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WAREHOUSE MANAGEMENT MODEL INTEGRATING BPM-LEAN WAREHOUSING TO INCREASE ORDER FULFILLMENT IN SME DISTRIBUTION COMPANIES

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Maria Fernanda Lazo De La Vega Baca

Código 20173528

Kevin Luis Ambrosio Flores

Código 20162814

Asesor

Juan Carlos Quiroz Flores

Lima – Perú

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Warehouse management model integrating BPM-Lean Warehousing to increase order fulfillment in SME distribution companies

Kevin Luis Ambrosio Flores
Facultad de Ingeniería y Arquitectura
Universidad de Lima
Lima, Perú
20162814@aloe.ulima.edu.pe

Maria Fernanda Lazo de la Vega Baca
Facultad de Ingeniería y Arquitectura
Universidad de Lima
Lima, Perú
20173528@aloe.ulima.edu.pe

Juan Carlos Quiroz- Flores
Facultad de Ingeniería y Arquitectura
Universidad de Lima
Lima, Perú
jcquiroz@aloe.ulima.edu.pe

Ezilda Maria Cabrera Gil Grados
Facultad de Ingeniería y Arquitectura
Universidad de Lima
Lima, Perú
ecabrera@ulima.edu.pe

Abstract— **In many cases, warehouse logistics in the distribution SMEs usually do not have a standardization, structure, and methodology for the reception, storage, and dispatch. Most of the flows within the warehouse tend to occur over time, but there is no feedback or a choice of logistics tools to make it more efficient. This lack of tools causes problems such as a non-existent flow of information, a lack of warehouse organization, inventory control, and a non-existent work protocol. These problems cause the customer satisfaction index to shallow since mishaps usually occur during order delivery. The general objective of this research is to increase the indicator of complete orders, so the root causes of the problem are identified and quantified. After that, a model based on implementing Lean Warehousing tools such as multi-criteria ABC, 5S, Kardex and work standardization, and BPM methodology was also applied. Subsequently, the model's reliability was guaranteed using a simulation through Arena software and a pilot test. Finally, the model increased the indicator of orders entirely delivered by 12%. Likewise, as a secondary consequence, other indicators were increased: inventory record accuracy, location registration accuracy, coverage, cycle time, and productivity by 16%, 32%, 57%, 3%, and 24%, respectively.**

Key words — Lean warehousing, ABC, 5S, Kardex, Work Standardization, BPM

Fig. 1. INTRODUCTION

Many companies, especially those that involve warehousing processes, constantly deal with inventory shortages. This situation affects the company a lot since the customer usually has three options: change store, change the outcome, or postpone the delivery time when not finding the product. The first has a negative effect, and the other has a relatively positive impact—total sales losses caused by the out-of-stocks amount to 3.9% worldwide [1].

In addition to direct sales losses, a stock-out situation can also cause indirect adverse effects such as higher inventory holding costs, inaccurate information exchange, and poor sales planning [2]. However, for retailers, one of the biggest problems is the decreased store loyalty [3], which could cause a deficit in the company's long-term business performance.

The annual cost of permanent loss of shoppers to competitors is estimated at US$ 1 million per 200 shoppers [4].

For these reasons, retail companies face various challenges and problems related to inventory and customer satisfaction. Since the pandemic, E-commerce models have been boosted in all countries. However, in Peru, the process is slower because they use the traditional channel, such as going to the market or the warehouse. "Normally, a retailer attended the e-commerce channel sporadically, but that was transformed, and due to the pandemic, the warehouse capacities for picking, the warehouse capacities for bagging and packing quickly were saturated," said Hernán Carranza, CEO of NetPartners International [5].

Therefore, due to the current new context, retail distribution companies need a proper model for establishing inventory plans to ensure product availability at the right place and the right time for the customer. That said, it is crucial to ensure inventory availability to minimize stock-outs and keep customer satisfaction high, as this directly impacts sales. For this reason, warehouse management and information integration within retail distribution companies is a significant challenge.

It is necessary to design a logistics chain that manages with maximum efficiency and quality levels the fulfillment process of orders (warehousing, order preparation, and shipping), as well as delivery under conditions that are not always favorable. One of the most accurate indicators for measuring warehouse management in trading companies is perfect order fulfillment [6].

One of the conditions for perfect order fulfillment is the execution of deliveries made entirely in quantity between what is offered to the customer and what is shipped to the customer.

Therefore, it was decided to focus the following case study on improving the indicator of complete orders in a construction materials trading company. This indicator was achieved through a model where Lean Warehousing tools such as ABC multicriteria, 5S, Kardex, and Standardization of work were applied; also, the BPM methodology was used. Our

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