A conceptual Project Based Report on "Material Handling, Storage and Packaging Challenges In LSCM"

School of Logistics and Aviation Management

Bachelor in Business Administration
(Logistics & Supply chain Management)

By

Rashida Rajabu
(B.B.A. LSCM, 6TH SEM)

Under the guidance of

Prof. Ashok Kr. Sharma
H.O.D (LSCM)
School of logistics &
Aviation Management

Prof. Avdhesh Kumar
Faculty (LSCM)
School of logistics &
Aviation Management

Certificate of Approval

The following Conceptual Project Based Report titled "Material Handling, Storage and Packaging Challenges In Logistics " is hereby approved as a certified study in Supply Chain Management carried out and presented by **Rashida Rajabu Kihengu in** a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Bachelor of Business Administration in Logistics & Supply chain Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the Conceptual Project Report only for the purpose it is submitted to the Conceptual Project based Report Examination Committee of the Galgotias University for evaluation of Conceptual Project.

	Name	Signature
Faculty Mentor	_____	_____

Chairman

(Head of the Department)

Table of Contents

Acknowledgement

First of all I would like to thank God who gives me opportunity and strength to carry out the study and my parents for the financial support throughout my study period.

I would like to extend my gratitude and regards to my guide Prof. Ashok kr. Sharma(H.O.D), Prof. Avdhesh Yadav and all other faculty members for their exemplary guidance ,cooperation and constant encouragement throughout the course of this project ,providing necessary information regarding the project and also for their support in completing the project. The help and guidance given by them I will carry along the way in the journey of my career I am about to embark

Abstract

There is a significant contribution of materials to be handled, transferred, and used; further, large logistics operations are related to transporting, storing, moving, and reloading in LSCM Industry. Thus, the research aims to investigate issues/challenges that occur beyond the site, material handling, and transportations. Accordingly, extensive literature was synthesized to identify the usage of materials in large-scale construction projects, their significance, and procedures of material handling and transportation. This study adopted a qualitative research approach by selecting a multiple case study strategy. Finally, the gathered information was analysed using computer- based content analysis and further supported by data collected through observations. The outcomes disclosed various issues in material handling and transportation with respective causes and possible solutions to minimize identified issues in large scale construction projects. Accidents, adverse weather conditions, lack of material handling equipment, lack of labours, improper packing systems, misplace and steal of materials, lack of pre-arrangements, bulk quantities, limited site area, delay in taking approvals, improper supervision and unawareness of the handling process were identified as common material handling and transportation issues. It was identified these can be mitigated by proper supervision, providing a manual to handle each material, labelling material, maintaining good communication with laborers and arranging a gate pass system. Further, recommendations for improving.

,
This study is one of the first literature reviews of publications on logistics and SCM in Africa. It presents an overarching map of the research to date and a series of propositions to inform future research of the Logistics industry makes an important contribution to the African economy.

Introduction

A successful Logistics industry is often seen as a symbol of economic success and as a sign of mastery of modern technologies.
There has been consensus that logistics as well as supply chain management is a vital research field, yet with few literature reviews on this topic. This paper sets out to propose some hot issues in the current research, through a review of related literature from the perspective of operations management. In addition, we generate some insights and future research directions in this field.

Logistics is the management of the flow of goods between the point of origin and the point of consumption in order to meet some requirements, for example, of customers or corporations. The resources managed in logistics can include physical items, such as food, materials, animals, equipment, and liquids, as well as abstract items, such as time, information, particles, and energy. The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, warehousing, and often security. The complexity of logistics can be modelled, analysed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in logistics for import and export.

As we can see, the concept of logistics focuses on the product flow, which is the meaning by which this word has been translated in Chinese. It also puts emphasis on the activities of handling product, which include the storage, transportation, distribution, and packaging and processing. Although business logistics involves many activities, the traditional research of operations management on logistics mainly relates to the fields of logistics facility, transportation, and inventory planning.
Materials handling refers to an efficient short-distance movement that usually takes place within the confines of a building such as a plant or a warehouse and between a building and transportation agency.

