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A Cost-Benefit Analysis of Material Handling on the Productivity of Food and Beverage Manufacturing Industries

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Abstract- Food and Beverage manufacturing companies face challenges today due to their high competitiveness, poor working conditions, and more stringent regulations. Growing demand for high quality products and frequent changes in the variety of products by the consumers had an impact on the viability of the food and beverages manufacturing sector. Working conditions for many food and beverages operatives are difficult, as it requires large number of labours for handling. In the present scenario, the production cost increases due to the handling of material from one place to another inside the factory by using the unskilled labour. Due to shortage of labour majority of the manufacturing industries are facing problem and there is a drastic reduction in total output and not achieving the required target is a common weakness In most of the small scale food and beverage manufacturing companies manual handling is adopted to transfer the raw material from one place to other, transfer of semi- finished material from one equipment to other and finally transfer the final finished products to the packing section and storage division. In all these stages movement of material takes place with help of semi-skilled workers. Because of this required quality is not achieved. Finally cost of the product increases, which they are not in a position to match the competitive market. One of the major reasons for slow growth of the Indian Economy is the improper handling of materials and unnecessary costs incurred. This research paper focuses on the benefits of utilising the material handling system with properly planed plant layout and automation, there is a drastic reduction labour cost and it avoids the damage caused by manual movement of material, which results in better- quality product with less cost of production. Good handling system also improve inventory control, less fatigue of workers, greater industrial safety with less accident potential and disruption of work, improved morale of workers.

Index Terms- Material Handling, cost-benefit analysis

I. INTRODUCTION

Productivity is the ratio of output to inputs. Productivity is the measure of the efficiency of the system and looks at the economies achieved during the process. In a manufacturing Industry, the layout and material flow in the shop floor decides its productivity. Material handlings system play a key role in influencing productivity, throughput time and product cost. Material handling is the integral part of production and operations management. It is defined as movement, storage, control and protection of materials, goods, and products throughout the process of manufacturing, distribution, consumption and disposal.

In the present scenario, the production cost of industries increases due to the handling of material from one place another inside the factory by using the unskilled labour. Due to shortage of labour majority of the manufacturing industries are facing problem and there is drastic reduction in total output and not achieving the required target. Finally cost of the product increases, which they are not in a position to match the Global market. By utilising the material handling system with planed plant layout and automation, there is drastic reduction labour cost , avoid the damage caused by manual movement of material, which result in better quality output product with less cost of production. Good handling system also improve inventory control, less fatigue of workers, greater industrial safety and elimination of accident potential and disruption of work, improved morale of workers.

Concept of material handling means, adopting a material handling systems from overall optimization point of view. While selecting material handling system one must be see whether it is profitable for the industry. The amount of return on investment must justify the proposed handling system. A

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detailed cost benefit analysis has to be carried out before the choice of material handling equipment's.

II. REVIEW OF LITERATURE

The review of literature consists of previous journal articles, books, scientific, papers, and reports. Researchers has to mention in his review about findings of each study, recommendations written by various authors relevant to his present research.

Present topic of research related to the productivity improvement by adopting material handling in foods and beverages manufacturing companies and analysing cost benefit analysis.

The purpose of the review is as below –

- To study and understand the background knowledge of the research topic.
- To study and identify the potential relationship between the research topic with various literature and formulate the hypothesis.
- To understand what research study of various authors made and to find out what is further scope of contribution in the selected research topic
- To find out appropriate research methodology, research design, data collection and analysis.
- To find out the appropriate research methodology, research design, data collection and analysis.
- TO find out the gaps in the earlier studies.

To fulfil the above-mentioned purposes the available literature on the research topic related to the purpose of the study is classified as below-

- Literature review on productivity improving.
- Literature review on material handling selection
- Literature review on food and beverages manufacturing companies.
- Literature review on cost-benefit analysis

Objectives

Hence, the main objectives of this study are to find out:-

- To Study the effect of material handling systems on the productivity of Food and beverage manufacturing companies.
- To evaluate the Cost-benefit analysis – Economical aspects of the selection of material handling systems
- To identify the right type of material handling system for the food

Hypothesis

The Study is based on the following Hypothesis:-

- **H 0 1** - There is no significant effect of the material handling system's role on Improving the productivity of manufacturing companies.
- **H a 1** -There is a significant effect of the material handling system's role on improving the Productivity of manufacturing companies.
- **H 0 2** - Installing a material handling system does not have a significant impact in Terms of cost-benefit to the manufacturing companies
- **H a two** - Installing material handling system has a significant impact in terms of cost-benefit to the manufacturing companies\

III. RESEARCH METHODOLOGY

The data-collecting procedure is performed through various measurements, interviews, and other types of observations.

Based on the need these data can be collected either by survey, market research by visiting food and beverage manufacturing industries where the real problem of material handling exists.
For all the above activities existing method of material handling adopted by the industries where the survey is to be conducted is noted down. Incise at present all the above-mentioned activities are done by manually by unskilled labour, then the total labour working in each department is noted down.

