

Implementing Warehouse Management Systems in Logistics: A Case Study

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Abstract

As we see the technological developments evolve in the recent arena, it is contributing to Warehouse Management Systems (WMS) Implementations implementation as well in the Logistics industry. Though there have been a number of researches done in the past decade or so on WMS implementations, it appears that there is a huge gap between the number of recent researches against the number of recent technological developments as the technological developments advances heavily. Hence, it is attempted to understand the latest trends and developments in WMS implementations in this research based on a case study conducted in a leading Logistics and Supply Chain enterprise. The benefits and challenges that the businesses have at the recent times have been discussed. As the technological developments are tremendously changing the business operating models, this study can be extended periodically to understand the latest and greatest in WMS implementations at any given time.

Keywords: *Logistics and Supply Chain, Warehouse Management Systems and WMS Implementations.*

INTRODUCTION

Supply Chain Management is a process of managing the supplying partners of an enterprise or business entity. This process

ensures the seamless flow of materials from supplier to customer and provides the visibility of material movement more closely on the entire supply channel. In

order to manage the entire supply chain, organizations have been using Enterprise Resource Planning (ERP) applications as part of their IT strategy and model. A typical supply chain model is shown in figure. 1 to depict how the materials flow from one end to another through different business partners involved with (See **Figure1**)

And, Logistics is an important process of storing/warehousing and/or distributing the materials from one business partner to another per business requirements.

Managing the warehouse processes become complex for businesses with no sophisticated IT systems, especially when the business requirements are complex. The combination of low business complexity and low business volume may not require the advanced Warehouse management systems but it is much needed to manage the business when it has the complex requirements and the high volume profile. A sample logistics diagram is shown in figure. 2 to depict how these inter-units are integrated into Logistics;



Figure:-1 A Typical Supply Chain Model

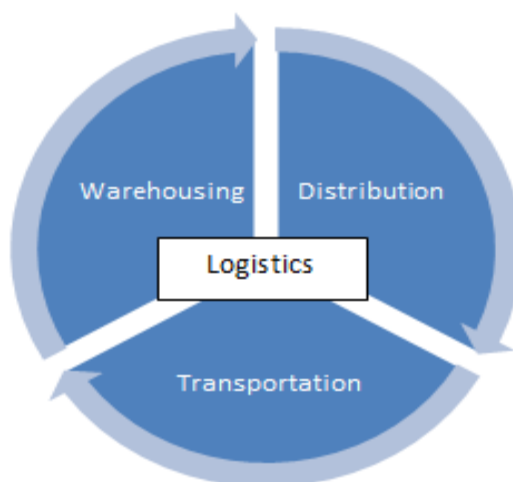


Fig 2 A Typical Logistics Model

Logistics businesses use the Warehouse Management Systems (WMS) to facilitate the warehouse operations through IT systems for better tracking and managing the inventory effectively. The Warehouse Management Systems can be categorized into different groups based on a numerous factors but in general they are categorized into Tiers such as Tier-1, Tier-2 and Tier-3. This categorization is based on the built-in functionality and flexibility of the WMS product. The WMS product vendors are incorporating the technological developments and advancements into the core function of WMS Implementations to support the Logistics and Supply chain businesses better. The chart shown in figure.3 depicts the relationship between the Logistics business complexity and the WMS product capability;

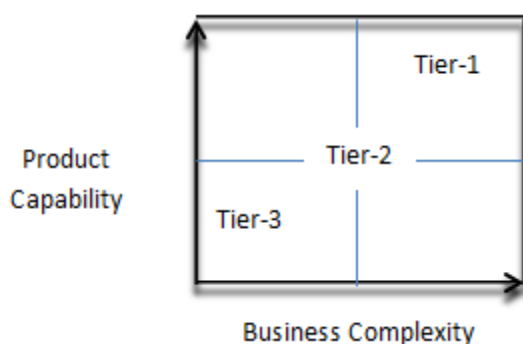


Fig 3 The Chart of Complexity Vs Capability

Managing the material movement from one entity to another in an enterprise business at right time, right inventory and at the right place is critical for the success of Logistics and Supply Chain business. And, there are many entities involved in a supply chain process such as; Marketing, Sales, Sourcing, Manufacturing, Warehousing, Distribution and Transportation etc. The more channels that are on a supply chain the more business parameters involved in the business. The more variables to the business require the more sophisticated IT systems to manage and control the supply chain. Hence, the businesses are implementing the Enterprise Resource Planning (ERP) systems in providing the better and clear supply chain visibility to their stakeholders.

