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BUSINESS PROCESS RE-ENGINEERING IN WAREHOUSE

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Abstract: Customers receive labor-intensive services from warehouses. High expenses and unmet consumer demand may arise from underperformance. According to new market trends, warehouses must process a large amount of orders in a short amount of time. Order picking methods must be adjusted to deal with this by addressing a wide range of planning concerns. Order picking planning issues that are solved in a sequential manner may result in a decrease in overall warehouse activities. Order-picking consumes the most time in warehouse. This action requires more travelling time, looking for certain commodities, and then proceeding to other operations, and it occupies more than 50% of warehouse activities. In central warehouses and material distribution centers, automated modular conveyor systems are frequently implemented to deliver high throughput and smooth logistics operations while keeping flexible and efficient. The goal of this research is to show how a system may increase efficiency in the order-picking portion. This is a technology that can assist humans in reducing the amount of time they spend traveling and the labor costs they spend. Business Process Reengineering provides for the assessment of the risk associated with redesigning certain business process stages. It serves as the foundation for a process-oriented decision support system with the objective of consistently assessing and improving business processes.

Keywords: Order-Picking, Automated Modular Conveyor, Picking System, Warehouse, Business Process Re-engineering

Introduction

Supply Chain Management (SCM) refers to the flow of products and services and includes all processes that convert raw materials into finished commodities. Simplified, is an integrated activity from the supply to the consumer (end-to-end system). A system that is networked among suppliers, manufacturing, warehousing, and distribution is required to accelerate these activities (Garay-Rondero et al., 2020). Warehousing is the process of storing practical objects in a specialized warehouse or storage facility until they are sold or transferred to another location. Warehousing is an important piece of your retail supply chain (Halawa et al., 2020). In addition, warehousing is a set of management activities in logistics storage starting from the activities of receiving, recording, entering, storing, regulating, book keeping, maintaining, expending, and distributing to the activities of warehouse management accountability (making repots) to support the continuity of work units as well as the effectiveness and efficiency of the organization as a whole (Ackerman & Brewer, 2008).

Technology is the whole of a method that rationally leads and has efficiency characteristics in every area of human activity. The need to gain a competitive advantage and boost delivery speed has resulted in a slew of logistical advances (Mathauer & Hofmann, 2019). Warehouses, as crucial supply chain hubs, are under pressure to keep up with technological advances in order to meet demand. Picking operations account for a significant portion of the time spent in the preparation of items. With technology, picking time may be reduced, and all warehouse tasks can be optimized (van Gils et al., 2018). Supply and demand balance is as crucial as ever, yet it necessitates flexibility. Automation as a Service technologies are becoming more popular, allowing warehouses to easily scale resources up or down to meet demand fluctuations (Sorrel, 2012).

Business Process Reengineering (BPR) is focused with restructuring existing operations in order to take advantage of new technology and better serve consumers (Borgianni et al., 2015). It involves significant changes to core processes in order to produce substantial gains in quality, cost, and speed, among other things. Today, this notion is famous in the logistics industry since improving BPR has a massive impact on a firm. However, the term BPR is also used in diverse contexts: it can refer to small process improvements or major changes in both business processes and organizational structure (Ghannouchi et al., 2010).

Warehousing activities start from receiving, identifying the goods, dispatching good to storage by sorting & putting away, storing, order-picking goods, and shipping (Öztürkoğlu & Hoser, 2019). Among all warehouse tasks, order-picking consumes the most time. This action requires more time traveling, such as picking products in specified regions, looking for certain commodities, extracting, and then proceeding to other operations, and it occupies 50% of warehouse activities (Aboelfotoh et al., 2019). Therefore, order-picking is an activity that a time-consuming and labor-intensive process in warehousing because it ensures the match between the list of goods in the computer and physical goods. (de Koster et al., 2007).

Today, technology is one of the most significant drivers of organizational transformation. More than half of all existing positions will be transformed as a result of technology improvements during the next decade, with around 30% of all positions being replaced. Significant developments have occurred in the field of manufacturing or industrial technology (Silva et al., 2020). Robotics and computer-controlled machinery produce products, while personnel supervise operations from computer controls. Today, a lot of companies use BPR is to re-think, re-design core processes, first to reduce costs and cycle times (Borgianni et al., 2015). Business Process Reengineering reduces costs and cycle times by eliminating unproductive processes and the employees who perform them (Sorrel, 2012). Team-based reorganization reduces the need for management levels, speeds up information flows, and minimizes mistakes and rework caused by numerous handoffs. The second goal is to improve quality. Business Process Reengineering increases quality by eliminating task fragmentation and creating explicit process of ownership. Workers take responsibility for their job and are able to evaluate their overall performance based on timely feedback.. (Attaran, 2004).

