suppliers, distributors, retailers, and customers to maximize profit while minimizing overall costs. Because of this, it's clear that the export supply chain is an integral part of the process by which buyers and sellers with an interest in communication share information and coordinate the flow of goods. More crucially, the group uses information exchange as a technique to assist its members improve their performance by making more informed judgments regarding strategic problems. According to the definition provided by Business Dictionary, a supply chain is "a network of organizations that are involved, through upstream and downstream linkages, in the various processes and activities that produce value in the form of products and services in the hands of the ultimate customer."

Order Fulfillment

In the broadest sense, order fulfillment is everything that happens from the time a consumer makes an enquiry at the point of sale and the time they get their order. Order fulfillment may relate to the specific act of distribution or the logistics function, but more generally it describes how businesses react to consumer orders. However, for businesses to fully take advantage of these openings, they will need to rise to the occasion presented by new difficulties. In particular, balancing the need for process integration with the need for isolation across several channels is an ongoing design consideration for any multi-channel distribution system. Further, distribution and after-sale services are becoming integral parts of the product offering, therefore business choices pertaining to sales and operations are becoming linked.

III. LITERATURE REVIEW

While many studies, e.g. [4], have focused on the supply chain as a whole, the processes inside it have received less attention. The concepts of product flow and process management in a supply chain are comparable even when seen through a variety of lenses. In-depth examination of the various SCM procedures reveals even more distinctions in the underlying ideas and frameworks. The methods used in the supply chain might change based on the origin of the product being delivered. There are procedures, which are obvious for the order fulfilment and procedures that are linked to the order fulfilment process, even with the variations in definitions and categorization of the supply chain operations.

Product availability information, timely delivery with the appropriate degree of flexibility, transparent and dependable service, service recovery in the event that a service is not completed, and efficient operations are all things that should be guaranteed by the order fulfillment process [5]. This is fulfilled through the three phases of the order fulfilment process: collaborative planning, replenishment and forecasting; order fulfilment and order delivery. Each phase is explored in further depth inside the supply chain model provided before. The order fulfillment process that succeeds, as presented by Jiang, Li, Aneja, Wang, and Tian [6], is one that is crafted with the final product in mind. This means that the needs of the client are the primary focus throughout the order fulfillment procedure. They list five benefits the process must provide to satisfy the customers: Product presence; Timely delivery; Reliable and Transparent service; Recovery of service; and Effective operations.

Supply chain and inventory actions farther upstream affect product availability. Prompt deliveries are characterized by three characteristics: speed, consistency, and adaptability. A transparent and trustworthy service makes all relevant information, including any updates, readily available to the end user. When orders can't be processed, customer service fails. This necessitates a separate procedure for addressing service outages and evaluating the procedure to lessen the likelihood of service outages. Finally, operations must be efficient, and efficiency is often more essential than service level.

When it comes to the framework of the order fulfillment procedure, one of the eight SCM procedures given by Bohanes and García [7] is applicable here. The order fulfillment process includes taking orders, processing payment, packaging the goods, shipping it, and then servicing the client. The order fulfillment process may be a means of communicating with customers, and as such, it can affect their level of satisfaction. In order to maximize profits, management allocates specific resources to the strategic process of order fulfilment. Transactions are at the centre of the order fulfilment process at the level of operation.

The sub-processes at the level are linked to the process interface of the other eight processes within the supply chain. According to [8], Fig. 1 shows these linkages.

