A study to evaluate the performance of WMS implemented by Al Madinah Logistics Company

Abstract

Al Madinah Logistics is one of the largest third-party logistics services providers in Oman and the gulf region. In a bid to improve efficiency and service delivery, the firm has invested in a state-of-the-art Warehouse Management System. Several years since procurement and operationalization of the system, no study has been undertaken to study its efficiency. The current study was thus executed to assess the efficiency of the system from an employee perspective. The study was undertaken through questionnaires that asked the employees to rate the warehouse management system employed by the company on eight different dimensions. The system was rated on a scale of 1 to 5 with 5 being the highest score on any given dimension.

The results did indicate an efficient system, by a majority of the dimensions assessed. This included the system providing an expansive storage system, power consumption, documentation, visibility, and forecasts. However, the WMS was found to be lacking in physical location tracking of the goods as well as expiry and stock outages controls and forecasts. The respondents were also of the view that the system needs updates and modifications and less support for a whole new system being acquired.

Consequently, the management of the firm needs to devote more resources to boosting the tools and capabilities of the WMS to address the identified weak areas. Employee twining may also be necessary to maximize the efficiency of these systems.

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Introduction

Warehouse Management systems are database-based software systems designed to control and coordinate the warehousing operations with the desire of achieving efficiency and effectiveness in warehouse

operations. Over the recent years, the market for warehouse management systems has grown and expanded in line with rising attention given by business managers and scholars on the need for effective warehousing operations in the supply chain. It is indicated that warehouse operations take up costs to the tune of 2% of annual sales of any given company, and as such optimizing both costs and operations of this vital operation would help the firm improve not just efficiency and effectiveness but also achieve better returns.

There is a wide range of warehouse management systems in the market, and businesses are almost spoilt for choice than ever before. This allows business firms to selected WMS that best fit their unique needs and demands. However, it is imperative that businesses continuously evaluate the performance of their warehouse management systems against their specific needs from time to time to ensure a complete system that best discharges the needs of the firm. For the current study, the WMS implemented by Al Madinah Logistics Company was evaluated against a set of eight different criteria to determine how well it was fulfilling its mandate in line with what the firm wanted to achieve worth the acquisition.

Statement of the Research problem

In a bid to improve its overall performance, Al Madinah Logistics company has invested in a state-of-the-art Warehouse Management System to automate and improve its warehouse management operations. The firm has fully implemented and operationalized this system and trained its staff on its use. While the firm implemented this system with a view of boosting its efficiency and effectiveness, there has not been a comprehensive study to detail the efficiency of the system. This leaves the company's management without concrete information on how well the system performs and its shortcomings if any. This is the problem that this research aims to cure.

Aims

The purpose of the current research is to evaluate the efficiency of the Warehouse Management System implemented by Al Madina Logistics company.

Research Objectives

➢ To determine the factors affecting the efficiency of the Warehouse Management System at Al Madinah Logistics company

➢ To determine the performance of the WMS implements by Al Madinah Logistics company on the various dimensions of efficiency

➢ To determine areas of WMS that need urgent redress to improve the efficiency of the WMS implemented by Al Madinah Logistics company

➢ To propose possible solutions to improve the efficiency of the WMS implemented by Al Madinah Logistics company

Research Questions

i. What are the factors that determine the efficiency of a WMS?

ii. What is the performance of the WMS implemented by Al Madinah Logistics company concerning the various factors that affect the efficiency of a WMS?

iii. Which areas of the WMS implemented by Al Madinah Logistics company need to be urgently improved to improve efficiency?

iv.   What are the possible solutions to address the limitations in the WMS implemented by Al Madinah Logistics company?

Literature Review

Warehouse Management Systems

A warehouse Management System (WMS) is defined as a database information technology designed to aid in running warehouse operations to increase efficiency and effectiveness of the warehouse function through coordination and integration of warehouse operations as well as couture, update, and maintenance of warehouse transaction records (Istiqomah et. Al. 2019). The authors theorized that the warehouse management system is designed to control and coordinate all processes that occur within the warehouse, including reception, pit away, picking, and dispatch of inventory within the warehouse. They indicate that a warehouse management system is deployed as a tool that aids in the control and management of the availability of the warehouse.