Method

The whole research used qualitative approaches for identifying the order-picking process in warehouse in depth which can be used as an alternative support in business process re-engineering warehousing activities. The application of qualitative approaches may provide facts, better precision, a thorough grasp of the issue, and specifics in the outcomes. According to them, there is a specific need for qualitative research that may give clear insight and comprehension of the complicated nature of many elements (Mehta, 2020).

This paper consists of a detailed evaluation of the potential benefits of system simplifications order-picking logistics. This research was based on observations in project X that analyzes order-picking in warehouse scope essential oil aromatic for health. We interviewed and investigated their performance of several workers at the warehouse specifically on the order-picking section (scan barcodes, pick-up goods, receiving the order through WMS, packing, and storing) about constraints and problems that often occur in warehouses specifically order-picking. Almost all workers are concerned at a very long time traveling and matching the product with orders manually. Therefore we try to do a solution to the warehouse to do a process reengineering on the work process that takes time, so as to reduce the risk of errors or delays in the process.

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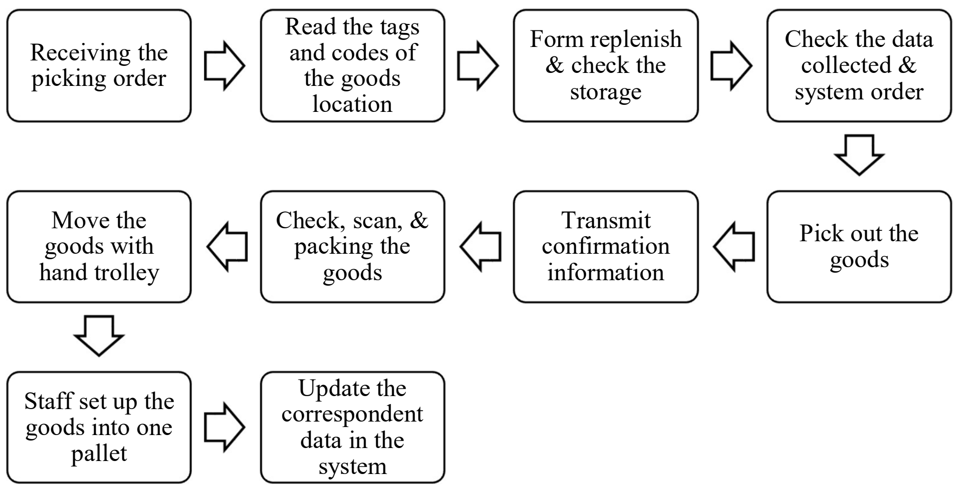
Discussion and Result

In central warehouses and material distribution centers, automated modular conveyor systems are extensively utilized to achieve high throughput levels and smooth material flow while staying adaptable and efficient (Panayiotou et al., 2019). The increased capacity and complexity of interactions in advanced warehousing require enhanced analysis to minimize design errors and assure optimal operation. Variable demand and a high degree of unpredictability, for example, offer major problems in achieving targeted efficiency and maintaining smooth material flows. (Liu et al., 2019).



4.1 Operational Limitations

The system is set up in such a manner that the pickup stations are always the bottleneck. This is to guarantee that orders continue to flow in other sections of the system and that orders are always accessible for pick-up station owners. Operators have a significant operational expense, thus they should never be idle (Ilic et al., 2020).

During times of heightened system load, the highway frequently becomes a bottleneck, causing the flow of orders to be interrupted. Several data sets obtained while operating the system indicated that the highway bottleneck occurred as a result of capacity restrictions as well as the technique of how the supplier maintains the route, which uses a significant portion of its capacity. The current simulation modeling and analysis, intended to examine a new technique of feeding goods from the supplier to the system

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and, using data-driven analysis, to support the related improvements (Ilic et al., 2020; Liu et al., 2019).

4.2 The Accumulation conveyor system

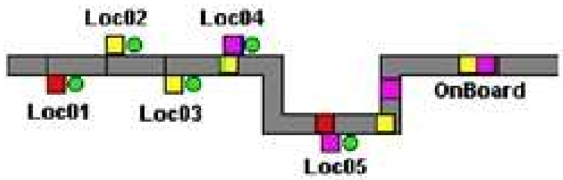

Figure 1.