Logistics is a key program in a supply chain when it comes to deliver the right product right time and to the right place. And, some of the primary services include in the Logistics business are; Receiving, Putaway, Picking, Packing, Shipping, Replenishment, Materials movement, Customer Compliance and Value Added Services. It becomes impossible in managing all these processes without any IT systems when the business model is complex and every changing due to the

LITERATURE REVIEW

market behavior. And, one of the IT systems which help facilitate these Logistics processes seamlessly is the Warehouse Management Systems.

There are researches in the Warehouse Management Systems which reveals the benefits attained by the businesses. Warehouse Management Systems (WMS) helps the Logistics business in managing and tracking the Inventory [5,8]. A warehouse management system or WMS primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, put-away and picking. A warehouse management system (WMS) is a database driven computer application, to improve the efficiency of the warehouse by directing cutaways and to maintain accurate inventory by recording warehouse transactions. The systems also direct and optimize stock based on real-time information about the status of bin utilization [1,9].

Warehouse Management Systems helps the businesses to maximize their operational efficiency in different areas in the processes. To meet these high performance goals, a way needs to be found to eliminate any waste from the

warehouse, to streamline its operations, and improve efficiency in every aspect of warehousing activities. One of the most proactive ways of doing so is the use of a warehouse management system (WMS) that is designed to speed up order turnaround time, improve inventory accuracy, provide instant order status information, manage warehouse space and enhance labor productivity [2,10].

The WMS application is built based on different factors such as Industry specific requirements, General Logistics Requirements etc. Any WMS application regardless of the business complexity should be able to support some basic logistics functions. The WMS must have tools and functions to support the main steps and logistic processes of inbound, production and outbound, such as: pre-receiving of materials, concierge management, receiving, inbound quality control, storage, transfer, picking, cyclic counting and shipping [3,6].

Businesses have been taking advantage of using WMS and are getting benefited in many different ways and also to be able to meet the Metrics and SLAs. WMS provides optimization, monitoring and control of complex warehouse and distribution activities such as yard

management, dock scheduling, order management, inventory management, and others in an efficient manner [4, 7].

Based on the research works published in the journals, conferences and on the other modes, it is clearly seen that only limited researches have been done in the past on WMS Implementations and those researches have revealed both the benefits and constraints of using the system. And, there are very few attempts in the recent times on researching and investigating the recent trends in WMS implementations to understand the latest happenings or issues or challenges. Hence, it is attempted in this research article by conducting a case study to analyze the issues/challenges on these WMS implementations and finding the best possible solutions for those respective issues/challenges.

WAREHOUSE MANAGEMENT SYSTEMS IMPLEMENTATIONS

The logistics businesses implement the Warehouse Management Systems for process efficiency, improvement and transparency. And, a WMS implementation would normally require the four important phases for a successful implementation as per diagram shown in figure. 4 to be able to ensure the business requirements are completely met by the IT solutions;

A WMS implementation requires various business partners to be engaged and contributed at all times for a successful project delivery. There are challenges and issues in every WMS implementation project based on the resources and data available for the successful delivery of the project.

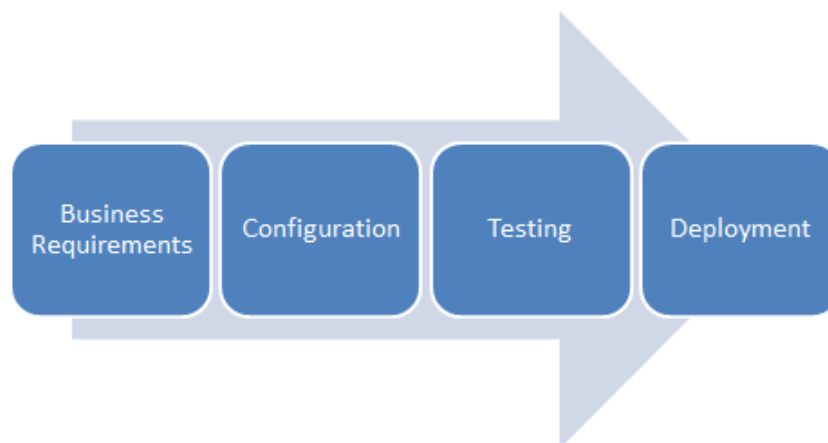


Fig 4.The phases of a WMS Implementation

RESEARCH METHODOLOGY

The methodology that has been used in this research is shown in Figure 5 and a variety of data and a lot of necessary data have been collected through different sources within the organization and analyzed and the findings are published appropriately. In simple terms to say, this case is analyzed in a qualitative approach.