Dimensions of Material Handling –

- The movement aspect of materials handling involves the conveyance of good into and out of storage facilities. Efficient materials handling means efficient movement of goods to, from, and within the storage facility.
- The time dimension of material handling is concerned with readying goods for production or for customer order filling.
- . The quantity issue addresses the varying usage and delivery rate of raw, materials and finished goods, respectively. Material-handling system**s** are designed to assure that the correct quantity of product is moved to the needs of production and customers.
- Material-handling equipment consumes space in the warehouse and plant. This space in a facility is fixed, and the materials-handling system must utilize this space effectively.

Objectives of Material Handling

- Increase effective capacity of warehouse.
- Minimize aisle space.
- Reduce number of times product is handled.
- Develop effective working conditions.
- Reduce movements involving manual labour.
- Improve logistics service.
- Reduce cost.

Packaging

Is the process of designing , enclosing or protecting products for distribution, storage, sale, and use.

Containment - Product must be contained before they can be moved from one place to another. If the package breaks open, the item can be damaged or lost, or contribute to environmental pollution if it is a hazardous materials.

Protection - The contents of the package must be protected from damage or loss from outside environmental effects such as moisture, dust, insects, and contamination.

Apportionment - The output must be reduced from industrial production to a manageable, desirable consumer size that is, translating the large output of manufacturing into smaller quantities of greater use to customer.

.

Unitization - Primary packages can be unitized into secondary packages, which can then be unitized into a stretch wrapped pallet, and ultimately into a container loaded with several pallets. This reduces the number of times a product must be handled.

Convenience - Packaging allows products to be used conveniently, that is with little wasted effort by customers. (e.g., blister packs, dispensers).

Communication - Packaging allows the use of unambiguous, readily understood symbols such as a universal product code (UPC).

Background

Today's fierce competitive global markets, short product life cycles, and increased customer expectations have forced organizations to recognize the vital importance of investing and focusing on their logistics systems in terms of gaining competitive advantages (Christopher, 2005; Bramel&Simchi-Levi, 1997). Lowe (2002) defines logistics as planning, implementing, and controlling of transportation activities and storage of goods; including services with related information, from the point of origin to point of use to meet customer requirements. Jonsson and Mattsson (2005) exemplify logistics as an open system which has exchanges with its surroundings, and in order to perform these exchanges a logistics system should manage three flows; material, information and monetary. According to Harrison and Hoek (2011), material flow is the transportation of physical goods from initial source to customer, while information flow is generating data, so that material flow can be accurately controlled and planned.

The definitions of logistics involve activities that ensure the necessary material is available at the right place and at the right time. Gourdin (2001) identifies some of these activities and states that a logistics system can consist of several different functional elements, such as storage and material handling, transportation, information processing, demand forecasting, production planning, and so forth. Further, Christopher (2005) introduces a total system viewpoint, which consists of different sub-systems that shares the same goal; satisfying the needs of the next customer in the supply chain. Each sub-system; material supply, production, and distribution monitor and control the material flow by various value-adding activities.

The challenges in logistics management can be categorized under strategic, tactical and operational levels, but the centre of these challenges is the need of connecting suppliers with company's own processes, and then with customers in an efficient way. Goldsby and Introduction 2 Martichenko (2005) shed light on the importance of eliminating waste regarding to accomplish this goal. Wastes can be found in every step of the logistics activities, since most of the organizations have a natural tendency to create them. By process mapping through the supply chain, it is possible to differentiate value adding and non-value adding activities and; thereby, reduce the variation while increasing speed and magnitude of the chain (Goldsby & Martichenko, 2005; Harrison & Hoek,

2011). Further, Goldsby and Martichenko (2005) denote logistics wastes as following; inventory, transportation, space and facilities, time, packaging, administration, and knowledge. On the other hand, Harrison and Hoek (2011) focused on logistics wastes from lean point of view such as overproduction, unnecessary motion, defects etc. Despite different definitions of wastes, logisticians can draw from these approaches to design their own, tailored solutions in terms of eliminating waste through the supply chain.