Accumulation conveyors allow cases to queue up on a conveyor in between processes. It has become as ubiquitous to conveyor systems as belt conveyors. Without the ability to accumulate containers from process to process the entire system could only move as fast as its slowest process (Uriarte et al., 2019). Accumulation conveyors are typically driven by chain or a small belt but can also be driven by a 24v roller. The dive mechanism runs continuously, and photo eye sensors actuate an air bladder to raise or lower the drive train to connect with the rollers. The 24v style accumulation conveyor the drive roller turns on and off to stop a single case in a zone.

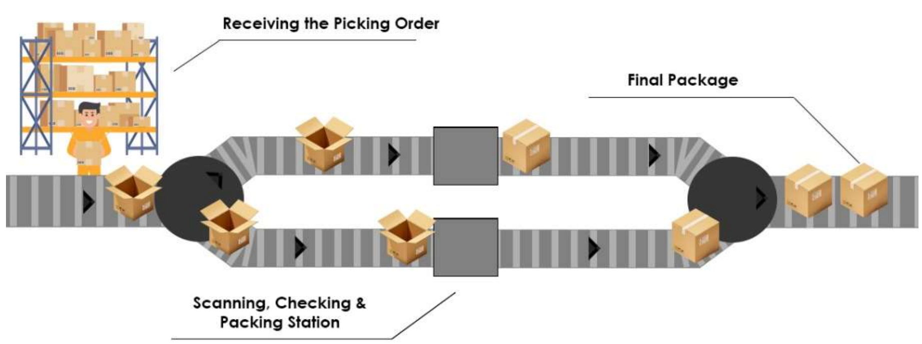

Figure 2.

The system studied was an automatic modular conveyor system for handling goods of small quantity and relatively light weight, especially on goods purchased per unit, not in one box or bulk. The system is used after the order is received, the data collection is done by the staff and the replenish form is immediately printed to be forwarded to the storage

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party to process the packing and delivery of the goods. Staff in the first model are in charge of moving products that have gone through the replenishment procedure.

A conveyor network is made up of two or more sections that are linked together to allow parts to be merged, diverted, and recirculated. A conveyor may have one or more input points and one or more exit points in such cases. Consequently, part entrance and departure may not necessarily occur at the conveyor's beginning or finish (Uriarte et al., 2019). We utilized the Accumulated conveyor model, which involves numerous components arriving to a conveyor site at one or so more non-conveyor places. Conveyors serve the same purpose of verifying that the order is correct, scanning products, and packing. An element will emerge at the intersection that is responsible for moving an object from one line to the next line interchangeably.

Accumulation conveyors can be zero contact or zone to zone contact. With both options the sensors look upstream of the zone being controlled. If a product is in this zone (meaning the current zone cannot move forward) the drive apparatus drops out and allows the case to stay in the zone, while still allowing the rest of the conveyor behind it to run. This allows a queuing of the conveyor until such time as a process downstream accepts the product on the conveyor and the cases move forward (Boysen et al., 2019).

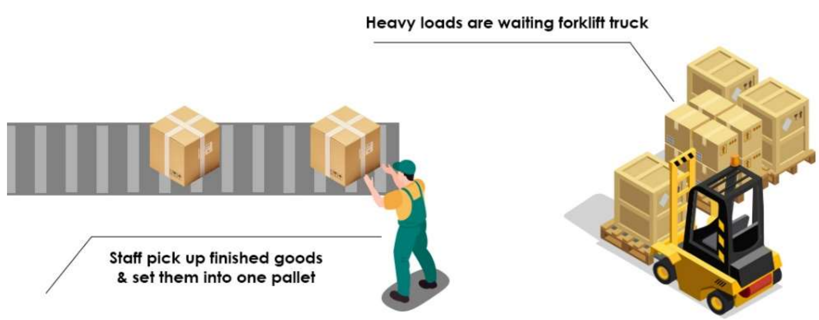

Figure 3.