Andiyappilai (2019) observes that the warehouse management system aids not just in the control but also in the movement of goods and materials within the warehouse, giving the logistics function the necessary tools for managing and tracking inventory moving through it. The functions enlisted by this author as controlled and coordinated by the warehouse management system include receiving, put away, picking, shipping and dispatch. The author debates that the warehouse management achieves efficiency improvements in the wresting through directing cutaways as well as improving the accuracy of inventory. The system is also expected to direct as well as optimize stock, helping in decision making through making available real-time data related to stock levels as well as space utilization.

According to Andiyappilai (2019), the Warehouse Management System is indispensable in facilitating the maximization of operational efficiency in different processes, elimination of wastes, speeding up order turnaround time, provision of real-time updates in order status, enhancing labor productivity, and managing warehouse space. The author also observes that WMSs are built based on a range of factors that include industry requirements and specifications, logistics requirements, specific requirements among others. It just has certain functions regarded as basic to the warehousing function, and other functions that are sophisticated depending on the nature of the warehouse. The author debates that the Warehouse Management System must possess the tools and functions necessary to support core warehousing functions that include pre-receiving, storage transfer, shipping, cyclic counting, inbound quality control, concierge management among others. The author reckons that a significant proportion of the businesses have implemented warehouse management systems and have reaped benefits, although the extent to which these benefits match the expected benefits, as well as costs incurred in acquiring and operating them, remains untested. Some of the noted benefits include optimization, better monitoring, and control of warehousing functions, dock scheduling, work management among others.

Miralam (2017) contends that good warehouse management systems allow for easy and efficient access to all merchandise stored within the warehouse, allowing for easy storage location as well as to find the shortest path to the merchandise, and finally ensure efficient delivery to its end destination. The author debates that the implementation of WMS will provide an increase in the level of accuracy, lead to a

reduction in costs, achieve a greater ability to customer service as well as reduction of cycle times. He further contemplates that the positive effects of a warehouse management system do not end with the inventory reduction but extend to better utilization of storage space as well as enhanced efficiency and accuracy. It enables the warehouse operators to quickly and effectively retrieve the merchandise when they need it, simplifies the product identification process among other core benefits.

Miralam (2017) notes the acquisition and implementation of a warehouse management system is a process that consumes significant amounts of resources as well as time, and as fun firms that implement these systems desire to gain significant competitive advantages as a result of the same. In evaluating the factors that determine the efficiency of a warehouse management system, Miralam (2017) ten different qualities or values upon which he indicates that the performance of the warehouse management system needs to be evaluated. These factors according to the author include speed increases in material handling, shipment accuracy, efficiency with fewer steps, reduction in labor as well as supervision, improvements in inventory accuracy, improvements in space utilization, improvements in location and order picking processes, returns in investment, and paperwork reduction.

Istiqomah et. al. (2019) does indicate that the efficiency of a warehouse management system can be added by breaking it down to the major operations and assessing honing supported for each one of these operations. According to the authors, the major warehouse functions supported by the warehouse management system include receiving, put away, order picking, outbound checking, loading, and stock take or name. The receiving process involves makes the final physical transfer from the supplier into the warehouse, and entails activities such as comparison between the records of the goods to be received against those being received, oftentimes involving a receipt note. The warehouse management needs to have sufficient features that allow for this process to be undertaken within the shortest time possible z minimize errors, automate the majority of the routine and administrative tasks, as well as make easier the comparison and quality check process. For many of the warehouse management systems, this includes having barcode readers and technology as well as the inclusion of the Radio frequency identification technology to simplify the receipt process. Some of the warehouses' management stems have also been designed to allow for the attachment of custom noted and pictures of the goods.

The second process is the put-away process and entails the transfer of materials or goods received from the receipt area to their storage position. The process needs to be tightly controlled, ensuring that the arrangement of the goods or materials is doing away that simplifies identification and retrieval, and enables foods with shorter time to security to be expedited outbid the warehouse management. Istiqomah et al (2019) opine that high-efficiency warehouse management systems allow for an orderly and controlled put-away process that includes directed out away, where the warehouse operations are directed on where and how to place the goods and materials within the warehouse. Such directed put away allows the warehouse to minimize errors related to manually put away, as well as optimize space utilization. Istiqomah et al (2019) observe that majority of the WMS uses wither the dedicated put away system, as well as the free flow, put away system. The free flow space allocation system randomly selects a location for the storage of the material or good, while the dedicated storage system allows for goods to be stored in an order predetermined by the operator, and when a rack is full the next level of the rack will be selected for storage. While the deviated put away approach allows for neatly arranged products that also facilitate easy picking. However, when goods are not stored in one rack then they may be far away from each other as a result.