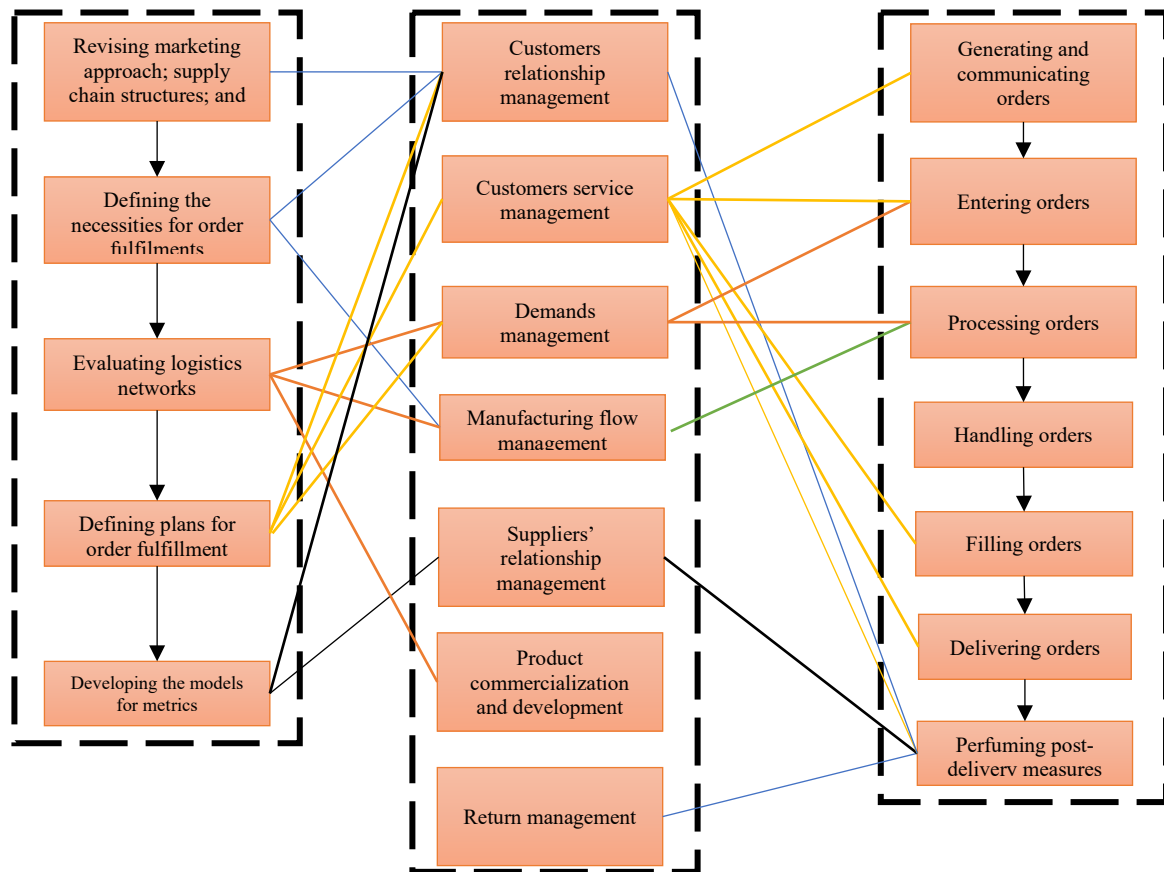


Fig 1. Connecting business processes within the supply chain to the process of order fulfilment on the operational and strategic sub-process level

An important part of the strategic processes is managing interactions with customers. Strategic evaluation of the supply chain and the formulation of a strategy for fulfilling customer orders are closely related to other business activities. Strategic choices within the logistic networking system and developing an approach for order fulfilment have the greatest impact on other processes, and this is especially true for the customer service part of the order fulfillment process.

Only the operational sub-processes of post-delivery activity and evaluate performance are related to the three business functions of returns management, customer relationship management, and supply chain management. Information gathering, synchronization, decreased unpredictability, and heightened adaptability are all parts of the operational sub-processes that connect the demand management and order fulfillment processes. As stated by authors in [9], the operational processes of the customer service management include the identification of an event, the analysis of a given situation and its potential solutions, and the implementation of a chosen course of action. According to Huegler and Hartman [10], managing the flow of manufacturing is related to the fulfilling of orders in the execute capacity and demand sub-process. These activities and their connections to the operational sub-processes that make up order fulfillment are the focus here. Fig. 2 depicts the interdependencies among the various operational sub-processes engaged in the process of order fulfillment, including the customer service management, manufacturing flow management, and demand management. The tasks involved in each of these sub-processes are also outlined.

The operational sub-processes of creating and reporting an order, inputting an order, and executing an order are related to other operational sub-processes in demand management, the manufacturing flow process, customer service management, and hence need the most communication channels. In the early stages of the order fulfillment process, external communication serves to acquire and provide data needed for subsequent stages of the process. Order fulfillment is intertwined with customer service management in that the latter requires knowledge of the former in order to properly respond to customer inquiries, and the former in turn need knowledge of the latter in order to fulfill customer delivery documentation.

These organizational sub-steps are linked because they depend on data that is unique to each consumer. Information transfer across operations is especially crucial at the start of order fulfillment due to the interconnected nature of activities from throughout the supply chain. Furthermore, early data collection influences subsequent steps in order processing. This highlights the significance of order details for smoother order fulfillment operations. In addition, the initial step of the order

fulfillment process places extra emphasis on the accuracy of the order information and how it may be connected with the sales process to improve efficiency and cut down on errors. Additionally, in their model for delivering in-stock items, Zhang, Zhuge, Tan, and Zhen [11] include earlier phases of order fulfillment. They stress that the delivery timeframe really begins before the purchase is even placed, with the client inquiry and quotation.

