



# A review on characteristics of warehouse (hubs) management and basic analysis on warehouses operating in chennai city

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## Abstract

Warehouse (Hubs) Management represents one of the key elements of logistics that stores goods between the point of manufacture or production and the spot of consumption in order to confer a never ending flow of goods. It plays a crucial part in the supply chain of an organization to stock up products effectively in Material Management practices. The potential of Warehouse (Hubs) has received much attention, recently, and considered to be an increasing and novel approach among the best performing organizations. Warehousing operation is vital as it serves as the hub, where nodes are linked to their respective spokes.

An effective strategy adopted in the Warehouse (Hubs) enables to enhance and to satisfy the customer genuine needs as demonstrated earlier. Hence, in the present study, we investigate the level of warehousing characteristics or attributes associated with supply chain Warehouse (Hubs) efficacy, among the selected employees of logistic sectors and Warehouse (Hubs) management firms, functioning in Chennai city, with a sample size of 417 respondents, using descriptive statistics. Results showed that there was a significant positive correlation was observed with moderate frequency of 35.4% followed by high frequency 30.7% respectively among examined respondents and elucidated their intention and a quest for sustained or continuous effective Warehouse (Hubs) management measures, to improve and target the unique demands of the customers.

The outcomes of the descriptive analysis showed that, obtained mean values as above 3 ( $3 <$ ) indexed clearly that looking for hub and spoke model strategy that ensured adoption of safety parameters with a higher standard deviation (1.169). The low standard deviation indicates the low possibility and our findings shown to be higher opportunities for integration of efficient Warehouse (Hubs) management. Study inferred that effective and continuous Warehouse (Hubs) management confers a promising platform for enhanced data management cost optimization, forecasting of demands, in the light of value added approaches in supply chain management of examined Warehouse (Hubs) sectors.

*Keywords:* Warehouse (Hubs) operation, Supply chain management, Hub and spoke, Safety parameters, Logistic management.

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## 1. Introduction

In the literature, the dimensions of Warehouse (Hubs) management have not yet been explored. Based on the above literature and interviews with experts, we propose to broadly define Warehouse (Hubs) management as a combination of the planning and control systems and the decision rules used for inbound, storage, and outbound flows. We now consider each aspect in more detail [2]. "Warehouse (Hubs)" represents the set of events including accepting, storing and making them ready for reshipment. It is distinguishable with a mere storage facility and it functions as a hub for varied related attributes such as detection, holding and harmonizing interventions, and promising accessibility to achieve the demands. Warehouse (Hubs) ensure commodities are ready for re-shipment to avoid distress on the sustained flow of goods. Requirement of raw materials is considered to be a significant factor for a quality production. Prior to using the raw materials for finished end products, it absolutely requires care and safety with utmost level to avoid unwanted happenings, such as thefts and damages. Inevitably, it is a crucial approach to the organizations to maintain a safety, effective Warehouse (Hubs) with remarkable material management practices [7].

In the supply chain of an organization, Warehouse (Hubs) contributes and plays a significant role in a major section of the logistic business, specifically for storage of goods. Indeed, all produced products are impossible to deliver or reach the customer at a time. Hence, Warehouse (Hubs) offers adequate time and place for using raw materials, partially completed and finished products up to delivery. Within this stipulated tenure, organization may catalyze or facilitate the best lead times, analyze cost-effective logistics and enhanced competency benefits. During the flow of goods in every step on the partial finished materials are being measured and confer value added. This kind of instrumental phenomenon towards finished materials leads to categorization. Based on this, Warehouse (Hubs) is grouped as production Warehouse (Hubs) s, distribution ventures and so on, in accordance with the demand of the customer and requirement of distribution of the finished products. Hence, it is argued that operation of Warehouse (Hubs) s is not associated with a single factor, and could be considered as an aggregated hub or niche for numerous spokes linked factors, involved in supply chain management practices. The technological integration is the key area where future research could be carried forward with respect to integration and innovation of technology. The integration of technology is a revolution which is having a greater impact in our day today lives. The Technological integration in the process of warehouse management further smoothen the process with the help of RFID, GPS, and other tracking technologies. The research study is focused upon the set by step framework of the warehouse operation along with its work flow. Hence by the technological integration into the process will eventually improve the time efficiency and error reduction which will lead to cost reduction. This is not the only solution in order to reduce cost but definitely one of the key solutions in achieving lower cost.

