Revitalizing warehouse management to enhance global manufacturing competitiveness: insights from South Africa

Tshepo Mabotja

ABSTRACT

Company operations and global trade necessitate storage. Warehouse management is essential for meeting customer expectations, ensuring product availability, and delivering globally swiftly and affordably. A company's international competitiveness can suffer from warehouse instability. This study assesses warehouse performance for competitive advantage. The report also explores top management's disregard for warehouse management's impact on manufacturing competitiveness. This paper reviews warehouse management system research from several industries. Reviewing literature for gaps and flaws. Quantitative methods include industrial specialized surveys. Three varied South African manufacturing enterprises will be case-studied. Deduction is used to analyze industry expert consultation data. Due to its accessibility and data collection suitability, convenience sampling was employed to choose participants. This study discovered many warehouse management issues in South African industrial firms. Integration and automation are lacking in current systems, hampering global competitiveness. Warehouse movements and infrastructure damage increased without zone selection. Technology-illiterate warehouse workers slowed operations. The study offers zone picking, warehouse training, and warehouse system integration and automation to address these difficulties. South African industrial firms should strengthen warehouse management systems, according to this study. These organizations can enhance operational efficiency, save money, and compete globally with the suggested changes. Zone picking, warehouse system integration, and worker technical training can alleviate challenges and provide companies an edge. This study highlights warehouse management's often overlooked significance in manufacturing competitiveness. International organizations can do better by studying warehouse management system problems and solutions. Practical warehouse management advice from this study increases South African industry competitiveness.

Introduction

This study is undertaken during a time marked by an increasingly uncertain and fiercely competitive global business environment. The industrial industry has faced challenges in fully recovering since the tremendous instability it encountered during the 2007/8 global economic crisis. Manufacturing companies are facing difficulties such currency instability, high energy charges, increasing labor costs, and a significant rise in input expenses. Furthermore, changing consumer tastes and strong competition in the industry diminish the competitive edge of manufacturing companies, as stated by Knudsen et al. (2021). Therefore, the task of a Manufacturing Executive in navigating this intricate environment has become extremely difficult.

One major concern is that increased complexity in the production environment leads to decreased competitiveness. In South Africa, many manufacturing enterprises have experienced a decline in worldwide competitiveness due to environmental concerns following the 2007/8 financial crisis. Manufacturing leaders are currently facing the pressing challenge of reducing costs while maintaining product quality. Boehm et al. (2022) state that in a competitive manufacturing setting, a company gains a competitive advantage by

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showing its capability to produce and distribute goods at lower costs than its competitors. Manufacturing Executives must execute measures to improve competitiveness and ensure long-term sustainability in the industry.

Kjellström et al. (2020) state that a key initial step to achieve this objective is for Manufacturing Executives to develop expertise in efficiently managing operations in a dynamic and technologically sophisticated environment. The second crucial step involves creating a coherent framework. Methods to improve the efficiency and capabilities of the complete manufacturing value chain. The third crucial step is to guarantee that each component of the manufacturing value chain is given equal focus by top management. According to Katsaliaki et al. (2021), focusing on certain value chain aspects over others might cause uneven growth and reduce competitiveness. The warehousing role is frequently overlooked or sidelined in the manufacturing value chain.

Schneller et al. (2023) found that 65% of Manufacturing Executives in the United States do not give enough strategic attention to the warehousing function, which poses a substantial risk to manufacturing competitiveness compared to other value chain components. Hutt & Speh (2021) stress the need of Manufacturing Executives integrating the warehouse function into a company’s manufacturing strategy to enhance competitiveness.

In the 21st century, decision-makers in manufacturing companies have recognized the connection between efficient warehouse management methods and production success. Warehousing management is crucial for industrial performance and competitiveness in high-tech manufacturing settings, especially for enterprises involved in mass production. Warehouses are essential in the distribution process as they act as central hubs for storing and transporting raw materials and finished goods. Thus, they are closely linked to the entire distribution function. Companies often combine these services to achieve improved convenience and operational efficiencies (Vishniakov, 2022).

When handled wisely and cleverly, the warehouse function can be a persistent source of competitive advantage for a firm. Effective warehouse management can provide a competitive advantage when its activities are carefully incorporated into a manufacturing firm’s overall business plan. While the restructuring of manufacturing value chains in South Africa has been praised, aspects such as warehousing and logistics are not given enough attention, particularly at the top management level.

Ylä-Autio (2021) stated that warehousing management is a new discipline that has not been widely embraced by many manufacturing companies in South Africa. Many manufacturing enterprises in the country lack comprehensive and modern warehouse management systems and practices. The sector’s lack of understanding of the strategic significance of efficient warehouse management methods has led to this problem. The study seeks to analyze several aspects that impact the efficiency of the warehouse operations in large manufacturing companies. A well-designed warehouse management plan is assumed to be a sustainable source of competitive advantage.