The third process for performance evaluation is the order processing or picking process, which is essentially the process involving retrieval of the goods or materials stored in the dispatch area. According to Istiqomah et al (2019), higher performance is attained when the operators in the warehouse are now to pick the products or materials with minimal steps in the process, as well as ensuring accuracy in the picking process, and confirmation of the materials or goods picked and those ordered for. The multiplicity of these factors makes order picking or processing one of the core elements of determining the performance of the warehouse management system. The process also needs to ensure that the inventory and other stock information are updated immediately after the retrieval, and the location information is also updated to match the new state of affairs. The next step after order processing is the loading process, which is used for comparison between the material being loaded as well as those that needed to be loaded and updating information that relates to the goods or products that have been loaded into the dispatch vehicles into the system. Outbound checking is also critical leaned of the loading process, and entails confirmation of the materials that include are on the order picking list as well as those loaded in the outbound vehicle.

Stocktake is the other core warehouse operation by which the warehouse management system needs to be evaluated, as per the bases developed by Istiqomah et al (2019). The authors do identify that the stocktake process entails a holistic activity designed to ensure that the physical inventory within the warehouse matches the information held by the warehouse systems. This is to ensure that there is a clear correlation between the information and the physical contents of the warehouse and to correct and update any discrepancies that may exist between the two. This ensures that any errors are realized well in advance and that any such errors are arrested early in advance.

Klabusayova (2013) is one of the other authors who propose the assessment of the warehouse management system in terms of support for various core warehousing operations. The author debates that in the modern warehouse it is no longer sufficient to deploy manual systems but instead businesses are increasingly turning to technology to speeds up the process and improve accuracy at the same time. The author denotes that modern warehouses used Serial Shipping Container Codes for logistics units such as pallets, and this includes ensuring that the warehouse management system has support for these systems and technologies. The author in this case thus adopts an evaluation approach that looks at the performance and efficiency of the warehouse management system in terms of the technologies supported by the warehouse management system. The author notes that support for SSCC codes for goods reception aids in reducing the time taken for goods reception and verification.

Klabusayova (2013) also debates that an efficient warehouse management system must have support for electronic data interchange (EDI). Electronic Data interchange enables the various actors involved in the warehouse management process to communicate with each other and coordinate their activities, solve any issues arising within the shortest time possible and facilitate effective transactions. Scanning of SSCC codes enables the goods reception process to proceeds speedily, while electronic data interchange allows for any additional or regular information to have been exchanged between the parties involved in the transaction.

Klabusayova (2013) notes for an efficient process, the warehouse amazement system needs to have enabled RF terminals for the storage of goods and materials within the warehouse. The author reckons that the warehouse management system needs to have position identification for goods, scanned warehouse maps as well as deploy the use of EAN codes for ease of storage and retrieval. The author also proposes that an efficient warehouse management system needs to have support for continuous replenishment, in that it

would be able to create replenishment tasks immediately the stock levels run below certain levels that have been predetermined by the warehouse management. This reduces the risks of running in shortage which would then inconvenience customers.

Another element that determines the efficiency of a warehouse management system involves the support for voice picking technologies. According to Klabusayova (2013), voice picking is a technology that has helped to improve efficiency and effectiveness in several warehouses by improving and simplifying their order picking process. The author debates that such technologies mallows the worker to focus fully on the task at hand, reduce interruptions and thus maximize productivity. Moreover, such a technology is also valuable for ensuring only the correct items are picked, not just similar ones. If a worker picks the wiring item the technology alters them to this normally, which limits the need for goods and products being rejected at the dispatch areas and thus limiting ant errors as a result. It also eliminates the need for manual elimination, especially advantageous for freezing warehouses. Warehouses which has deployed this warehousing technology have seen significant reductions in error rates.

Hamilton (2013) yet again emphasizes the functional value of the warehouse management system. In their survey, the authors reported that half of the firms surveyed were using warehouse management systems that were at least one version of an update away from the latest version update, while another half of the firms were using the latest version of the system. The study also reported that at least half of the firms surveyed had annual support and maintenance agreements with their system vendors, which allowed them to receive significant support, updates, and upgrades from the original developers of the system.

