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Grouping of Parts in a Parts Logistics Centre

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Abstract

Identifying and categorizing the parts based on the demand was a difficult one in many organization. In this paper the appropriate technique was proposed to solve above mentioned problem in the organization. From this technique it is easier to group the part based on its demand. In the present scenario inventories are normally presented in the production plant. So for, nowadays every organization needs a new technique to group the parts based on its demand, from which we can easily group the parts according to its demand period such as high demand, medium demand, low demand, the process of categories the parts has necessitated in the each and every organization to tackle the competitive environments across the world. The main objective of this paper is to reduce the inventory in the organization in terms of increasing the profitability of the organization.

Keywords: Inventory Management, Pareto Analysis, Parts Logistics Centre, HML Analysis.

1. Introduction

In present industrial scenario logistics management and inventory management are the most effective areas that has to be considered for growth. The idea of grouping the similar parts with the help of the HML grouping analysis technique. Products are segregated in the part logistics center and are transported in lot size as required by the assembly plant [1]. A Parts Logistics Centre (PLC) is a key part of the supply chain and primarily aims to control the movement and storage of materials within an area and process the associated transactions, including shipping, receiving, put away and picking. The PLC plays an key part in the supply chain management by storing the

parts and moving it according the demand in the plant. The systems also directs and optimize stock put away based on real-time information about the status of bin utilization [2]. The typical PLC Layout is given in the fig 1 :

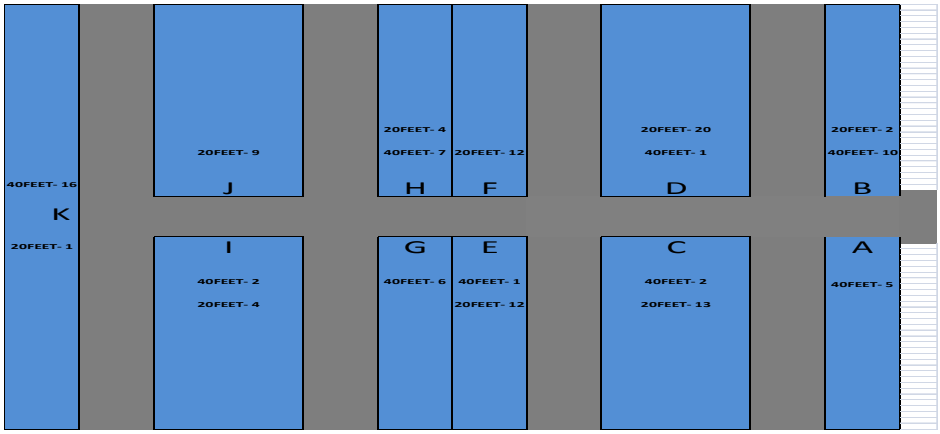

Fig. 1: A PLC Layout.

It involves the physical infrastructure, tracking systems, and communication between product stations. More precisely, PLC involves the receipt, storage and movement of goods, (normally finished goods), to intermediate storage locations or to a final customer. In the multi-echelon model for distribution, there may be multiple levels of PLC's. Despite of its benefits, Grouping of Parts has a drawback. It increases the lead time and consequently, deteriorates customer services and also this may not be possible practically in the industries which have a large scale warehouses. The grouping together of parts or products into families by processing operations so that all members of a family are processed in a miniature factory called a cell [3]. The logical arrangement and sequence of all fact of company operation in order to bring the benefits of mass production to high variety, mixed quantity production.

2. Literature Review

The references to the different approaches to the inventory classification which are available in the literature.

Investigate the warehouse order picking performance by sequence optimization. Routing heuristics for line sequencing in order picking batches are well researched, documented and implemented in today's warehouse management system. Nevertheless, in practice, where routing heuristics could hardly be applied, conditions in storage areas do exist. For such cases, the paper proposes the using of an optimization routine an alternative. Based on a digitized network, the Line Sequencing Optimization (LSO) calculates the line sequence with the minimum travel time. Thus the LSO is planned to be integrated as a supplementary functionality into an existing WMS of a supplier, and this functionality will enhance the supplier's product offer to the market [4].

The worst case burstiness increase due to FIFO multiplexing. Considering a FIFO multiplexer fed by flows that are individually constrained by arrival curves, and look for the best possible arrival curve for every output flow. This problem arises in scenarios where aggregate multiplexing is performed, such as differentiated services or front ends to optical switches. We obtain an exact result for a fluid model and for piecewise linear concave arrival curves, which are common in practice and correspond to combinations of leaky buckets. Finally they have analyzed the impact of FIFO multiplexing in the case where the arrival curve constraints for the input flows are concave piecewise linear functions [5].