The challenges in logistics share similar traits, notwithstanding the scale of the focus area, more explicitly company's internal logistics systems have alike characteristics; and therefore, alike challenges as its external logistics systems. The heart of logistics is managing inventory levels; in global supply chains the challenge is decreasing inventory levels at retailers and warehouses, while in company-scale it is lowering buffer levels by decreasing variation in the system; in any term, from customer demand to supplier delivery, and attaining a smooth, just-in-time material flow (Goldsby&Martichenko, 2005). Even though inventory management plays an important role for eliminating waste from the supply chain, half of the logistics costs are coming from transportation. Meyers (1993) emphasizes the importance of efficient Material Handling Systems (MHS) for companies. By assuring right product to the right place at the right time in the right quantity and condition, companies not only can decrease their operational costs, but also can eliminate/decrease unnecessary buffers within the shop floor. Nevertheless, material and information flow are highly intertwined in logistics, and for that reason information link is the keystone for efficient MHS (Meyers, 1993; Jonsson & Mattsson, 2005). According to Goldsby and Martichenko (2005), companies can be under a real threat, if material supply and production sections do not have an efficient communication link between each other; especially in cases of high variety in schedule changes and unexpected material shortages.

Purpose and Research Questions In background and problem formulation

Sections, several problems within companies' in house logistics systems are introduced regarding different aspects such as inventory levels, MHSs, information link, and so forth. Further MHS's dilemma between high delivery performance and low buffer levels is stated and referred as one of the biggest causes of factory inefficiency. In addition, it is argued that how to overcome this dilemma is largely neglected in MHS design literature. Hence, the purpose of this thesis is: To investigate how an in-house material handling system could be design to assure high delivery performance while maintaining low buffer levels In order to achieve this purpose, three research questions have been formed: -

RQ1.What problems and challenges affect the delivery performance and buffer levels in an in-house material handling system?

The first research question intends to investigate possible challenges and problems that are associated with in-house material handling system. Identified problems will be limited according to their impact on delivery performance and buffer levels on the shop floor.

RQ2.What material handling system concepts/features can overcome the identified problems and challenges?

The second research question is designed to elicit different material handling system concepts/features from literature that can overcome identified problems.

RQ3.Which features should be selected for an in-house material handling system to assure high delivery performance and low buffer?

The third research question aims to build a design for an in-house material handling system, in order to assure high delivery performance and low buffer levels. Features of the design will be selected among the ones mentioned under research question two.

1 **Components of the Theoretical Framework**

The theoretical framework of this thesis is divided into two main parts, and it is illustrated in Figure 2.1. In Section 2.2 before investigating MHS features and concepts, how a well-functioning MHS should operate will be defined in terms of having a clear picture of the desired target. Moreover, possible problems and challenges that can disrupt the system will be explored among relevant literature. Identified problems will be elaborated according to their direct and/or indirect impact on delivery performance and buffer levels on the shop floor.

2.2 **Problems and Challenges related to Material Handling Systems**

Tompkins et al. (1996) emphasize the importance of understanding the requirements of a MHS before coming up with different solutions to improve it. To be able to find out what can be the potential problems or which factors can cause inefficiency in an internal MHS, it is essential to know how a well-functioning internal MHS operates and what sorts of internal and external factors can have an impact on the system.

Tompkins et al. (1996) shed lights on that MHS is much more than only handling materials. It is a comprehensive concept that involves the movement, storage, control, Theoretical Framework 10 and protection of material with the aim of providing time and place utility. However, there is no unique definition that can cover all the features and activities in an internal MHS. Several researchers have been defined the concept of with the aim of providing time and place utility. However, there is no unique definition that can cover all the features and activities in an internal MHS. Several researchers have been defined the concept of internal MHS from their point of view. The following represents some of the definitions of MHS: -

- For Magad and Amos (1995) in-house MHS is the art and science of moving, storing, protecting and controlling material.

- Internal MHS is about providing the right amount of material, at the right time, at the right place and with the right method(s) (Kulwiec, 1985).

- Mattsson (2012) defines in-plant MHS as a system that has material and immaterial exchanges inside a factory where different departments and features are involved and working together to create value for the end-users. He points out that despite suppliers and customers are not involved in an in-house MHS, they do belong to the system's environment and can have huge impacts on its effectiveness.

- In Ballou's (1992) definition, in-facility MHS is a physical process of moving raw materials in small quantities over relatively short distances.

In the light of definitions above, it can be stated that internal MHS is a physical process inside of a factory between different departments with material and non-material exchanges (Stock & Lambert, 2001).

In Materials Handling Handbook, Mulcahy (1998) mentions several purposes that product transportation concepts should achieve

- To provide proper material and information flow

- To ensure possible lowest operation costs

- To ensure on-time and accurate delivery

- To minimize material damage and employee injury

- Reuse of the load-carrying surface and also material identification at any time.