**Literature Review**

According to Richards and Grinsted (2020), the management of warehouses plays a crucial role in the overall effectiveness of supply chain systems. The perception of a warehouse solely as a storage facility is an erroneous perspective. An efficiently structured warehouse management system possesses the potential to serve as a driving force behind a company’s attainment of market supremacy. An effective warehouse management system serves as the foundation for achieving organizational excellence and success. The strategic positioning of a warehouse at a central location facilitates the efficient and effective reception, storage, and distribution of items by a corporation to the market. The establishment of a central warehouse has the potential to generate cost efficiencies for both the organization and its clientele. Furthermore, the consolidation of goods within a firm enables it to exert influence on market demand through the manipulation of the supply side, as posited by Perkumienė et al. (2022). Warehouses also serve as crucial facilitators of international trade, enabling enterprises to fulfill the requirements of their worldwide clientele promptly and economically. Warehouse managers play a crucial role in facilitating the efficient transportation of goods to international customers by serving as mediators between offshore clients and manufacturing companies. Furthermore, a meticulously organised warehouse system serves as a safeguard against potential losses, damages, fires, theft, or unanticipated breakages.

According to Kembro and Normann (2022), the warehouse sector has undergone significant transformation resulting from recent improvements in warehouse management technology. The utilisation of technology to optimise warehouse operations offers substantial benefits to firms as well as their international clientele. The advancement of technology has broadened the range of operations within the warehouse industry to include many tasks such as transportation, packing, branding, bar tracking, and data administration. The warehouse sector possesses significant economic potential, in South Africa this sector exhibits an annual turnover of R50 billion.

**Warehouse Management Systems**

According to Min (2023), A warehouse management system (WMS) is a software application designed to efficiently oversee and control various warehouse processes, resulting in improved cost-effectiveness for industrial firms. The Warehouse Management System (WMS) is a software system that facilitates the effective administration of various warehouse operations. When a comprehensive Warehouse Management System (WMS) is implemented, customised software designed to meet the specific operational requirements of a corporation assumes responsibility for the strategic organisation, regulation, and oversight of warehouse operations. The major objective of a Warehouse Management System (WMS) is to optimise customer happiness by effectively
lowering the time required for order processing in real-time, resulting in decreased queue lengths and expedited response times. A dynamic Warehouse Management System (WMS) efficiently manages essential warehouse operations by directing instructions or commands to the relevant personnel via an internet platform or a computer-based application.

According to Shanmugamani & Mohamad (2023), Warehouse Management Systems (WMS) play a crucial role as indispensable tools for enterprises engaged in storage and distribution activities. The Warehouse Management System (WMS) is a software system that has been specifically developed to enhance and streamline warehouse operations. Its primary objective is to facilitate efficient inventory management and ultimately enhance overall productivity within the warehouse environment. These solutions provide a diverse array of advantages to enterprises across all scales and sectors. One of the key benefits associated with a Warehouse Management System (WMS) is the enhancement of inventory accuracy. The Warehouse Management System (WMS) effectively monitors inventory levels in real-time, hence minimising the occurrence of problems such as excessive stock or stockouts. The precision of the aforementioned accuracy contributes to enhanced demand forecasting, diminished carrying costs, and heightened levels of customer satisfaction. Furthermore, the use of Warehouse Management Systems (WMS) aids businesses in effectively organising and controlling the flow of goods inside their warehouses. This results in a reduction of errors during the picking process and guarantees the accurate shipment of items to consumers. Consequently, these improvements lead to a decrease in product returns and an enhancement of customer loyalty. Another significant advantage of Warehouse Management Systems (WMS) is the enhancement of operational efficiency. The utilisation of available space within the warehouse is optimised, so allowing enterprises to maximise their storage capacity. Furthermore, this technology facilitates the automation of diverse warehousing operations, including order picking and replenishment, thereby diminishing reliance on manual labour and mitigating the potential for human errors. The enhanced efficiency leads to expedited order processing and diminished labour expenses, hence enhancing the overall financial performance. In addition, Warehouse Management Systems (WMS) offer comprehensive visibility into the entirety of warehouse operations, facilitating data-informed decision-making and ongoing enhancements to processes (Andiyappillai, 2020).

Furthermore, WMS enhances customer service by enabling businesses to offer more accurate and reliable order fulfillment. Faster order processing and improved inventory accuracy lead to quicker order delivery times and fewer order errors, resulting in higher customer satisfaction and loyalty. The ability to provide real-time updates on inventory and order status to customers adds transparency and improves communication. In today's competitive market, a robust WMS is a critical tool for businesses looking to gain a competitive edge in supply chain management and customer service (Venkatasubramanian, 2021).

Challenges in Warehouse Management

Like any crucial element of a manufacturing organisation, the warehouse function faces many strategic and operational challenges. Zhang, et al., (2021) have identified several significant issues that impede the efficient functioning of warehouse operations. One of the commonly mentioned challenges faced by warehouse managers revolves around achieving an optimal equilibrium between reducing operational costs and ensuring the delivery of high-quality products to customers. Achieving this state of harmony is a complex undertaking, since the necessity to decrease expenditures is just as significant as the obligation to uphold a high level of service quality. According to Attaran (2020), one commonly mentioned obstacle pertains to the lack of alignment between the warehouse strategy and the overarching business plan of the organisation. The absence of congruence between these two elements undermines the effectiveness of the plan. The implementation of a warehouse strategy should not be considered as a standalone target, but rather as a tool to facilitate the attainment of desired goals, serving as a catalyst for a company’s growth strategy. This suggests that the inclusion of a warehouse in a company’s corporate strategy is essential, as it acts to improve overall performance. At a strategic level, the most significant problem stems from the inherent unpredictability of the business environment. Additionally, Zhang, et al., (2021) stated that the occurrence of unexpected alterations in the macro-environment might pose significant difficulties for a corporation in achieving its performance objectives. Warehouse managers in manufacturing contexts encounter a notable challenge wherein the warehouse function does not receive equivalent strategic focus as other equally vital elements of the value chain, including production, finance, marketing, and engineering. The perceived significance of the warehouse function, particularly among senior management, often poses challenges for the organisation in allocating adequate resources for its growth and development.