The evaluation of supply chain performance using delivery-time performance analysis chart approach. This uses lead time, delivery window and delivery performance chart (DPC) to measure the delivery performance of every stage in a serial supply chain. Lead time is an important delivery performance metric for organizations. Thus finally a case study which is related to the supply chain is presented to demonstrate how the proposed approach can be employed to evaluate delivery performance for further reduction of lead time variability [6].

Current problem also depicts the importance of inventory management where the main goal is to group the parts present in the container located in PLC to find the priority level of parts in PLC.

3. Methodology

The methodology is described as a flow chart as shown in Fig. 2.

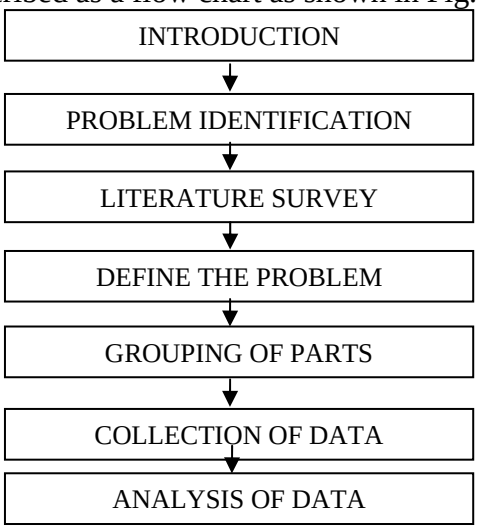

Fig. 2: Methodology.

The first step in any methodological procedure is the problem identification where, the problem is first identified. And the next step is to study the previous literatures related to the problem in order to gain knowledge about the problem. After analyzing the problem, has to be defined exactly and the area at which the problem occurred. The

next step which involves the collection of data's where the necessary details which is required are collected so that it would be easier to analyze the problem with the help of the collected data's. After analyzing the parts are grouped according to the part family classification.

HML analysis

Items are classified into three groups labeled as High – Medium – Low. The HML analysis is very similar to the ABC Analysis, the difference being instead of usage value, the price criterion is used. It helps to assess the security requirements and the type of storage for high priced items. For example, expensive ball bearings can be kept under lock and key in a cupboard. The frequency of stock checking is decided on the basis of the cost item . In other words, more expensive the items, more frequent will be its stock-checking. A control on purchases and buying policies can be exercised by the organization. This means H and M items will not be ordered in excess of the required minimum quantity. However, in the case of L items, they may be purchased in bulk in order to avail the benefits of bulk purchase.

4. Data Collection

The Data's which are required for the grouping of the parts in the PLC are collected and the grouping is done by the pareto analysis.

5. Pareto Anlaysis

It is the principle, named after economist Vilfredo Pareto that specifies an unequal relationship between inputs and outputs. The principle states that, for many phenomena, 20% of invested input is responsible for 80% of the results obtained. Put another way, 80% of consequences stem from 20% of the causes. It is also referred as the "Pareto rule" or "80/20 rule".

5.1 Pareto Analysis for Container Number WCIU9930833

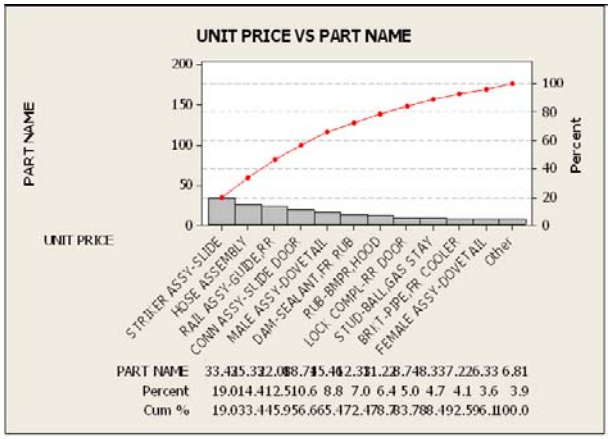

Fig. 3: Representation of Unit Price Vs Parts Name.

From the fig 3, it is clearly evident that the part name Striker Assembly slide has the highest proportion of usage on this container. So this has to be concentrated first for the inventory management.