In addition to that, Tompkins et al. (1996) enumerate nine factors that are essential to be fulfilled in order to eliminate material handling problems from shop floor:-

- **Right Amount:** The concept of just-in-time inventory management emphasizes the importance of holding the right amount of material both in manufacturing and distribution.

. • **Right Material:** An accurate identification system is necessary in order to pick and deliver the right material to the lines.

• **Right Condition:** The quality of the delivered material should fulfil the desired expectations without damages/defects.

• **Right Sequence:** The impact of the sequence of activities performed in a material handling operation is very evident. Therefore, it is important to move, store, protect, and control materials in the right sequence.

• **Right Orientation:** Physical orientation of materials represents a significant portion of people's activities both in manufacturing and distribution. Therefore, regaining the orientation of material will save valuable time.

• **Right Place:** The necessary material should be delivered at the point of use which can save undesired movements.

• **Right Time:** The need for the material handling system to move, store, protect, and control materials at the right time is increasingly important due to time-based competition.

• **Right Cost:** Right cost does not necessarily mean that a firm should decrease the cost of MHS. On the contrary, the system should be designed with competitive advantages, so it can be a revenue enhancer rather than a cost contributor.

• **Right Methods:** To perform all the mentioned points above in a right way, it is necessary to use the right methods. Hassan (2006) denotes that without a well-designed MHS production could encounter delays, production time and

cost could increase owing to unnecessary movement of products within the facility, and also products could get damaged or contaminated. On the other hand, a well-designed MHS would improve manufacturing and logistics operations, enhance delivery performance and quality on the shop floor, and also reduce work-in-progress inventories.

Possible Problems and Challenges related to Material Handling Systems

Labour Costs

In general, hundreds and thousands tons of materials are handled daily requiring the use of large amount of manpower while the movement of materials takes place from one processing area to another or from one department to another department of the plant. The forklift operator accounts for 96% of the operating cost over the vehicle life. Whereas, with an automated tugger solution replacing manned forklift travel, the vehicle can operate for approximately $3 per hour, 24/7. Moreover, high turnover rates results in expensive training regimen as operators come and go. The cost of material handling contributes significantly to the total cost of manufacturing. In the modern era of competition, this has acquired greater importance due to growing need for reducing the manufacturing cost. The importance of material handling function is greater in those industries where the ratio of handling cost to the processing cost is large. Today, material handling is rightly considered as one of the most potentially lucrative areas for reduction of costs. Almost every item of physical commerce is transported on a conveyor or lift truck or other type of material handling equipment in manufacturing plants, warehouses, and detail stores. These operators use material handling equipment to transport various goods in a variety of industrial settings including moving construction materials around building sites or moving goods onto ships. There is a shortfall of skilled labour to perform manual material handling. Companies are facing the challenge of solving truck driver shortage. High labour wages (in part due to low availability of labour) and medical costs add to skyrocketing costs of labour.

Material Management

When manufacturers don’t have full visibility to their inventory, they face the problems of either running out of stock at the wrong time or carrying too much stock and thus decreasing cash flow while increasing expenses to warehouse extra materials. Inventory shortage can lead to unfulfilled orders and unhappy

customers. Figuring out where to store inventory to meet demand quickly — while staying within profitability margins — is a growing challenge as the retail marketplace struggles to balance online and in-store sales channels. Today, fifty percent of manufacturing expenses are tied up in materials, reinforcing the critical nature of efficient materials movement and management.

Productivity

Lower unemployment rate coupled with ever-higher hourly compensation makes it difficult for materials handling executives to retain best workers. Variable labour is a cause of concern in manufacturing as well as distribution facilities, which operate on extremely thin margins. 25% annual personnel turnover in warehousing and distribution has a negative impact on productivity.

Safety

Forklifts cause about 85 fatal accidents per year; 34,900 accidents result in serious injury; and 61,800 are classified as non-serious. Fatal forklift accident causes and where they occur: Implementing a forklift safety program and effective training can prevent many of these accidents. Training can also prevent or reduce the severity of an accident related to the stability of a lift truck traveling with an elevated load.