Factors that drive warehouse performance

According to Mostafa et al (2019), the performance of a warehouse is a crucial element in supply chain management since it has a direct influence on a company's operational efficiency and customer satisfaction. Numerous elements exert significant influence on the operation of warehouses, thereby facilitating the effective storage, retrieval, packaging, and transportation of items. The configuration and architectural aspects of a warehouse play a pivotal role in determining its operational efficiency. Abdul Rahman, et al., (2023) concur that an optimised arrangement guarantees that items are placed in a manner that minimises the distance travelled by pickers, hence decreasing expenses associated with handling and enhancing the speed at which orders are fulfilled. Strategically designed storage systems, rack configurations, and aisle layouts have the potential to optimise productivity and minimise the occurrence of errors. The implementation of efficient inventory management strategies is crucial for optimising warehouse performance. This process encompasses precise prediction, strategic demand planning, and optimisation of inventory levels. The maintenance of appropriate inventory levels is crucial for ensuring the availability of products to meet consumer demand, thereby minimising carrying costs and mitigating the risks associated with either excessive or insufficient stock, both of which can disrupt
operational efficiency (Lee, 2021). The integration of technology and automation systems, such as warehouse management systems (WMS), barcode scanning, and automated material handling equipment, can significantly boost warehouse performance. Attaran (2021) asserts that these tools enhance order accuracy, increase efficiency, and provide real-time visibility into inventory and order status, leading to quicker and more precise order processing. According to Giannakis et al. (2019), the presence of a proficient and motivated crew is crucial for ensuring the effectiveness of warehouse operations. According to Masae, (2021) the implementation of effective training programmes, unambiguous job descriptions, and performance incentives has the potential to enhance staff morale, minimise errors, and augment productivity. Effective workforce management is essential for the efficient allocation of jobs and the optimisation of labour resources. Order picking constitutes a substantial proportion of both labour and expenditure within warehouse operations. The implementation of efficient picking procedures, such as batch picking, wave picking, or zone picking, has the potential to minimise trip time and enhance order throughput. It is imperative to ensure that pickers possess the requisite equipment and training to facilitate seamless operations. The consistent monitoring of key performance indicators (KPIs) such as order correctness, order cycle time, and inventory turnover is crucial in assessing the operation of a warehouse. Continuous improvement projects, which are grounded on the analysis of data, can uncover bottlenecks, inefficiencies, and areas that can be improved. The implementation of lean concepts and Six Sigma methodology has the potential to facilitate continuous enhancements in performance (Lameijer et al., 2021).

Every business has the primary purpose of addressing an unmet demand in the market efficiently. To achieve this, a business must ensure the effectiveness and efficiency of its service delivery mechanisms. An integral component of a company's service delivery apparatus is a robust warehouse management system, which plays a crucial role in maintaining a stable manufacturing environment. Any disruption to the warehouse management system can lead to costly interruptions in manufacturing operations, subsequently affecting the supply chain process. Such disruptions can wreak havoc in the market, preventing the company from fulfilling orders and meeting client delivery deadlines. Failing to meet these obligations puts the company's reputation at risk. To safeguard against these risks, manufacturing companies should invest in state-of-the-art warehouse management technologies, which enable real-time order processing and help maintain a positive market image.

Research and Methodology

This part provides a comprehensive description of the methodologies and strategies utilised in the collection, manipulation, and examination of the obtained data. The research employed a quantitative methodology. Mohajan (2020) posits that quantitative research is a methodical and objective approach used to establish and analyse relationships, as well as investigate causal connections between variables. According to Mohajan (2020), quantitative research may be described as a method of data collection that involves administering surveys to a selected group of participants, who provide self-reported replies to a set of questions presented by the researcher. The study employed a quantitative research methodology. Scharrer, & Ramasubramanian (2021) stated that quantitative methodologies prioritise numerical data and employ intricate mathematical tools, such as probability theory and substantial computing calculations. Quantitative research commonly commences by building upon existing information, which encompasses theories regarding the associations between different occurrences. For instance, one such hypothesis posits that exposure to linguistically demanding situations contributes to the enhancement of intelligence growth. The research centred on the Gauteng province of South Africa as its designated geographic region of focus. The study sample consisted of a diverse group of individuals employed in the warehousing and supply chain industry, encompassing roles such as warehouse managers, supply chain managers, warehouse clerks, warehouse assistants, pickers, packers, and warehouse supervisors. The study's target demographic encompassed professionals occupying comparable positions throughout the Southern African region. The study focused on a sample size of 300 participants who were employed by eight different organisations located in Johannesburg. The utilisation of random sampling in the study ensured that each warehousing professional in South Africa had an equal opportunity to be included in the sample.

The study population comprised 370 participants with diverse degrees of expertise in warehousing systems, encompassing warehouse managers, supply chain managers, warehouse clerks, warehouse assistants, pickers, packers, and warehouse supervisors. The data gathering process was conducted utilising a questionnaire, which facilitated the expression of participants' thoughts and enabled remote data collection. The survey employed a Likert scale consisting of five points, which was designed to coincide with the aims of the study. The participants in the study were individuals with extensive education and professional experience in the manufacturing industry. It was ensured that the confidentiality of their responses was maintained.