A CASE STUDY ANALYSIS

Every business model is unique in the Logistics industry hence every WMS implementation too. In order to understand and analyze the latest trends in WMS implementations, a case study has been conducted in a leading Logistics and Supply Chain company. And, this case study is done based on the observations in WMS implementations, discussions with the different resources and through project documentations.

This company implements a Tier-1 WMS application across their facilities in an effort to bring the unified IT WMS solutions across the organization. This strategy also helps the organization to save the resources by eliminating the other legacy WMS applications that have been used in the past decades.

This company has a well-structured IT organization which comprises of different internal entities as shown in figure. 6 to get participated and contributed to a WMS implementation. And, the roles and responsibilities of each team are well defined and managed appropriately. Every entity in the project is an important stakeholder and committed to deliver the better possible WMS solutions.



Figure:-5 The Research Methodology

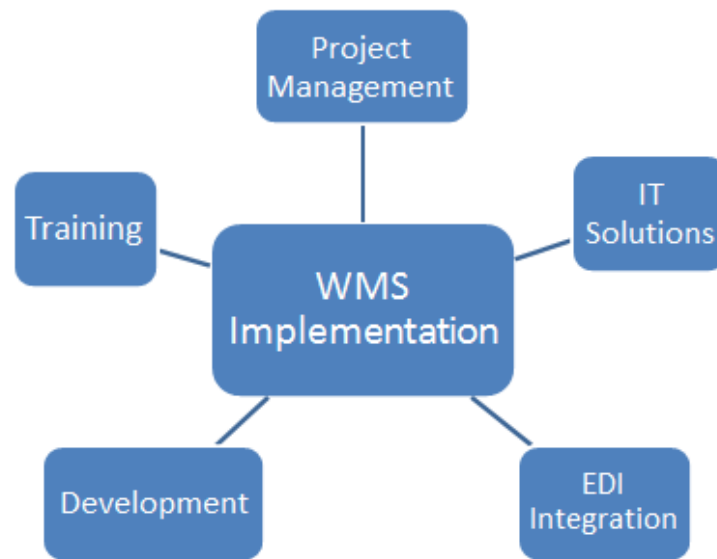


Figure:-6 The major entities in a WMS Implementation

The primary roles of each entity in a WMS implementation project are listed below;

- **Project Management** - To manage the project from start to end and ensure the smooth and successful WMS implementation.
- **IT Solutions** - To understand the business requirements from customer, configuring the WMS application per requirements, installing/managing the application and database.
- **EDI Integration** – To integrate the Customer systems and any other external systems with WMS systems and develop the EDI interfaces as per requirements.

- **Development** – To develop any functionality that is needed for the business and provides the respective solution through WMS platform.
- **Training** – To train the resources to be able to execute the WMS functions in the application.

Based on this research, the key factors that are influencing the WMS implementations are categorized into four groups and each of them is detailed out in figure.7 with the actions/pro-active measures that are being taken to accomplish a very successful WMS implementation.



Figure:-7 The Key Factors influencing the WMS Implementation

Systems Integration

Integrating the WMS to the external systems such as Host and other IT Logistics systems is always a challenging and very important task in any WMS Implementation project as the data flow across all the systems should be seamless and efficient with no interruption. And, the following processes help to mitigate the challenges reside in the systems integration;

- **API Integration** – Application Programming Interface helps to automate the interactions between the supply chain partners by creating a common or shared platform. This also changes the traditional way of systems communication and expedite the process dramatically.
- **TMS Integration** – Transportation Management System is integrated with Warehouse Management System and

this helps to do the better rate shopping with different parcel carriers and route the shipping accordingly based on the order data. This also helps to route the Shipments in the best network possible through network optimization.