Because the products have reached the end of the conveyor and have completed the scanning, inspecting, and packaging process, the conveyor network is configured by setting a single conveyor as the start and final conveyor, at this stage the goods can be said to have become the final package so that it will be passed on to the staff who will combine and arrange the final package into one pallet to be delivered on the delivery

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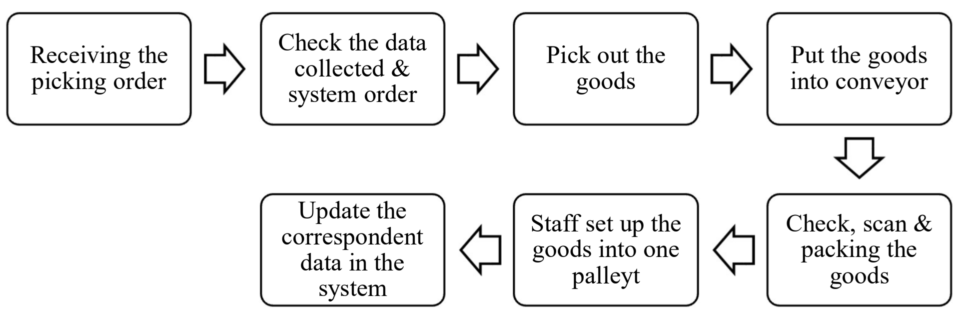
storage. When a forklift comes close to a pallet on the conveyor, it drives to the storage block, which takes the load off the conveyor and makes room for the next pallet. It is saved for a period of time determined by the storage block.

A forklift that is empty might return to the conveyor to pick up another package. The forklift returns to its starting location if there are no outstanding loads at the end of the conveyor. Therefore, when the sending truck comes to pick up the goods, then the goods are ready to be taken using forklifts in accordance with the appropriate pallet data on the delivery destination. The next stage is the data collection on the number of pallets that must be delivered on the trucks available at that time, including with the location to drop off the goods to the next warehouse. After logging on the pallets that have been submitted, the WMS system must perform the deletion of old data that has been sent with new data received in the warehouse every 3 days, depending on the time of reception of goods in the warehouse.

4.3 The Result of Conveyor System in Warehouse

To-be



Using the conveyor can maximize the target even more than the processing target set every hour, the conveyor can accelerate the flow of distribution of goods in each session, and reduce the time spent on traveling sessions (Uriarte et al., 2019). Officers get a target of 50 process orders at each hour, and the working hours specified by the company is 10 hours per day. The data was collected from the system over one week of operation amounting to minimally 2500 order based on the target per hour weekly. The data would include number of orders received by the system per hour as well as the number of orders processed by the system single hour.

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In addition, data analysis was utilized to predict probability distribution for a number of input factors, such as the manual feeding rate to the supplier, feeding rates from mini-loads, processing time at pick-up stations, and the process steps that distribute the order across the system. The changes associated with these probability distributions showed a significant degree of dynamism in hourly-based operational data (Boysen et al., 2018). It took a lot of work to model these variances accurately and program them into the Accumulation model conveyor system.

Several simulations were run, taking into account a variety of possibilities for the system's design changes (Ahmadi et al., 2019; Ilic et al., 2020). This is the outcome scenario that had the most influence on removing the bottleneck from the roadway and therefore enhancing the system's smooth material flow. The research focused on a variety of key system indicators, such as average content on the highway and sub-loops, operator idle time at pick-up stations, and passes at key decision points along the highway. (Uriarte et al., 2019).

Conclusion

Fully automated logistics systems have a higher degree of system dynamics complexity, as well as enhanced efficiency and performance. Advanced technical classification algorithms are quite beneficial for building near-reality independent settings to achieve this goal. The present model has been shown to be a dependable independent decision support system for operation and design modification. The present model has been shown to be a dependable independent decision support system for operation and design modification (Panayiotou et al., 2019). However, getting to a high level of efficiency is not always easy. Because of their increased capacity and complexity of interactions, smart warehousing systems need comprehensive analysis to avoid design mistakes and ensure successful operation. Factors like fluctuating demand and a high degree of unpredictability make attaining target efficiency and maintaining smooth material flows difficult. Traditional analytical approaches are frequently incapable of proving that the system design meets operational requirements under constantly changing conditions. Operations benefit from Accumulation conveyor are buffers product in between processes, de-couples processes allowing each to be efficient, queues up product to merge lines together and also creates High Throughput rates by bunching product together. A

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conveyor system is made up of two or many sections that are linked together to allow parts to be merged, diverted, and recirculated (Boysen et al., 2018). A conveyor may have one or more input points and one or more exit points in such cases. Furthermore, part entrance and departure may not necessarily occur at the conveyor's beginning or finish. A conveyor system is made up of one or more different types of conveyors that work together to transport components. Branching, merging, and looping are all possible features of such a system. Parts must be allowed to pile or back up at the conclusion of an accumulating conveyor segment. This usually happens at a transfer point or a processing facility.

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