The survey was structured into five sections:

i. Section A collected biographical information, including gender, age, education, positions held, and tenure within the organization.

ii. Section B explored warehouse management improvement.

iii. Section C examined warehouse management challenges.

iv. Section D focused on technological challenges.

v. Section E delved into zone picking benefits.
Data collected were analyzed through frequency distributions and percentages and presented using tables, bar graphs, and pie charts. The Statistical Package for the Social Sciences (SPSS) software facilitated quantitative data analysis. The study ensured the internal consistency and validity of the data by employing Cronbach's coefficient alpha.

Ethical considerations were upheld, with proper citations and acknowledgments given to professionals in the field. Respondents were required to maintain confidentiality and use their responses exclusively for educational purposes. They had the option to decline answering any questions they found inappropriate, and anonymity was preserved throughout the study.

The questionnaire incorporated factors under investigation and employed a five-point Likert scale, with responses ranging from strong disagreement (1) to strong agreement (5). The completed questionnaires were checked for usability and converted into numerical format for SPSS analysis. The study also used a 5-point Likert scale to assess factors affecting warehouse performance based on the literature. The results were ranked based on the relevance index after statistical analysis.

**Findings and Discussions**

Three hundred and seventy questionnaires were administered to the study sample. Of the 370 disseminated, 356 were returned (indicating a 96 percent response rate), and all 356 were usable. The first section presents demographic statistics of the participants.

Biographical gender frequencies and descriptive samples of respondent’s shows that 51.9% are males while female accounted to 48.1% as per figure 1 below:

![Figure 1: Respondents demographic per gender](image)

Respondents' demographic per age group distribution sample

The distribution of the sample population by age group is graphically depicted in Figure 2 below. The analysis of this distribution indicates that 31.5 percent of the respondents fell within the age range of 20-25 years, 28.5 percent were aged between 26 and 35 years, 14.6 percent represented the 36-45 age group, 10.8 percent belonged to the 46-55 age category, while 8.5 percent were in the 56-65 age bracket. Additionally, individuals aged above 65 years constituted approximately 6.2 percent of the sample.

![Figure 2: Respondents demographic per age group](image)

Respondents' demographic per educational distribution sample

The distribution of education levels among the respondents is depicted in Figure 3, with the following percentages: 15.4% of the respondents possess certificates, 27.7% hold diplomas, 30.8% have obtained bachelor's degrees, 13.8% have achieved honors degrees, 9.2% have completed master's degrees, and a mere 3.1% of the respondents have reached the level of a doctoral degree. This distribution provides insight into the educational background of the surveyed individuals, showcasing the diversity of educational attainment within the sample population.
The distribution of warehouse experience, as reported by the respondents, is illustrated in Figure 4 below. The findings indicate that a substantial portion of the respondents have varying years of experience in the warehousing sector. Specifically, 38% of the respondents reported having accumulated between 0 and 5 years of experience. Furthermore, 18.6% of respondents possessed a warehouse experience ranging from 6 to 10 years. A noteworthy 21.7% of respondents indicated a tenure in the warehouse field spanning from 15 to 20 years. Moreover, 8.5% of respondents reported an experience range of 20 to 25 years, while 13.2% of the respondents noted that they had accrued more than 25 years of warehouse experience. This distribution of warehouse experience provides valuable insights into the diversity and depth of expertise among the respondents in the warehousing domain.

The distribution of survey respondents, categorized by their respective professions, is illustrated in Figure 5. It is evident that within the sample, warehouse assistants constitute 16.9% of the respondents, while pickers, drivers, and cycle counters account for 7.7%. Packers make up a smaller portion at 3.8%, whereas supervisors represent the largest professional group with 25.4%. Furthermore, warehouse managers share the same percentage as warehouse assistants, both comprising 16.9% of the sample.

Notably, an “other” category has been included to account for respondents whose roles may not be directly associated with warehouse operations but nonetheless possess substantial knowledge relevant to warehousing processes. This category encompasses individuals such as those in procurement who collaborate closely with the warehouse function, ultimately contributing to its efficacy. The “other” category is found to be 29.2% of the total distribution, signifying the significant presence of individuals with peripheral yet consequential roles in the warehousing domain.
The purpose of this section is to provide and analyse the findings related to the improvement of warehouse management and its significance in relation to future growth. The analysis includes the Mean Item Score (MIS) of the survey questions, skewness measurements, and the outcomes of the exploratory factor analysis (EFA). Additionally, the descriptive statistics provide a ranking of all factors, with accompanying mean and standard deviation values for each individual element.

Exploratory factor analysis (EFA) is a fundamental method employed in the early stages of research to uncover the underlying patterns and interrelationships among a set of variables (Pallant, 2007). In this study, EFA was conducted using version 21.0 of the Statistical Package for the Social Sciences (SPSS) software. The preliminary assessments to determine the suitability of the dataset for factor analysis were carried out.