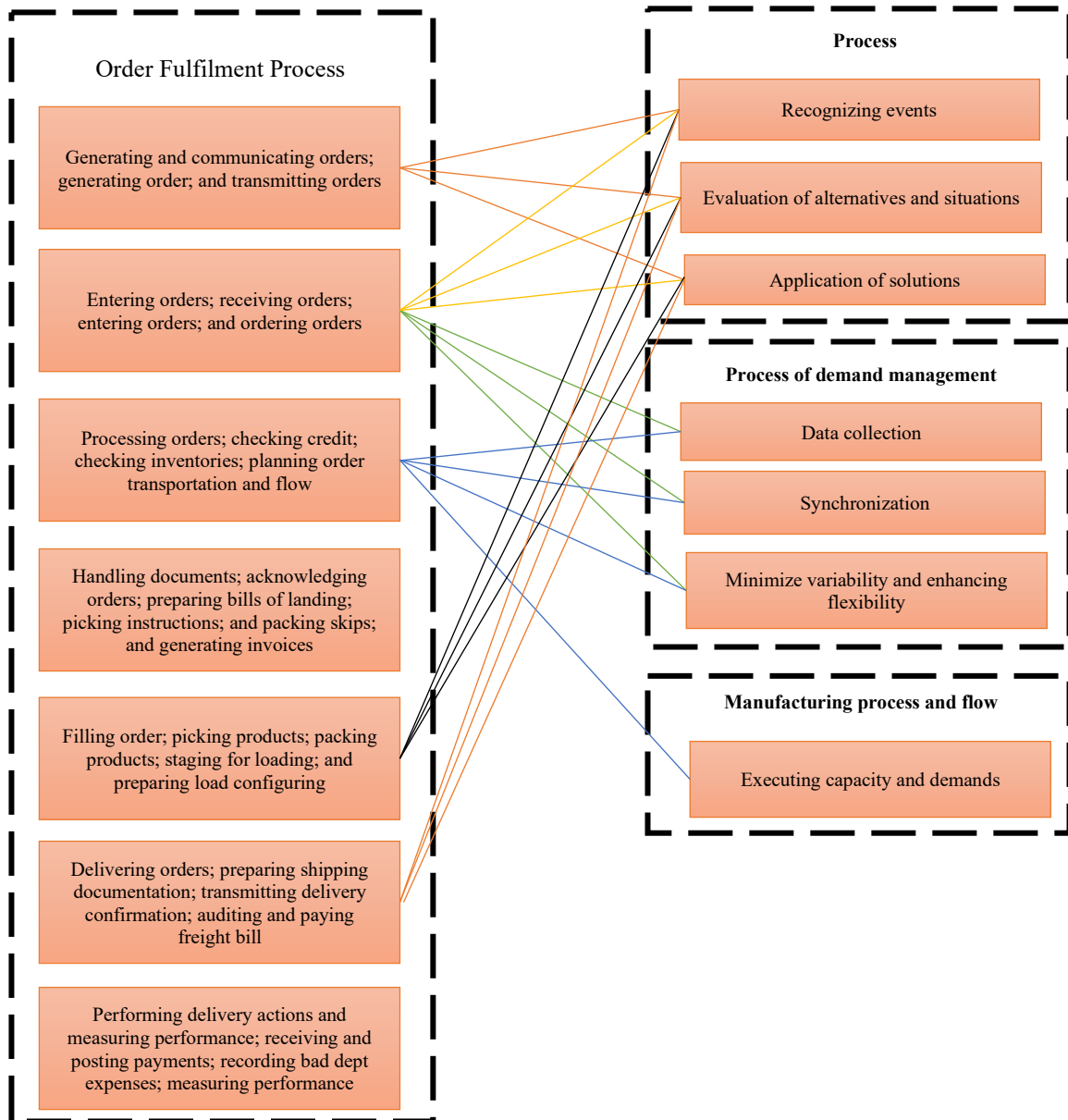


Fig 2. Operational sub-processes connecting between supply chain activities and processes in the sub-process.

Therefore, it is most important to get back to prospective customers as soon as possible with accurate, up-to-date information. A customer-generated event is any action taken as a result of a customer-generated occurrence, such as a quality complaint or a delivery schedule adjustment. When an event occurs, it's the job of supply chain processes to work together to produce the best possible reaction for the client. Customer service management is often intertwined with the order fulfillment process, as disclosed by authors in [12]. This is because the order fulfillment process plays a pivotal role in providing excellent service to customers and may even be the only customer service procedure in the company. Inasmuch as better customer care often costs more, enhancing the customer service component of the order fulfillment process is helpful only up to a degree.

IV. RESEARCH METHODS

Design Research with SDLC Waterfall

The software industry follows a method known as the Software Development Life Cycle (SDLC) to create and test reliable programs. The goal of the Software Development Life Cycle (SDLC) is to create software of the highest quality, one that not only satisfies but also delights the client. As a framework, the software development life cycle specifies what must be

done at each stage of the software creation process. The Software Development Life Cycle (SDLC) is a set of procedures used by businesses that create software. It's a precise blueprint for creating, maintaining, replacing, and modifying or improving a piece of software. Software engineering's Waterfall model was first introduced by Massitela, Assunção, Santos, and Fernandes [13]. The software development life cycle describes a mechanism for enhancing both the code and the development workflow. **Fig. 3** demonstrates the research methodology.