Hamilton (2013) while also assessing the efficiency and performance of warehouse management systems also did indicate that the respondents indicated that some of the warehouse management systems did have some functions which they did not use some had functions which they used, and others lacked functions which they needed. Others, however, noted that their systems lacked certain functions but they still did not require to want them added. From the results of the study which focused on the feature, 57% of the warehouse management systems surveyed indicated that they had desirable features, while respondents were using 76% of the desirable features, indicating that an average of 24% of the available features was not being utilized. The study also looked at the desirable of the uninstalled features, with 70% of the unavailable features being required by these systems.

Hamilton (2013) presents an evaluation of warehouse management system performance in terms of functionalities. The author indicates that the high-performing warehouse management systems allow for comparing the expiry dates of the products being received against the minimum acceptable shelf life of the item. The author reports that high-performing warehouse management systems must limit the odds of products likely to expire soon hitting the shelves. With regards to put away, the authors note that high-performance warehouse management systems do have a mechanism for comparing pallet height against the height of the racks to which the items are to be out, which ensures that there is no inconvenience of having to move with pallets from one rack to another in search of one with the correct height to contain the pallet or container.

Reporting is another critical functional element debated by Hamilton (2013) in assessing the performance of warehouse management systems. The author notes that high-performance warehouse management systems allow for available and used spaces to be displayed in both percentages and absolute numbers. This gives the users easier and faster processing power and the ability to better direct operations in the warehouse.

De Assis and Sagawa (2018) in their work present a different framework for assessing the performance of warehouse management systems, which is based on functionalities and capabilities. The authors debate that for an efficient warehouse management system it must possess a set of Basic warehouse management capabilities, those considered as advanced as well as extended.

In summary, there are multiple approaches to the evaluation of warehouse management systems. These include the functional qualities approach, the capabilities approach, and the warehouse operation approach, all of which may arrive at different results.

Measures for improving Warehouse Management Systems

Datexcorp (2016) discusses three major approaches towards addressing deficiencies in the warehouse management system. These include regaining the system, update of the system, and purchase of a new system. The author counsels that whichever option the firm intends to pick it must weigh the benefits and limitations, against its own unique needs.

Methodology

The research employed the use of questionnaires for the collection of primary data from the study participants. A total of 65 questionnaires was dispatched to the respondents, while a total of 61 questionnaires were duly filled and returned. The cleaning process eliminated three questionnaires because of incomplete responses and other errors, leaving a total of 58 to be used for the data analysis process.

Data Analysis was undertaken with the help of excel, assessing the number of responses for each specific dimension of performance.

Results and Discussion

The results did indicate that the respondents perceive the system to perform generally well in most of the dimensions studied. The system scored especially high in terms of accuracy, speed, and accuracy, with an average score of 4. The respondents also pointed out that the system allowed them to be more efficient with a few steps, and improved space utilization within the warehouse. The reporting and visibility capabilities of the warehouse management system were also rated highly, as it enabled the users to see how much space has been utilized as was remaining at every core point.

However, the respondents noted that a lack of capability to examine expiry dates and those of standard shelf times was a major deficiency of the system. The respondents wanted a system that would enable them to detect goods that were expiring soon and prioritize them for quick dispensation, as well as making comparisons between the expiry dates of incoming goods and those already within the warehouse.

The respondents also pinpointed location tracking as a core capability that was either lacking or deficient within the warehouse management system implemented by Al Madinah Logistics. The respondents especially lamented that the system often delayed in updated new locations of a product in case it was moved, which led to users moving to wing positions in the search of the product. This needed to be improved to increase the efficiency of the system.

Regarding the model for improving system performance, updates were the most highly suggested mechanisms. 80% of the respondents indicated that updates would be the best approach for improving performance. Given the performance of the system is generally highly rated across various dimensions and parameters, updates would be both appropriate and cost-effective. Moreover, given that the system has a continuous support and maintenance agreement with the system vendor, it would be appropriate for the system to be updated easily as original developers deeply understand its coding and working.

Conclusion

The study was designed to evaluate the performance of the warehouse management system employed by Al Madinah Logistics Company. Using questionnaires and semi-structured interviews the researcher was able to collect insightful views from the employees of the company about various dimensions used for assessing the performance of the WMS. The results did indicate that the warehouse management system was generally performing highly, with a performance score of 4.2/5.0. Deficiencies in physical tracking capabilities, as well as stock expiry comparison capabilities, were the two areas where the system was found to be lacking. The respondents also indicated that system updates were the best way to seal these identified loopholes. Future studies should aim at confirming the validity of the criteria used by the research for evaluating WMS performance.

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