### Frequencies & Descriptive Factor Analysis for warehouse management improvement

The results of the MIS of the questions and skewness of the data are presented and discussed below:

#### Table 1: Warehouse Management Improvement results

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are experienced people in the warehouse</td>
<td>3.83</td>
<td>1.098</td>
<td>1</td>
</tr>
<tr>
<td>Health and safety policies are adequate</td>
<td>3.56</td>
<td>1.030</td>
<td>2</td>
</tr>
<tr>
<td>Warehouse staff trained</td>
<td>3.50</td>
<td>0.926</td>
<td>3</td>
</tr>
<tr>
<td>The warehouse space is effectively utilised</td>
<td>3.41</td>
<td>1.038</td>
<td>4</td>
</tr>
<tr>
<td>The current warehouse layout is effective</td>
<td>3.40</td>
<td>0.964</td>
<td>5</td>
</tr>
<tr>
<td>Inventory records are reconciled on a regular basis</td>
<td>3.26</td>
<td>1.101</td>
<td>6</td>
</tr>
<tr>
<td>Warehouse is designed for unexpected demand or peak season</td>
<td>3.22</td>
<td>1.058</td>
<td>7</td>
</tr>
<tr>
<td>The equipment part breakdown time is recorded</td>
<td>3.17</td>
<td>1.091</td>
<td>8</td>
</tr>
<tr>
<td>The current storage facilities are adequate</td>
<td>3.13</td>
<td>1.120</td>
<td>9</td>
</tr>
<tr>
<td>Warehouse staff is engaged</td>
<td>2.93</td>
<td>1.142</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1 in this study presents the ranking of respondents with regard to various warehouse improvement questions, which have the potential to enhance the overall performance of warehouses within the South African manufacturing industry. The ranking is based on mean scores and standard deviations, providing insight into the perceived importance and variability associated with each identified factor. The foremost factor, as per the respondents’ assessment, is the presence of experienced personnel in the warehouse, which garnered the highest mean score of 3.83, accompanied by a standard deviation of 1.098. Following closely, the second factor, health and safety policies, received a mean score of 3.56, with a standard deviation of 1.030, underscoring its significant influence on warehouse performance. In the third position, the factor of trained warehouse staff was rated with a mean score of 3.50 and a standard deviation of 0.926, further affirming its relevance. The fourth position in the ranking was occupied by the effective utilization of warehouse space, denoting a mean score of 3.41 and a standard deviation of 1.038. Concurrently, the fifth factor, the current layout effectiveness of the warehouse, obtained a mean score of 3.40, with a standard deviation of 0.964.

The sixth improvement question focused on the regular reconciliation of inventory records, which was rated with a mean score of 3.26 and exhibited a standard deviation of 1.101. In the seventh position, the question pertained to the warehouse's suitability for accommodating unexpected peak periods or seasonal fluctuations, with a mean score of 3.22 and a standard deviation of 1.058. Subsequently, the eighth crucial factor concerned equipment breakdowns and their timely recording, attaining a mean score of 3.17 and a standard deviation of 1.091. The ninth question revolved around the availability of adequate storage facilities, receiving a mean...
score of 3.13, and registering a standard deviation of 1.120. Lastly, the tenth and final factor in the ranking questioned the level of engagement of warehouse staff, with a mean score of 2.93 and a standard deviation of 1.142, implying its relatively lower perceived importance among the respondents.

The findings from Table 1 suggest that experienced personnel in the warehouse, health and safety policies, and trained warehouse staff are considered the most critical aspects for enhancing warehouse performance within the South African manufacturing industry, while the level of staff engagement is ranked as the least significant factor. The standard deviations associated with these mean scores indicate varying degrees of consensus among the respondents regarding the importance of these warehouse improvement questions.

Warehouse Management Challenges

This section of the study provides an analysis of the outcomes pertaining to section C of the questionnaire, specifically focusing on the critical challenges encountered within the warehouse operations of manufacturing companies situated in South Africa. The investigation in this section encomposes a comprehensive examination of the mean item score (MIS) for the survey questions, as well as an exploration of the skewness in the distribution of responses. Furthermore, an in-depth discussion of the findings obtained through the employment of exploratory factor analysis (EFA) is presented.

The descriptive analysis undertaken in this study serves to elucidate the relative significance and hierarchical arrangement of the identified factors associated with warehouse challenges. The results are articulated in a manner that permits the ranking of these factors from the most substantial to the least significant. Additionally, a comprehensive tabular representation is provided, which delineates the individual mean and standard deviation values for each of the identified factors.

It is pertinent to note that exploratory factor analysis (EFA), a widely accepted statistical technique, is employed in this study as one of the two primary approaches to factor analysis. This analytical method is utilized to discern the latent constructs and underlying dimensions that contribute to the challenges within the warehouse domain of manufacturing companies in the South African context. The EFA enables a systematic exploration of the interrelationships between survey items and serves as a robust tool for identifying the key underlying factors that influence the critical challenges in this sector.

Frequencies & Descriptive Factor Analysis for warehouse management challenges

The results of the MIS of the questions and skewness of the data are presented and discussed below.

Table 2 in the present study delineates the respondents’ rankings of potential challenges associated with warehouse management within the South African manufacturing industry. These rankings provide valuable insights into the perceived difficulties encountered in this operational domain. The rankings are presented in descending order based on the mean scores, each accompanied by its respective standard deviation, providing a quantitative perspective on the variability of respondents' assessments.

The foremost challenge identified by the respondents pertains to the difficulty in eliminating excess or obsolete stock, as denoted by a mean score of 3.76, with a standard deviation of 0.934. This finding highlights the critical nature of addressing and mitigating this issue in the context of warehouse management. The second-ranked challenge closely follows, emphasizing the magnitude of the concern associated with a surplus of excess or obsolete stock, with a mean score of 3.75 and a standard deviation of 0.891. The third-ranked challenge, with a mean score of 3.48 and a standard deviation of 1.094, revolves around the issue of theft within the warehouse. The existence of this challenge underscores the necessity of implementing security measures and protocols to safeguard valuable inventory.