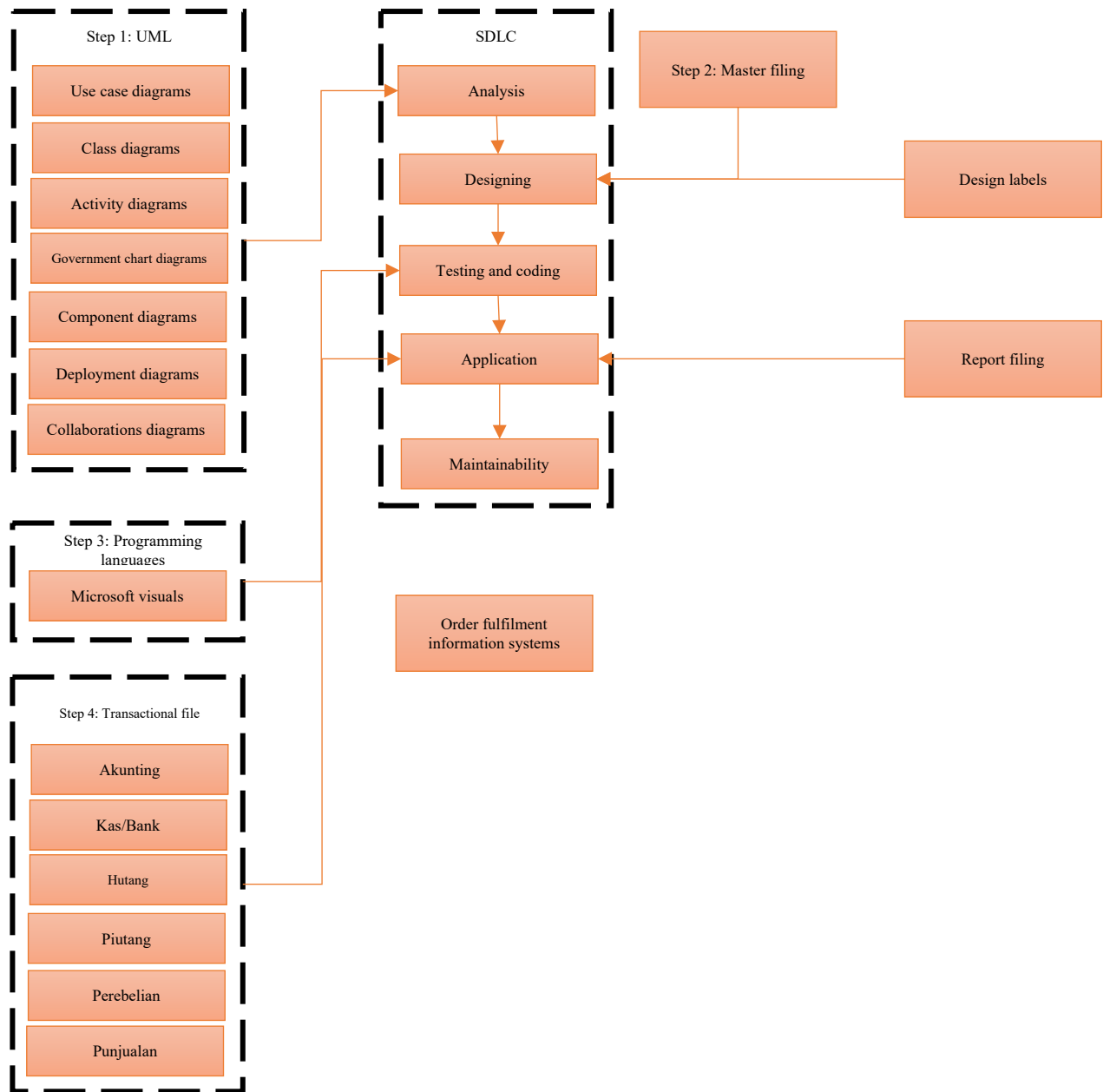


Fig 3. Illustration of proposed research methodology

System development phases are the many points at which work on a system is carried out in preparation for its eventual deployment. As a result, people working on system development will find this phase to be quite helpful. The first step in this kind of modeling is to determine what features of the whole system should be implemented as software. This is crucial since the program has to communicate with other components like hardware, databases, and the like. Analyzing a business issue in order to provide recommendations for enhancements and detail the needs and priorities of the firm is an analysis. The goal of a system analysis is to provide the project team a more complete picture of the issues and requirements that gave rise to the project. At this point, it is important to evaluate the situation and identify the issues that require fixing. Data from order completion is a necessary input into the requirements analysis process. Once you've determined what platforms the program will operate on, you may analyze them. Literature reviews, in-person observations, and phone interviews all contribute to the data collection process.

In order to meet the business needs that were uncovered in the system analysis, the next step is design, which entails the specification or building of a technical and computer-based solution. Initial system development will make use of complementary technology approaches. The system design phase is when the application's database, software, user interface, and network are planned out and developed once the alternative solution has been accepted. Software, or Source Code, the act of coding converts preexisting designs into a language that computers can read and use. This is the part of the process when the designer's plans are put into action by the programmer. Construction, installment, testing, and handoff to regular operations constitute implementation.

Installation

The purpose of installation is to put into action the design that has already been completed in a way that achieves the desired outcomes and fulfills the system requirements. The next step is to use the programming language to implement the general framework that was drawn out in the design phase. The testing procedure continues. In order to ensure that the produced software is of sufficient quality for its intended purpose, it must be tested. Due to the fact that not all software is created equally, regular upkeep and development are both necessary. Even after extensive testing, the program may reveal subtle bugs that were overlooked or it may reveal the need for extra functionality. When an external firm makes a modification, such as to an operating system or other gadget, development is required.