Based on the product manufactured by the selected industry total unit produced per day and total product cost are calculated either by interview

Now when the company installs the new material handling system all the above data are recalculated to find out the total production cost and total unit produced per day with the new material handling system.

IV. PRIMARY DATA AND SECONDARY DATA

For data collecting Primary and Secondary data, collection method is used to achieve the stated objectives.

Primary Data—data will be collected by means of structured questionnaires, online Surveys, Personal interviews, Observations on personal visits to industries, and case studies. Before finalizing the structure of the questions, those questions were first subjected to pilot testing in order to remove the difficulties.

Secondary Data- data will be collected through recent research Journals, published books and text materials, research articles, magazines, companies, websites, company's performance brochure, and annual reports.

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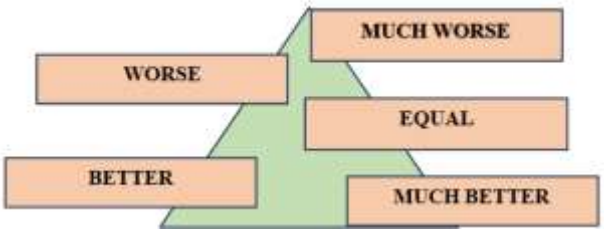
Primary data collection method and analysis
Following Steps Were Adopted to Collect the Information through Survey Questionnaires from The Respondents

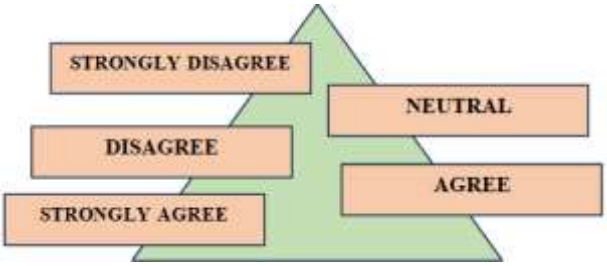
- Preparation of sample questionnaire on the objectives of the research sample questionnaire was prepared.
- Testing of the sample questionnaire- Sample questionnaires were given to some selected respondents of the population to get feedback.
- Revision of sample questionnaire –Based on the feedback given by the above-selected respondents the sample questionnaire was revised incorporating their suggestions,
- approaching the selected companies was given to the selected company's respondents
- Through online survey: A Questionnaire was published on the internet and links were sent to different respondents
- Respondent received –After a lot of effort researcher was able to collect only 147 responses. This is because most of the food and beverage manufacturing companies have not established any changes in the existing method of material handling. Hence they are unable to answer the questionnaire.
- Through Email-Questionnaire were sent to companies whose email address received from manufacture list of agriculture and processed food product export development authority which is under the ministry of commerce government of India.

Processing the Data

The questionnaires were recorded and coded and coded data was subjected to classification. Non-comparative scaling techniques are used to measure the respondent's attitude to a particular question. To analyse the data, it is usually coded as follows;-



Other types of measuring scales are as mentioned below-



V. DATA ANALYSIS

Null Hypothesis (H0)	Decisions	Conclusion
There is no significant effect of material handling system role on improving the productivity of manufacturing companies	H0 is rejected	There is a significant effect of material handling system role on improving the productivity of a manufacturing companies
Installing material handling system does not have significant impact in terms of cost benefits to the manufacturing companies	H0 is rejected	Installing material handlingsystem have a significant impact in terms of cost benefits to the manufacturing companies
Material handling equipment's need not necessarily replaces humanefforts and speed up production	H0 is rejected	Material handling equipment's replaces human efforts and speed up productions

Limitations of the Study

- The research will be conducted only in and around Mumbai Industrial Area.
- Designing a new Material handling system is dependent on many variables.
- As the new material handling system is designed and tested in one selected Company and limited to the requirement of particular selected company only.
- As the new material handling system is designed based on the existing layout Of the selected company and cannot be changed. The system is designed based On the given condition only.
- Time will be a limiting factor.

Suggestions

The scholars in his research study reached the conclusion that- Material handling system in food and beverages manufacturing companies plays a significant role

- By installing the material handling system there is reduction labour and human efforts.
- by installing material handling system production speed increases
- by installing material handling system cost of operation decreases 5.By installing a material handling system safety in handling is better.
- by installing a material handling system mechanical shutdown decreases.
- by installing a material handling system electrical shutdown decrease
- by installing a material handling system electrical shutdown decreases.

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- By installing a material handling system performance of a company as a whole is better.

VI. CONCLUSION

By utilizing the material handling system, there will be a drastic reduction in labour cost, avoiding the damage caused by the manual movement of material. This results in better quality output products with lower production costs. Good handling systems also improve inventory control, less fatigue of workers, and greater industrial safety and elimination of accident potential and disruption of work, improving the morale of workers. Finally, the cost of the product decreases and companies will be in a position to match the Global market

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