Downtime

Downtime due to equipment damage can have devastating result. There are numerous costs associated with downtime. These not only include upfront and visible costs, but also hidden costs, such as overtime, loss of revenue, emergency service calls. Machinery that continuously breaks down has an extremely negative impact on the business. New survey of auto industry manufacturing executives shows stopped production costs an average $22,000 per minute. Manufacturers say they need better machine maintenance. While one minute of stopped production, or downtime, costs an average of $22,000, some survey respondents cite the figure to be as high as $50,000 per minute.

With such high costs at stake, keeping production machinery operating smoothly is critical to a factory's bottom line. Ensuring that all the machines are regularly serviced is an effective tool in preventing downtime. For most manufacturers down time is the single largest source of lost production time. It can be triggered due to material issues, a shortage of operators, or unscheduled maintenance.

Problems/Challenges	References
Delivery Precision - by eliminating unnecessary movements of products within the facility, products can be delivered at the right time, at the right place and in the right sequence - insufficient MH would cause production delays and increase production times	Mulhacy (1998), Hassan (2006), and Tompkins et al. (1996)
Inventory Levels - Holding the right amount of material both in manufacturing and distribution - Just-in-time inventory management - Decreased work-in-progress material	Hassan (2006) and Tompkins et al. (1996)
Operation Costs - to ensure possibly lowest operation costs the system should be designed in a way that it can enhance revenue rather than be a cost contributor	Mulhacy (1998), Hassan (2006), and Tompkins et al. (1996)
Delivery Quality - quality on the shop floor can be achieved by receiving right material, in right condition, and with right methods	Hassan (2006) and Tompkins et al. (1996)
Information Flow - providing proper material and information flow - accurate material identification systems - real time information	Mulhacy (1998)

Safety - minimize employee injury - Protect products from getting damaged or being contaminated	Mulhacy (1998) and Hassan (2006)

Several problems and challenges that are related to MHS are summarized according to different categories in the table above. Even though balancing between high delivery performance and low buffer levels is the main challenge of MHSs, other categories— operation costs, delivery quality, information flow and safety— are considered also in terms of their impact on overall MHS's efficiency.

Research Approach

In order to achieve higher reliability during the research process, a combination of qualitative and quantitative research methods have been used (Marcoulides, 1998). Bryman (2007) defines quantitative research as a distinctive research strategy that emphasizes quantification in the collection and analysis of data. In addition, Kothari (2004) mentions that quantitative method is mainly based on numbers and measurements. On the other hand, qualitative method explained as qualitative phenomenon related to quality and type, and this approach examines why and how questions instead of what, where and when questions. Näslund (2002) points out content analysis, structured observations, questionnaires and surveys as methods used in quantitative approach while interviews, documentary analysis, unstructured observation can be pointed out as methods used in qualitative approach.

Research Method

In order to provide a deeper knowledge about the problems and challenges in the current in-house MHS and also to be able to suggest suitable solutions for the arisen issues a case study was conducted in this research

Case Study

Case study was chosen upon two main reasons; firstly, to investigate the possible problems and challenges related to MHSs .

Conclusion

The core element in an effective and efficient MHS was pointed out as real-time information sharing. The latter fact enables companies to rapidly react to different requests and changes and thereby, to obtain increased delivery performance and decreased buffer levels. It was also clearly argued that by integrating information technology with production processes many undesirable material handling activities could be easily avoided, in addition, the companies would be able to attain increased space efficiency on the production/assembly area and decreased work in process**.**

Another vital element in developing a new MHS was pointed out as interaction between the new system and its surroundings, particularly, the interaction between the system and people, who are utilizing and operating the system. Therefore, employee involvement and employee training was mentioned as a key component for achieving an effective and efficient MHS. Organizations already have been realized that without employee involvement the success of any system implementation is almost near to zero. However, these needs and contributions should be addressed and defined in earlier stages in order to attain the best outcome of the developed system.

Companies should focus on and implement a MHS that is cost effective and is able to function at the present time without any obstacle and failure.

References

Bititci, U. S. & Carrie, A. S. (1990), Information material flow mapping, Logistics Information Management, Vol. 3 (1), 31 – 36**.**

Brodie, D. M. (2005). Reducing the risk of manual materials handling. Occupational Hazards. 67 (6)

Beason, M. (1999). Here is a new material handling solution. Textile Word . 149 (2), 61-63