V. RESULT AND DISCUSSION

Review of Order Management

The term "order management" refers to the procedures used in the daily operations of a company to tally, verify, and fill customer orders. Everything from taking a customer's purchase to being paid for it might fall under this category, from collecting their information to printing their labels. Manual methods, such as updating static spreadsheets, were formerly necessary for order administration. These practices no longer provide a viable option for today's retail establishments and distribution centers since they are antiquated. Band-aid solutions between systems and processes may be even more problematic, since they can result in a lack of transparency, inaccurate numbers, and additional stress. Brands that want to remain ahead of the competition need solutions that can grow with them and adapt to the changing demands of both consumers and the industry. To deliver at the level that the market currently demands, a dependable and effective order management system is essential.

Order Management Systems (OMS)

An OMS guarantees the digitization and synchronization of the complete operational system to standardize all the steps of the order journey. Software for managing and tracking e-commerce orders is in place, allowing businesses to handle and monitor shipments from several fulfillment centers and delivery methods. As a result, service providers may speed up their automation efforts and consolidate their data into a single, accessible location. A unified brand experience may be provided to customers via several touchpoints. Because of the interconnected nature of e-commerce and multichannel selling, order management systems are no longer a luxury but rather a need for every company with aspirations of growth.

Gaining an edge over the competition requires access to and use of real-time data, which is a key component of any successful distributed order management system. Spreadsheets and other similar methods of data collection are inefficient, out of date, and prone to human mistake compared to using an integrated software system like Mintsoft. Every organization, no matter how big or small, needs a reliable OMS that can do the basics. The complexity of the OMS required is determined solely by the nature of the business and the field in which it operates. E-commerce between businesses (B2B) and consumers (FMCG) may, for instance, have subtleties that the latter do not. Therefore, certain businesses may need more advanced technologies. All OMS tiers need to be equipped with the following fundamental features:

a) Order Tracking

It may be argued that an OMS's most fundamental capability is its capacity to monitor and track orders. Your e-commerce business will need an order management and aggregation system if it begins to expand. To simplify the monitoring process for both the client and the provider, an OMS is a useful tool. Notifying customers of the shipment's whereabouts at regular intervals, for instance, helps ease their minds and cut down on their number of questions. In fact, a poll from 2021 found that real-time order monitoring solutions were the top concern of omnichannel merchants. When your business is accountable for sales across several channels, an OMS is even more crucial.

An effective OMS will monitor and record sales made via your online shop, marketplaces, and any other channels. Having all relevant information about inventory, orders, and customers in one convenient location improves productivity and efficiency, and also decreases the likelihood of making mistakes and boosting the likelihood of making cross-sale offers. Moreover, digital channels are not required. Order Management Systems (OMS) often also keep track of and process in-store and phone orders. When all order information is centralized, it will be easier to see [14]. Staff members will have a lot simpler time getting in touch with one another, which will make it easy to check on the progress of orders, make any necessary adjustments, and contact consumers if they have any concerns, queries, or potential possibilities.

b) Inventory Management

Inventory levels may fluctuate as a result of received orders and shipped products. It might become complicated fast if you have numerous customers sharing a warehouse or if you sell on various websites. When items move quickly in a shared

resource setting, effective inventory management is crucial. Without precise inventory counts, managing a warehouse efficiently becomes challenging, and a number of problems might arise.

Overselling: Accepting orders for items when there isn't enough supply to meet them is known as overselling. Because of this, it may be necessary to cancel already made orders with consumers. How many clients do you think you'll lose if this kind of thing becomes routine?

Overstocking: Overstocking is the polar opposite of understocking, since too much of either may lead to wasted warehouse space and cash. Using assumptions like this almost guarantees you'll be stuck with unsold or obsolete inventory.

Forecasting: While the aforementioned problems and their consequences are simple to see, the positive impact that reliable forecasting may have on your company is more difficult to imagine. It is more challenging to comprehend order demand from customers without accurate global inventory stock level statistics. With the data at hand, you can make educated decisions about where to focus your time and energy. For instance, you may decide to devote greater resources to your seasonal ranges. A survey indicated that 54 percent of vendors were not using forecasting software, which might lead to inventory problems down the road. An OMS may help you save time and money by streamlining your inventory monitoring process, allowing you to more easily identify issues and opportunities, and minimizing the likelihood of human mistake.

Fulfillment

When an order is fulfilled, it is transported from the warehouse to the recipient. Finding the goods, packing it, organizing the best shipping choices, and applying labels are all typical steps in this process. It's not hard to envisage warehouse employees using mobile barcode scanners to keep track of inventory and record their progress. Information is sent in this fashion into an order management program like Mintsoft. With this information at your disposal, you'll have complete command over all of your orders. This information will tell you how long it takes for shipments to arrive, where delays are occurring, and how you can help eliminate the issue of missing mail.