5.2 Pareto Analysis for Container Number Fciu8755678

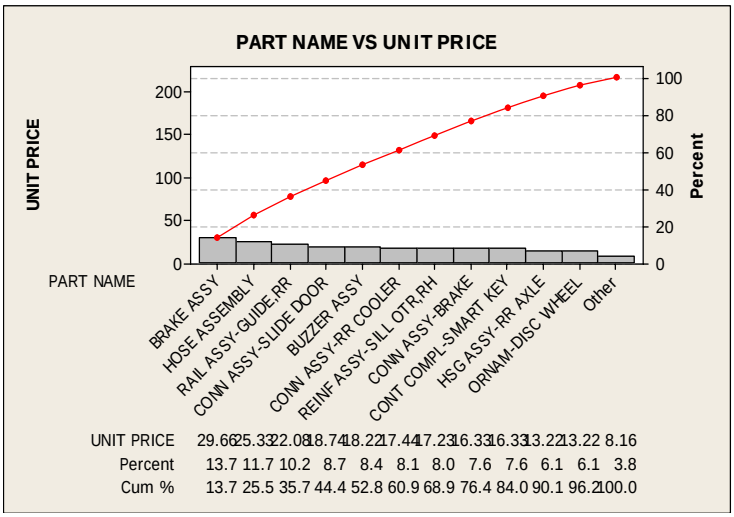

Fig. 4: Representation of Unit Price Vs Parts Name.

A detailed Pareto analysis was done for the next container as well. The container number is FCIU8755678.It is noticed that Brake assembly and Hose assembly constitutes larger percentage, which needs to manage as topmost priority as shown in the Fig. 4.

5.3 Pareto Analysis for Container Number--MOAU0309451

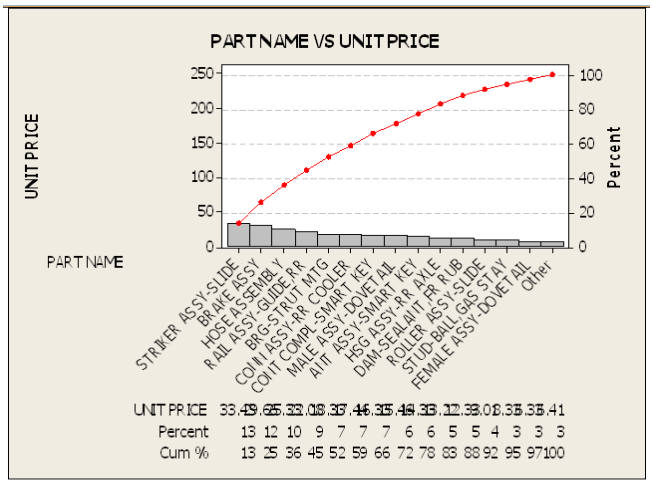

Fig. 5: Representation of Unit Price Vs Parts Name.

Fig. 5 clearly indicates that Striker Assembly slide and brake assembly hold the maximum percentage from the Pareto analysis. They are needed to be grouped first.Thus the Pareto Analysis is a powerful decision-making criterion, which has been used in quality improvement problems like the classification of inventory items. It was derived by Vilfredo Pareto, an economist and sociologist. A Pareto chart is a graphical representation that displays data in the order of priority. In this Analysis, the data are collected over a specified time period and the results are displayed in a bar chart. The Pareto analysis is performed using Minitab software based on the descending order.

6. Results and Discussion

The Pareto Analysis is the key to categorize parts under HML analysis. The classification done in the each container are under three classes for all the product variety belonging to the container. Under the container number WCIU9930833; it is noticed that parts such as the Hose assembly, striker assy-slide, Rail assy are classified under HIGH class of container. This needs more concentration and inventory control has to be done so as to reduce the consumption value. Under the same container, it is also classified into MEDIUM and LOW CLASS, which needs lesser control compared to the HIGH CLASS. Similar classification is done for other two containers, which are discussed in the above table. This gives a clear image about the parts inventory that needs control, so as to realize profits to the industry which is financial crunch.

7. Conclusion

Thus the parts which are present inside the container are grouped by the HML classification technique and it is according to the grouping in which they are classified. The Pareto Analysis is thus the key to categorize parts under HML analysis. During the classification in the each container it is noticed that under the container number WCIU9930833, the parts such as the Hose assembly, striker assy-slide, Rail assy are classified under HIGH class of container. This needs more concentration and inventory control has to be done so as to reduce the consumption value. Under the same container, parts are classified into MEDIUM and LOW CLASS, which needs lesser control compared to the HIGH CLASS. Similar classification are done for other two containers, which are discussed in the table. This gives a clear image about the parts inventory that needs control, so as to realize profits to the industry which is financial crunch.

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