Subsequently, the fourth and fifth challenges revolve around the absence of a defined order picking procedure (mean score of 3.29, standard deviation of 1.178) and the impact of warehouse location (mean score of 3.28, standard deviation of 1.199), respectively.
Both challenges highlight the significance of well-structured warehouse processes and strategic decisions regarding warehouse locations. The sixth challenge, with a mean score of 3.25 and a standard deviation of 1.111, pertains to issues related to the warehouse system itself. Simultaneously, the seventh challenge, featuring a mean score of 3.25 and a standard deviation of 1.012, draws attention to inaccuracies in inventory records, which can adversely affect warehouse management operations.

The eighth challenge is characterized by inaccurate demand planning, with a mean score of 3.23 and a standard deviation of 1.149. Accurate demand forecasting is essential for optimizing inventory levels and order fulfillment processes.

Subsequently, the ninth challenge involves difficulties in locating products within the warehouse system, represented by a mean score of 3.13 and a standard deviation of 1.178. The challenge of locating products effectively contributes to operational inefficiencies and the need for streamlined inventory management. Finally, the tenth challenge revolves around the frequent breakdowns of forklifts, with a mean score of 2.90 and a standard deviation of 1.281. This challenge emphasizes the importance of well-maintained equipment and its impact on the overall efficiency of warehouse operations. In summary, the rankings presented in Table 2 shed light on the prevailing challenges in the South African manufacturing industry’s warehouse management, which vary in terms of both perceived severity and inherent variability. These findings offer valuable insights for stakeholders seeking to enhance warehouse management practices within the region.

**Technological Challenges**

This section elucidates the findings obtained from Section D of the questionnaire, which pertains to the critical technological challenges confronting manufacturing companies’ warehouse operations in South Africa. The analysis in this section encompasses the mean item scores (MIS) of the survey questions, skewness measurements, and an exploration of the results through exploratory factor analysis (EFA). The descriptive presentation of the outcomes serves to establish the hierarchy of these factors, arranged in descending order from the most prominent to the least significant. Additionally, the tabulated data provides insight into the individual mean values and standard deviations associated with each of the identified factors.

**Frequencies & Descriptive Factor Analysis for technological challenges**

Table 3 presents the respondents’ rankings of technological challenges in the warehouse, providing valuable insights into the perceived difficulties encountered within this operational context. The challenges are ordered based on their mean scores, with associated standard deviations, reflecting both the central tendency and the dispersion of respondents' opinions regarding each challenge.

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once - off training is not sufficient</td>
<td>3.69</td>
<td>1.000</td>
<td>1</td>
</tr>
<tr>
<td>Outcome of reports are difficult to interpret</td>
<td>3.45</td>
<td>1.086</td>
<td>2</td>
</tr>
<tr>
<td>Power failures lead to chaos because everything relies on technology and not much can be achieved.</td>
<td>3.41</td>
<td>1.083</td>
<td>3</td>
</tr>
<tr>
<td>Loss of personal engagement.</td>
<td>3.35</td>
<td>1.049</td>
<td>4</td>
</tr>
<tr>
<td>It is difficult to use a new system</td>
<td>3.30</td>
<td>1.146</td>
<td>5</td>
</tr>
<tr>
<td>The system is slow to process data</td>
<td>3.30</td>
<td>1.031</td>
<td>6</td>
</tr>
<tr>
<td>Monthly passwords changes cause problems due to complexity of it.</td>
<td>3.28</td>
<td>1.132</td>
<td>7</td>
</tr>
<tr>
<td>Typing errors leads to complications for entire departments involved.</td>
<td>3.26</td>
<td>1.075</td>
<td>8</td>
</tr>
<tr>
<td>Staff work in silos, they prefer email than talking</td>
<td>3.19</td>
<td>1.109</td>
<td>9</td>
</tr>
<tr>
<td>Technology increases fraud within the warehouse</td>
<td>2.87</td>
<td>1.266</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 3 presents the respondents' rankings of technological challenges in the warehouse, providing valuable insights into the perceived difficulties encountered within this operational context. The challenges are ordered based on their mean scores, with associated standard deviations, reflecting both the central tendency and the dispersion of respondents' opinions regarding each challenge. Insufficient One-time Training: The most pressing challenge identified by respondents is the inadequacy of one-time training. This challenge received the highest mean score of 3.69, with a standard deviation of 1.000, signifying a relatively high level of consensus among the respondents about its significance.

Difficulty in Interpreting Outcome Reports: Ranked second is the challenge of interpreting outcome reports, which garnered a mean score of 3.45 and exhibited a standard deviation of 1.086, indicating a moderate level of consensus among respondents. Power Failures Chaos: The third-highest ranked challenge pertains to the chaos caused by power failures, with a mean score of 3.41 and a standard deviation of 1.083, revealing a similar level of consensus as the second challenge. Loss of Personal Engagement: The fourth challenge is associated with the loss of personal engagement within the warehouse environment, receiving a mean score of 3.35 and a standard deviation of 1.049, indicating a notable level of concern among respondents.