Returns

Nobody like the concept of returns, but an OMS may make the process much easier. It does it in a manner that minimizes frustration for shoppers and saves time and energy for store or warehouse management. One unified platform allows for instantaneous redelivery or cancellation, with no hassle to the customer.

Benefits of an OMS

The goal of developing OMS software is to automate and streamline the compliance process while minimizing costs.

Flexibility in Growth

Generally, an ecommerce OMS is developed with distinct functionalities that are delineated by distinct tasks, so that each part of the system has access to the data it needs to perform its own purpose. The smooth functioning is the result of their well-designed interfaces and integrations with one another. The modular nature of these systems allows for easy addition of new features and expansion as needed via the use of separate modules. Given that OMS software is meant to serve as a shared intervention across the distribution chain, from transportation and in-store handling to back-end production and customer competence, the functionality used throughout the journey can transform to meet the requirements of its user, as can the functionalities that are appended.

Synergy

The operational platforms cannot function without an OMS. A top-notch OMS will constantly keep tabs on all the connected devices and communication channels, allowing for more efficiency and less interruptions in the workplace. The main goal of this innovation is to increase productivity while simultaneously decreasing the room for mistake. If an order is canceled by a consumer or a merchant, if there is a shift in stock levels, or if a customer's order is qualified for drop-shipping from nearby fulfillment centers, the system is aware of this quickly. When it comes to preventing and correcting problems, an order management system has the advantage over human workers since it can link and exchange real-time data across each system. It integrates information from all points along the supply chain, including carriers, drop-ship sites, suppliers, and others. Because of this, studies have shown that warehouse employees believe automation improves their productivity and allows them to pursue more engaging tasks.

Enhanced Customer Service

Order management systems' one-of-a-kind architecture is critical to provide a memorable experience for customers and, by extension, a positive return on investment for the business. Customers will be able to monitor the progress of their orders at any time, from the time they are placed until the moment they are delivered. Customers can now see when their shipment is being accepted, dispatched, and delivered, as well as any difficulties or delays that may arise, thanks to increased visibility into the shipping and fulfilment process. If problems do emerge with an order, support agents will have access to the customer's shopping cart and purchase history thanks to the OMS integration. If a client is experiencing trouble checking

out, for instance, a support rep may access the cart and make the necessary changes by hand. The technology will be able to inform support staff of the most probable reason a consumer has phoned with an inquiry regarding their purchase.

Order Fulfillment Process

Order fulfilment relies heavily on processes illustrated in Fig. 4. When a consumer places an order, it kicks off the supply chain, and it is the first step in giving excellent service to the customer if the order is filled quickly and accurately. However, there is a lot more to the fulfillment process command than merely fulfilling orders. Creating systems and procedures that allow businesses to satisfy consumer needs at the lowest possible cost. To illustrate how the Fulfillment Order process may be deployed across departments and managed at the corporate level, it is broken down into its component parts. Each sub-tasks processes are analyzed, and the sub-processes' and their interfaces with other company functions, processes, and companies are assessed.