## 2. Operations of warehouse (HUBS)

The operation of Warehouse (Hubs) Management constitutes, accepting goods as raw materials or partially finished products or finished goods in good condition for extending storage and a place for certain replacement happenings, for carrying out proper distribution. In the purview of storage, it can be subdivided such as sorting, packaging, and customizing and so on based on various operations. It is noteworthy that Warehouse (Hubs) operation needs varied interlinked approaches such as Safety Standard Operation (SSO) Delivery center operation and etc. to increase their potential up to the optimum. "The receiving activity includes the unloading of products from the transport carrier, updating the inventory record, inspection to find if there is any quantity or quality inconsistency. Transfer and put away involves the transfer of incoming products to storage locations. It may also include repackaging (e.g. full pallets to cases, or standardized bins), and physical movements (from

the receiving docks to different functional areas, between these areas, from these areas to the shipping docks).

The order picking/selection is the major activity in most Warehouse (Hubs) s. It involves the process of obtaining a right amount of the right products for a set of customer orders. The accumulation/serration of picked orders into individual (customer) orders is a necessary activity if the orders have been picked in batches. In such a case the picked units have to be grouped by customer order, upon completion of the pick process.” [8] Hence, efficacy of Warehouse (Hubs) management is directly correlated with different kinds of determinants in supply chain management. The contribution of Logistics Operation, in the Material Management that involved certain activities at a due course of Warehouse (Hubs) excellent management is significant. Every goods transaction is positively associated with efficient material handlings of the Warehouse (Hubs) as reported early. Using innovative technologies such as Automation, computer programming packages in material handling are indicators of enrichment of accuracy, data processing and value added mechanism. (<https://www.researchgate.net/figure/company-supply-chain-network-fig.4-263735704>).

Currently, the majority of the supply chain companies are posing major constraints such as lacking more expert methodologies than recently embracing assignment in arranging and elevating Warehouse (Hubs) assignments [9]. These adverse attributes affect supply chain activities and in turn, performance of the company. In certain circumstances, performance is a vital criterion to perpetuate success in the market [5]. Hence, it is mandatory to resolve warehousing challenges and improve the efficiency factors. Increased efficiency contributes a positive attitude in supply chain performance. Several earlier investigations appeared in the literature on supply chain warehousing. However, a very limited study on Warehouse (Hubs) efficiency assessment among employees of the Warehouse (Hubs) and logistic firms. Therefore, in the present manuscript, an evaluation of effective management of Warehouse (Hubs) s, Logistics Firms functioning around Chennai city, was attempted.

### 3. Significance of warehouse (HUBS)

“Warehouse (Hubs) s apparently form an important part of a firm’s logistics system. They are commonly used for storing or buffering products (raw materials, goods-in-process, finished products) at and between points of origin and points of consumption. The term ‘Warehouse (Hubs)’ is used if the main function is buffering and storage. If additionally distribution is a main function, the term ‘distribution centre’ is commonly used, whereas ‘transshipment’, ‘cross-dock’, or ‘platform’ centre are often used if storage hardly plays a role.” [8] Prior to entering into the analytical interventions, it is crucial to elucidate the significance of Warehouse (Hubs) management that includes getting orders, manipulating or devising or modulating the goods to achieve desirable output and targeting demand of the customer willingness. These would fluctuate, from time to time during the operation. Day to day materials would be customized, systematically, according to the customer’s wishes in the Warehouse (Hubs). This technique neglects unnecessary wastes, minimizing the rework process or repetition, material misplacement and accessing top grade inventory. These quality indicators enable the operation successfully, within a limit and scale, for maintaining superior quality.

The subdivisions of the storage process, such as sorting, organizing and interpreting the data would ensure the detecting and tracking of a specific product in materials management. However, several organizations pose a major challenge, such as lengthening cost of Warehouse (Hubs) maintenance, since a mountain of evidence has elucidated that increasing cost of maintenance has shown to be closely associated with optimum quality.

Recently, Warehouse (Hubs) managements have been well equipped with varied advanced technological domains. Automation has been enhanced by using Robotic technology and is used in sensitive materials handling, integrating radio frequency identification (RFID) to curtail the errors. Similarly, Programming Data Management of materials in Warehouse (Hubs) s is tackled by using material

resource planning as well as planning and enterprise resource planning tools, which help to monitor, on time replenishment events with high quality. Another measure, such as QR code and wireless devices, is attributed added benefits. Although it is to note that maintaining a flexible strategy to face futuristic modifications would suddenly emerge in the due course of tenure. However, the complexity may prevail in overlapping the process that may occur in the Warehouse (Hubs) operations often, resulting in excess time, energy and cost that should be given top priority to avoid.