Difficulty in Using New Systems: The fifth challenge revolves around the difficulty in adapting to and using new systems, yielding a mean score of 3.30 and a standard deviation of 1.146, suggesting a noteworthy level of variability in respondents' opinions. Slow
Data Processing System: Ranking sixth is the challenge of slow data processing systems, with a mean score of 3.30 and a standard deviation of 1.031, demonstrating a moderate level of consensus among respondents.

Monthly Password Change Issues: The seventh challenge concerns monthly password change issues, receiving a mean score of 3.28 and a standard deviation of 1.132, indicating a moderate level of agreement among respondents. Typing Errors: Ranked eighth, the challenge of typing errors received a mean score of 3.26 and exhibited a standard deviation of 1.075, signifying a moderate level of concern among respondents. Silos and Preference for Email Communication: The ninth challenge relates to staff working in silos and their preference for email communication over face-to-face interaction, garnering a mean score of 3.19 and a standard deviation of 1.109, suggesting a moderate level of consensus.

Technology-Induced Warehouse Fraud: The tenth and final challenge concerns the perceived increase in fraud within the warehouse due to technology. It received a mean score of 2.87 and exhibited a relatively high standard deviation of 1.266, indicating a wider range of opinions among respondents regarding this issue. These rankings and associated statistical measures provide a comprehensive overview of the technological challenges faced in the warehouse setting, offering valuable insights for addressing these issues and improving operational efficiency.

**Zone Picking Benefits**

This section offers an empirical analysis of the outcomes pertaining to section E of the questionnaire, specifically focusing on the benefits associated with zone picking within the warehousing operations of manufacturing companies located in the context of South Africa. The assessment of these outcomes involves the computation of the Mean Item Score (MIS) for the pertinent survey questions, an exploration of skewness in the data distribution, and the conduct of an Exploratory Factor Analysis (EFA) to unveil underlying patterns and relationships within the collected responses.

To commence this analytical endeavor, the descriptive results are meticulously elucidated, providing a comprehensive ranking of the identified factors in descending order, thereby unveiling their relative importance as perceived by the respondents. Furthermore, a tabular representation is employed to succinctly convey the individual Mean and Standard Deviation (SD) values for each of the discerned factors, enhancing the interpretability of the findings. This segment of the analysis serves to offer a clear and concise presentation of the quantitative results obtained from the survey instrument employed within the scope of this research.

**Frequencies & Descriptive Factor Analysis for zone picking benefits.**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to group products</td>
<td>4.21</td>
<td>0.794</td>
<td>1</td>
</tr>
<tr>
<td>Simplifies stock takings</td>
<td>4.18</td>
<td>0.821</td>
<td>2</td>
</tr>
<tr>
<td>There is a sequence in which goods are picked.</td>
<td>4.08</td>
<td>0.776</td>
<td>3</td>
</tr>
<tr>
<td>Improves loading delivery time scales.</td>
<td>4.07</td>
<td>0.865</td>
<td>4</td>
</tr>
<tr>
<td>Improves the efficiency of the warehouse.</td>
<td>4.02</td>
<td>0.836</td>
<td>5</td>
</tr>
<tr>
<td>Zone picking will reduce warehouse movements.</td>
<td>3.91</td>
<td>0.956</td>
<td>6</td>
</tr>
<tr>
<td>There will be fewer problems in the order picking since zone picking introduction.</td>
<td>3.89</td>
<td>0.883</td>
<td>7</td>
</tr>
<tr>
<td>Reduce stock damages</td>
<td>3.88</td>
<td>0.915</td>
<td>8</td>
</tr>
<tr>
<td>Aids in accurate planning</td>
<td>3.86</td>
<td>0.855</td>
<td>9</td>
</tr>
<tr>
<td>It enhances warehouse performance</td>
<td>3.67</td>
<td>1.141</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 4 presents the ranking of zone picking benefits within the South African manufacturing industry, as evaluated by respondents. The benefits are assessed in terms of their mean scores and standard deviations (SD), providing valuable insights into their perceived importance and variability.

The foremost benefit, "Easy to group products," was ranked highest, with a mean score of 4.21 and a standard deviation of 0.794. Following closely, the second-ranked benefit was "Simplicity in stock taking," with a mean score of 4.18 and a standard deviation of 0.821. Subsequently, the third-ranked benefit was identified as the "Sequence of picking goods," with a mean score of 4.08 and a standard deviation of 0.776. The fourth-ranked benefit, "Improvement of loading delivery time scales," received a mean score of 4.07, with a standard deviation of 0.865. Ranked fifth, "Improvement of the efficiency of the warehouse" attained a mean score of 4.02 and a standard deviation of 0.836.
In the sixth position, "Zone picking will reduce warehouse movements" was ranked, exhibiting a mean score of 3.91 and a standard deviation of 0.956. Following this, the seventh-ranked benefit was "There will be fewer problems in the order picking since zone picking introduction," with a mean score of 3.89 and a standard deviation of 0.883. The eighth-ranked benefit, "Reduce stock damages," obtained a mean score of 3.88 and a standard deviation of 0.915. Occupying the ninth position, "Aids in accurate planning" received a mean score of 3.86 and a standard deviation of 0.855. Lastly, the tenth-ranked benefit, "It enhances warehouse performance," achieved a mean score of 3.67, accompanied by a standard deviation of 1.141.

These findings provide a comprehensive overview of the relative importance and variability of zone picking benefits in the context of the South African manufacturing industry. Such insights are instrumental in shaping strategies and decision-making processes related to warehouse and logistics management.