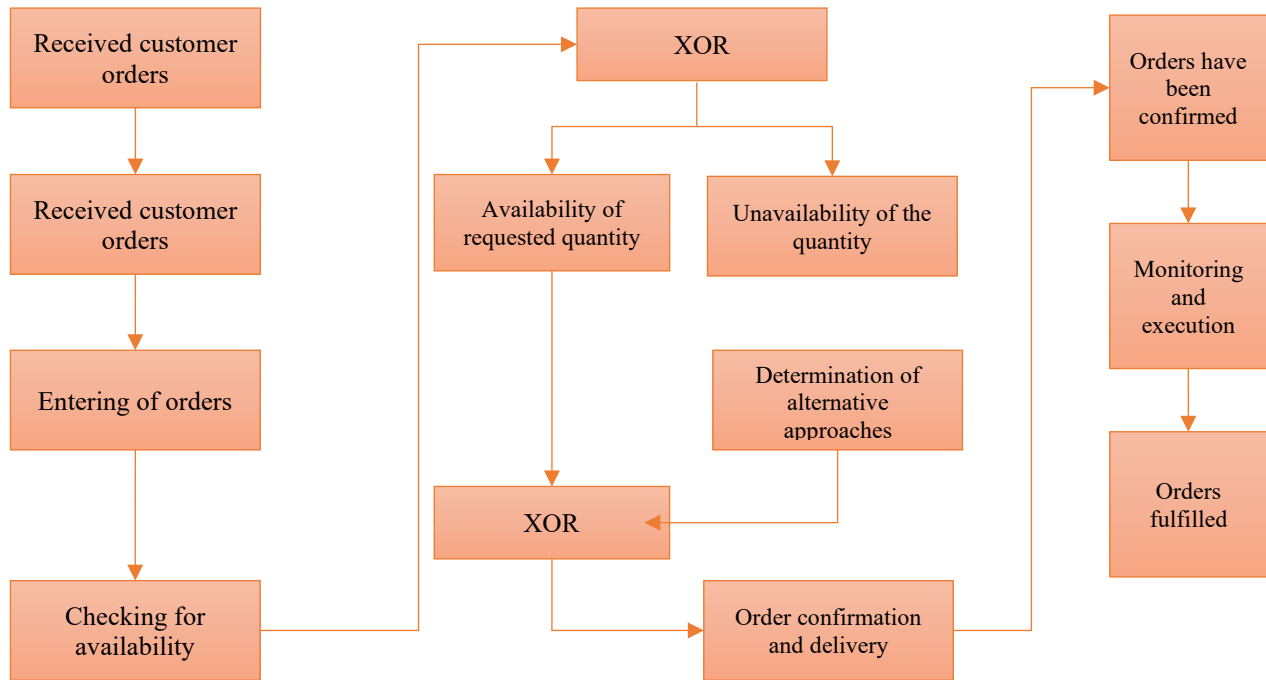


Fig 4. The order fulfillment process diagram

Intermediate providers are becoming more important for businesses to maintain global competitiveness. The industrial sector, in order to adapt to the development of the global economy, has an urgent need to generate, distribute, and communicate relevant and timely knowledge and information. Many businesses today recognize the importance of a strong supply chain to their success and have begun to consider how they may better manage their supply networks to gain a competitive edge. Suppliers, manufacturers, wholesalers, retailers, and end-users all play roles in keeping the information, money, and goods moving through a supply chain. When the advantages of information exchange within a supply chain exceed the costs, we have a clear definition of its genuine worth.

Investment in information systems and fees imposed by customers or suppliers for disclosure of information might be among these expenses. Communication and management expenses may be included in the total cost of coordination. Improved IT has increased the significance of supply chain Information Exchange (IT). In addition, studies have been done to determine how knowledge sharing affects final product quality. Furthermore, further research is needed to determine the optimal means of information exchange and the positive consequences on quality enhancement. Because the goods must arrive in time to capitalize on present sales possibilities, order fulfillment management is a crucial consideration. Since the firm's tagline is "deliver it at the right place, at the right time, for the right price," customers have high hopes that the company will be able to deliver as promised.

Conceptual Framework of OFIS development

Small and medium-sized company owners in particular should never lose sight of the importance of keeping operations running smoothly. The most successful company owners keep a close eye on everything from internal processes to sales to employee performance to make sure their operations are operating smoothly and efficiently. When a group of people joins a manufacturing or distribution firm, overall company and productivity are not the only things that require strategic focus. Implementing a variety of automated order fulfillment methods is crucial if a distribution center is to establish itself as a credible player in the market devoted to meeting the needs of all of its customers. OFIS development need a data source to guide future iterations. Therefore, firms that have a need for such information systems have been surveyed to collect data

about business operations as a means of informing development. The business Process Management in the Workplace Business Process Management Notation (BPMN) is used to design and implement automated procedures for use throughout an organization.

Master data, the core process, and the support process are the three pillars upon which a computerized business process is built. Each of these three components is essential to depicting how a business functions after adopting the Order Fulfillment IT infrastructure. The purpose of the "Master Data Management" strategy is to centrally manage the most important data sets that serve as the bedrock for all of a company's activities. The Key Process encompasses the acquisition of raw materials, the manufacture of finished goods, the recording of sales (sales orders, sales invoices, sales returns), the making of purchases (purchase orders, purchase returns), and the administration of stock (handover of goods, goods receipt, goods entered, materials entering). The primary objective of the Support Process is to aid in the administration of data pertaining to the aforementioned areas of accounting, finance, and AP/AR.

The Order Fulfillment data system will be evaluated and designed using Unified Modeling Language (UML) based on the previously specified business processes. A Case Diagram and Activity Diagram, both of which are part of the Unified Modeling Language (according to Gao, Goodman, Li, and Lee [15]) may be used to simplify the study of developing an IT system and provide a high-level representation of its structure. The many people or organizations involved in a use case are separated into the departments that the company controls. Operations like as administration, sales, purchasing, warehousing, accounts payable, accounts receivable, finance, and accounting all have a common cast. Access permissions in the Order Fulfillment database may be set up in a variety of ways to accommodate a wide variety of use cases, and the separation of actors is done just to offer a better view of each scenario performed by the actor. Reporting is just a scenario in which the actor may display or make reports according to the scenario, although all other scenarios in each process, particularly data setting, have the right to create, modify, and delete data linked to the scenario.

When the debt is explicitly referenced in the Purchase area, an action is triggered in the Accounts Payable section, where the purchases are recorded as accounts payable. When the action on the Sales section pertains to Accounts receivable, the transaction will be recorded as an Accounts receivable in the system since the seller has not yet been paid for the goods or services they provided to the buyer. When a sale is made of an item that has a connection to the actions in the Purchase area, and when action is taken in the Warehouse part to receive the items, the system may trigger a condition. In response to requests or demands, the Finance, Accounting, Administration, Sales, and Purchasing departments may now begin taking action. Any time a report is needed, it may be generated at the conclusion of the section where the activity trigger is located, without the need to first adjust the data settings for earlier actions on that section.