#### 4. Research methodology

“The first stage consisted in defining the scope of the research and elaborating a framework based on a systematic review of the literature. This framework was constructed starting from the initial bibliographic research. The second stage refers to data collection, corresponding to the study of articles published on Warehouse (Hubs) design listed in the Science Direct database, considering indexed articles in the areas of: business management; decision sciences; and materials science”. [1].

In the present study a well-designed questionnaire was prepared and a survey was undertaken to examine the efficiency of Warehouse (Hubs) functioning around Chennai city, using opinions of the supply chain firm working personnel and logistic company staff members under three varied categories. By using random sampling procedures, 427 respondents were distributed for the determination of opinions, and recollected with appropriate information. The employee data of the company was kept confidential and respondents were chosen on random sampling basis. This survey was finished within 3 months duration. The response rate was found to be as follows:

<b>Total distributed</b>	457
<b>Returned</b>	430
<b>Invalid</b>	3
<b>Valid</b>	427

#### 5. Warehouse process efficiency

One of the most important aspects of material flow efficiency in the supply network is warehousing operations. The specificity of warehousing procedures would have to focus on such aspects, which have a massive effect on the flow of material continuity all through the distribution chain. Many aspects - procedures and materials - that affect the entire warehousing operation could be found in research studies of logistics activities. As a consequence, it is evident that warehouse management must concentrate on initiatives to enhance process efficiency, both internally and externally, as well as continual assessment of results.

The researchers have evaluated the effectiveness of the warehouse procedure, taking into consideration the multi-dimensional assessment of the interconnections within the process, and also interconnections with other influencing factors like the consistency of flow of material, as recognized by the research question noted by the researchers during the research literature and findings in enterprises [? ].

In terms of economics, effectiveness is the result of a company’s activity expressed as a percentage of the accomplished impact divided by total spending:

$$E_f = \frac{e_f}{s_p} \quad (1)$$

*key : E<sub>f</sub> – efficiency; e<sub>f</sub> – effects; s<sub>p</sub>–spending*

A number of management techniques are used to enhance warehouse efficiency that adds to the complexities of warehouse operations. We can differentiate a few methods to increase activity efficiency

based on model (1): reducing spending while maintaining the level of impacts, reducing spending while improving the level of impacts, preserving the level of spending while improving the level of effects, increasing the level of spending while improving the level of effects dramatically, and raising the level of spending while improving the level of effects dramatically.

Warehouse efficiency is a critical issue in terms of how an industry's and supply chain's procedures are organized. Enhancing the productivity of a warehousing process is thus a critical component of control operations. On the value stream product of the warehousing operations chain, the efficiency analysis procedure uses Value Stream Mapping tools.

The basis of product value analysis for  $m$  values that make up a set of dependent variables is multifunctional. A collection of values  $V_n$  at the end of the supply chain is determined by the outcomes of component operations  $D_k$  in the warehouse operations chain (efficient utilization of space, machinery, and labor), such as warehouse punctuality and comprehensiveness, warehousing quality and reliability, precise order picking and ability to handle, and etc.

$$V_{m=1}^M(m) = f[B_{k=1}^K(k)] \quad (2)$$

## 6. Analysis and findings

At first, perspectives of Warehouse (Hubs) operation are essential for proper maintenance among total respondents of 427, results showed that 35.4% of respondents have shown positive orientation towards effective Warehouse (Hubs) management. Whereas 30.7% respondents exhibited high positive correlation with effectiveness of the functioning Warehouse (Hubs). Moreover 34.0% of the respondents answered low perception with respect to the effectiveness.

Table 1: The Perception on efficiency with respect to warehouse (Hubs) management among the respondents working in warehouses (Hubs), Chennai City.

Construct variable	Frequency of Respondents	Percentage
Low	145	34.0
Moderate	151	35.4
High	131	30.7
Total	427	100