Conclusion
This study's investigation has illuminated crucial facets of warehouse management in the South African manufacturing sector. The study has examined the importance of enhancing warehouses, obstacles faced, technological constraints, and advantages of zone picking. The findings provide valuable insights that can guide decision-making and strategic planning for warehouse operations in this specific situation.

The study emphasizes the crucial role of experienced individuals, appropriate health and safety standards, and well-trained staff in warehouse improvement. Respondents have selected these elements as the most important for improving warehouse performance. Conversely, staff interaction was deemed the least important, indicating a need for enhancement in this area. Evaluating the hurdles in warehouse management highlights the importance of tackling issues like surplus or outdated inventory, theft, and challenges in executing order picking processes. These issues can greatly affect warehouse productivity and necessitate specific solutions.

Technological obstacles in warehouse operations provide considerable concerns, including the necessity for continuous training, challenges in report analysis, and susceptibility to power outages. The difficulties highlight the significance of technology in contemporary warehouse management and the necessity for solutions to reduce related hazards. The analysis of zone picking benefits emphasizes the advantages of this strategy, such as facilitating product grouping, streamlining stocktaking, and enhancing warehouse efficiency. These advantages can help improve efficiency and boost overall performance.

This study offers a thorough summary of the present condition of warehouse management in the South African industrial sector. The elements found in relation to improvement, obstacles, technology, and zone picking provide significant information for stakeholders aiming to enhance their warehouse operations. Organizations must create customized strategies and use resources and training to overcome hurdles and maximize rewards. Enhancing warehouse management methods can improve operational efficiency and contribute to the growth and success of the manufacturing industry in South Africa.

Practical Impact on Business
The study emphasizes the crucial importance of warehouse management in gaining a competitive edge in the global market. South African manufacturing companies have the opportunity to reassess and update existing warehouse management systems, resulting in enhanced operational efficiency, cost reduction, and higher competitiveness. This can lead to a stronger market presence and the capacity to rapidly answer client demands, therefore expanding the global reach of these companies. Implementing warehouse management suggestions like automation, zone picking, and personnel training can result in cost savings. Manufacturing organizations can save labor costs, eliminate errors, and enhance order processing times by optimizing warehouse operations.

Optimizing space utilization in the warehouse increases storage capacity and minimizes the requirement for extra storage facilities. Efficient warehouse management results in enhanced inventory precision and quicker order fulfillment. This results in improved demand forecasting, decreased carrying costs, and enhanced customer satisfaction. Customers gain from expedited order delivery, reduced errors, and improved order fulfillment, leading to increased loyalty to the manufacturing companies. Warehouse management systems provide comprehensive insight into warehouse activities. Utilizing this data-driven method allows firms to make well-informed decisions, pinpoint bottlenecks, and consistently enhance warehouse performance. It improves transparency, communication, and customer service. The report highlights typical obstacles in warehouse management, including the need to balance cost-cutting measures with service excellence and to ensure consistency between warehouse strategy and overall business strategy. Implementing the suggested modifications can assist manufacturing companies in tackling these difficulties and operating with more efficiency.

Operations and Processes
Effective warehouse management is essential for organizational operations, particularly within the realm of international trade. Efficient warehouse management is crucial for meeting customer needs, maintaining product availability, and delivering items cost-effectively to a worldwide consumer base. Warehouse management technology advancements have broadened the sector's scope to include transportation, packaging, branding, and data management. Warehouse management systems (WMS) are crucial for optimizing operations and enhancing efficiency. They improve inventory accuracy, operational efficiency, and customer service by minimizing mistakes, automating procedures, and provide immediate insight into warehouse operations. Warehouse performance is
influenced by various elements such as physical layout, inventory management, technology integration, automation, workforce skills, motivation, and order picking tactics.

Long-term Impact

South African manufacturing enterprises can improve their competitiveness in the global market by rectifying the inadequacies in warehouse management systems. This will strategically place them for enduring success and resilience, enabling them to navigate economic volatility and other obstacles. Implementing the suggested modifications, like integrating and automating warehouse systems, implementing zone picking, and offering technology training to staff, will improve operational efficiency. This will ultimately decrease operational expenses, enhance product quality, and lead to financial benefits in the long run. Implementing warehouse management systems and automation will propel technological progress in the manufacturing industry. As companies incorporate and adjust to these technologies, they will promote innovation and drive progress in supply chain management and manufacturing processes. The study's ideas and insights can be disseminated globally across many sectors. Global advancements in warehouse management methods can be achieved if industrial firms worldwide study the triumphs and challenges experienced by South African firms.

This study has shown the crucial importance of warehouse management in manufacturing firms and its ability to drive long-lasting improvements in the South African manufacturing sector, which can have a ripple effect on the worldwide manufacturing industry. This research identifies key difficulties and proposes creative solutions that can transform traditional warehouse management techniques and significantly enhance the success of manufacturing companies. This study has significant practical consequences for businesses, providing a detailed plan for South African manufacturing companies to thoroughly reassess and update their warehouse management systems. This strategic realignment has the potential to bring numerous advantages such as increased global competitiveness, cost savings, better customer happiness, and improved economic sustainability.

Firms can overcome operational obstacles and increase performance in their warehouse operations by recognizing and integrating warehouse management as a key strategic component of their overall company strategy. This research enhances our comprehension of the crucial role of warehouse management and provides a strong basis for practical measures that can help manufacturing companies thrive in the competitive South African and global manufacturing industry.

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