VI. CONCLUSION

The order fulfillment process and the Order Fulfillment Information System (OFIS) are discussed in this article, which explains the necessity for a data source to guide future iterations. Firms that need such information systems have been polled in order to obtain data on their company activities as a source of data for development. The Order Fulfillment Information System (OFIS) is explored and created in this work using the Unified Modeling Language (UML) based on previously stated business processes. Measurement developments for order processing and customer support are now in the works. Encouragement metrics for order processing and customer service are critical for guiding Small and Medium-sized Enterprises (SMEs) from their existing level of capabilities to their desired future state. Customer demand starts the supply chain, and meeting that need in a timely and correct way is the first step in providing exceptional customer service. To develop, produce, and test new software, the software industry currently employs a process known as the Software Development Life Cycle (SDLC).

Data Availability

No data were used to support this study.

Conflicts of Interest

The author(s) declare(s) that they have no conflicts of interest

References

- [1]. R. Atkins, A. Sener, M. Drake, and K. Marley, "Predictors of burnout among supply chain management professionals," *Int. J. Value Chain Manag.*, vol. 14, no. 1, p. 1, 2023.
- [2]. A. Shah, Z. Yu, M. Tanveer, W. Ali, and A. R. Saleem, "Effect of product assortment, internet of things, order fulfillment, green on purchase intention through the mediating role of shopping assistance," *J. Adv. Manuf. Syst.*, pp. 1–26, 2022.
- [3]. S. Ahmed, A. Ahmed, and N. U. Eisty, "Automatic transformation of natural to unified modeling language: A systematic review," in *2022 IEEE/ACIS 20th International Conference on Software Engineering Research, Management and Applications (SERA)*, 2022.
- [4]. M. Vivaldini and M. da P. M. M. Iglesias, "Humanitarian actions of a cultural center during the Covid-19 pandemic: an analogy with supply chain business processes," *J. humanit. logist. supply chain manag.*, vol. 12, no. 3, pp. 333–358, 2022.
- [5]. M. A. Camilleri, "E-commerce websites, consumer order fulfillment and after-sales service satisfaction: the customer is always right, even after the shopping cart check-out," *J. Strat. Manag.*, vol. 15, no. 3, pp. 377–396, 2022.
- [6]. D. Jiang, X. Li, Y. P. Aneja, W. Wang, and P. Tian, "Integrating order delivery and return operations for order fulfillment in an online retail environment," *Comput. Oper. Res.*, vol. 143, no. 105749, 2022.

- [7]. J. Bohanes and D. R. García, “Automatic discovery procedures in the WTO – the treatment of annex V to the SCM agreement by appellate body report in United States – measures affecting trade in large civil aircraft (second complaint) (DS353) (US – Boeing),” *Glob. Trade Cust. J.*, vol. 7, no. 10, pp. 441–446, 2012.
- [8]. K.-J. Chung, J.-J. Liao, H. M. Srivastava, S.-F. Lee, and S.-D. Lin, “The EOQ model for deteriorating items with a conditional trade credit linked to order quantity in a supply chain system,” *Mathematics*, vol. 9, no. 18, p. 2311, 2021.
- [9]. C. G. Chatzopoulos, a West Pharmaceutical Services Deutschland GmbH & Co KG, Eschweiler, Germany, M. Weber, and Customer Co-Creation, Waalwijk, the Netherlands, “Digitization and Lean Customer Experience Management: success factors and conditions, pitfalls and failures,” *Int. j. ind. eng. manag.*, vol. 12, no. 2, pp. 73–85, 2021.
- [10]. P. A. Huegler and J. C. Hartman, “Fulfilling orders for steel plates from existing inventory,” *J. Oper. Res. Soc.*, vol. 58, no. 9, pp. 1156–1166, 2007.
- [11]. S. Zhang, D. Zhuge, Z. Tan, and L. Zhen, “Order picking optimization in a robotic mobile fulfillment system,” *Expert Syst. Appl.*, no. 118338, p. 118338, 2022.
- [12]. B. A. Y. A. Nassar, “The impact of e-service quality and ease of use of e-customer relationship management: a study of mobile phone services in Jordan,” *Int. J. Electron. Cust. Relatsh. Manage.*, vol. 13, no. 2, p. 146, 2021.
- [13]. I. Massitela, J. Assunção, A. Santos, and P. Fernandes, “A structured stochastic model for software project estimation in Waterfall models (S),” in *Proceedings of the 30th International Conference on Software Engineering and Knowledge Engineering*, 2018.
- [14]. Z. Wang, J.-B. Sheu, C.-P. Teo, and G. Xue, “Robot scheduling for mobile-rack warehouses: Human–robot coordinated order picking systems,” *Prod. Oper. Manag.*, vol. 31, no. 1, pp. 98–116, 2022.
- [15]. J. Gao, J. Goodman, M. Li, and K.-F. Lee, “Toward a unified approach to statistical language modeling for Chinese,” *ACM Trans. Asian Lang. Inf. Process.*, vol. 1, no. 1, 2002.