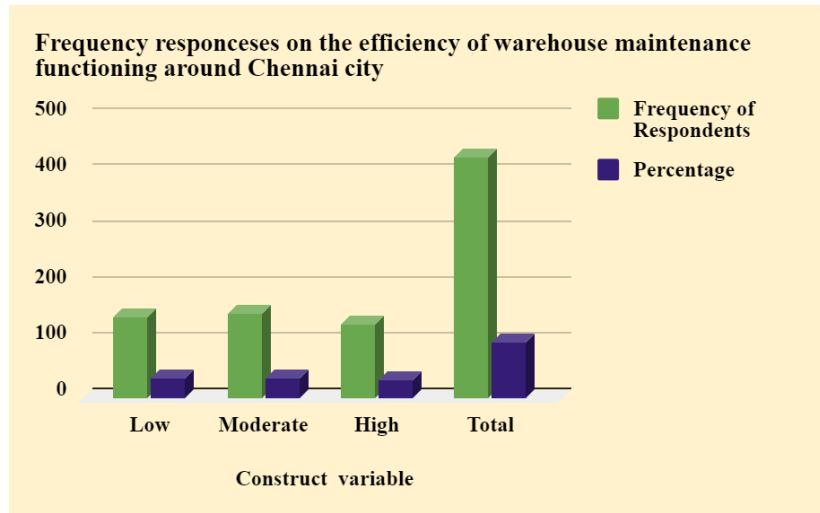


Figure 1: Frequency of responses on the efficiency of warehouse maintenance

Table 2: Total Warehouse (Hubs) Descriptive statistics (Mean & SD)

	Mean	Std. Deviation
Hub and spoke model ensures centralization of operations	3.26	1.185
Hub and Spoke model leads to effective inventory management	3.37	1.113
In Hub and Spoke model SOPs are easily followed	3.33	1.169
Hub and Spoke model ensures implementation of safety parameters	3.40	1.169
Hub and Spoke model reduces warehousing related problems	3.18	1.233
Hub and Spoke model involves use of analytical tools	3.30	1.170
Hub and Spoke model helps in effective network analysis	3.30	1.215
Hub and Spoke model ensures accumulation of authentic data	3.38	1.095
Hub and Spoke model enables use of extensions with fixed hub locations	3.34	1.218
Hub and Spoke model enables efficient recycling/reusing of waste	3.26	1.237

Results showed that responses from examined respondents indicated Mean value as above 3, indexed for looking at more effective maintenance of Warehouse (Hubs) s rather present. Outcome of our result depicted that the value above 3 falls on all variables and hub and spoke model implementation with safety measures approach was preferred by maximum frequency. The values of SD are denoting low possibility of deviation and higher opportunities for integrating efficient management.

### 7. Discussion

Our questionnaire examined the unique characteristics of Hub and Spoke model strategy adopted in Warehouse (Hubs) s with their highlights and characteristics, such as centralization of operation, effective inventory management, easy handling of SOPs regulations, safety parameters, reduction of warehousing associated issues, applications of analytical tools network advantages data authenticity, fixed hub locations and recycling ,waste in Warehouse (Hubs) were included to assess the responses of the selected respondents. The outcome of the analysis revealed that the majority of the responses fall on Hub and Spoke model strategy with effective implementation of safety components followed by Accumulation of data with authenticity, with a mean value of 3.40 SD ± 1.169 and 3.38, SD ± 1.095 respectively.

“A study has demonstrated that, while establishing a Warehouse (Hubs), a characteristic profiling, baseline, benchmark, computerization and advanced automation devices are considerable indicators

for efficiency of operating and maintaining effective Warehouse (Hubs). In our findings, functioning Warehouse (Hubs) s have been well equipped with such indicators and yielded desirable effects on the profit of the organization” [3].

“Study outcomes were evident or can be a reference for appreciating the unique features of Hub and spoke strategy in Warehouse (Hubs) management practices. 65% of respondents preferred and accepted the technological innovation and adaptability of the accuracy, while top priority goes for safety measures by the respondents. Previous study results were shown to be close agreement with our findings” [4]. Discussed characteristics of efficient Warehouse (Hubs) maintenance, reflected moderately in the examined Warehouse (Hubs).

## 8. Conclusion

As an impact of large product varieties and shortened customer response times there is a greater emphasis on the ability of the organizations to establish smooth and efficient logistics operations. In this regard, Warehouse (Hubs) plays a vital role because they function as nodes that direct the flow of materials within a distribution network. The effects of organizing warehousing activities can directly be seen in customer service levels, lead times, and the cost structure of a company. Hence we can conclude that warehousing influences the performance of an entire supply chain [6]. In the competency environment, Warehouse (Hubs) management is inevitably part of the logistic sector. Our, well executed study suggested that effective maintenance of Warehouse (Hubs) s, inherently, appreciated and accepted the innovative technologies by the most of the respondents of selected organizations tested. It has been concluded that effective warehousing management is being operated, in examined organizations, will positively impact on the supply chain process and increased cost optimization and forecasting of demand in the light of successful logistic ventures.

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