- **Automated EDI Alerts** - the EDI failure or delay at any point in the entire communication platform would be reported automatically to be able to resolve any such issue pro-actively and quickly. This also would help alert the business or operations to prioritize a specific customer or order.
- **Alignment** – It is very important that all the parties involved in the Integration are aligned on all the factors such as Mode of communication, Systems security, EDI file formats, Mapping guides (with each field attributes), Frequency and Volume.

WMS Product Capacity and Capability

Determining the hardware / software capacity and capability at the early phases of the project is another important challenge in the WMS implementation project as this plays a vital role in ensuring the hardware and software compatibility for the business and the usage of those resources to its maximum extent. The below decisions and determinations alleviate the challenges with respect to these factors;

- **Database architecture** – determine the capacity of the database and the number of virtual machines based on the complexity and volume of the customer. And, also to look at the other tools such as Data Analytics, Reporting and Dashboards etc.
- **Standardization** – Running the business with the standard IT system solutions is easy as it has impact to the systems configuration, customer compliance, reporting etc. Hence, implementing the standard IT solutions is always recommendable for better, faster and cheaper implementations and also to manage the project with ease in the long run.

- **Network / Devices** – studying the site or facility thoroughly at the initial phase and also on regular basis based on the business growth is important in providing the right network connectivity and the necessary devices to perform the operational processes as expected. This might include in increasing the network speed, providing new AP's, adding new RF and other devices to meet the customer expectations.

- **Automation** – there are two types of automations can be extensively looked into; i) setting up the multiple virtual instances for the application install is a key for load balancing and running the systems with little to no impact for the business. And, making the code deployments automated to all these virtual instances would help to avoid any errors. ii) Automating the warehouse processes through MHE setup and configuration would help increase the operational efficiency.

Business Partners / Stakeholders

Aligning all the business partners / stakeholders involved in the business is one of the biggest challenges in any IT systems implementation and WMS is no exception to that. And, any misalignment

(includes the business requirements) with any of the stakeholders would derail the project if not fixed as soon as it was identified. Below are the solutions to mitigate these risks;

- **Key Partners / Stakeholders** – Identifying and working closely with the key business partners / stakeholders are inevitable for the success of the project. And, the key partners / stakeholders include the representatives from the customer, operations and IT and making the collective decisions would ensure the smooth and a very successful implementation in the entire project life cycle. Some of other stakeholders involved in the project are; the product vendor, training & support and any other external partners involved.
- **Requirements** – understanding the requirements from the customer / business in detail and documenting those requirements into an acceptable WMS solution is mandatory for running the project in Green. These could be done in having customer / operations provide the Business Requirements Document / Operational Requirement Document and conducting the Design sessions with

stakeholders and then providing the Solution Design Document with the expected IT solutions.

Visibility

Providing the visibility on the project timeline and all the tasks involved in a project is crucial not just for monitoring the progress of the project but also be prepared for the consecutive activities pro-actively. The below tools help in providing the project visibility;

- **Project Timeline** – This details out the tasks involved in a WMS project and the corresponding timeline on each activity. This should be approved by the customer and any change to this by any partner would impact all the partners on the timeline of the deployment of the project or deployment cost or both.
- **Network Diagram** – This helps to easily visualize the activities and tasks involved in a project. It also displays the interdependent relationship between the activities and tasks. And, also to see the predecessors in each activity to ensure an activity is complete before proceeding to the next task.

CONCLUSION

It is so evident that Logistics and Supply Chain businesses want to implement the Warehouse Management Systems (WMS) to maximize their business potential and gain competitive advantage by providing the seamless Logistics services to their customers. At the same time, the implementation of WMS should be aligned with the recent technological developments to be able support the latest technologies.

Based on the case study conducted, the key factors that are influencing the WMS implementations are discussed and also the actions/pro-active measures taken by the businesses to ensure a very successful WMS implementation are detailed out. This research also reveals that the company is updating their WMS implementation strategy based on the corresponding technological changes to be competitive in the market.

It is clearly seen that the company is making use of the technological developments and getting benefited from it and at the same time there are some challenges hindering the organization from implementing them. Finally, as the technology evolves and impacts the current business behavior, the similar

research can be extended to understand the latest trends in WMS implementation projects at any given time.

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