PRODUCTIVITY LINKED ASSEMBLY AND PACKAGE IN PAPER INDUSTRY

Author:- Vishnu Kumar Singh  
Student M (Tech) Industrial- Production  
Department of Mechanical Engineering  
School of Engineering & Technology  
University:- Noida International university  
Email:- vish1532rock@gmail.com

Guide:- Dr. A. Shanmuganathan  
Designation: - Director  
School of Engineering & Technology  
University: - Noida International University  
Email: - a.shanmuga@niu.edu

ABSTRACT--The project work deals with the Productivity linked assembly and package in Paper Industry. The utilization of machinery linked with the production is given priority during paper packed industry manufacturing corrugated boxes. Overall study on paper industries is made starting from obtaining raw material in supply chain and producing the product by technically testing quality of paper of different gram mages used like Kraft paper media paper semi Kraft paper as produced by different paper mills in India and abroad. Most of the paper industry in India is located at south side and the paper which is manufactured by paper mills for which the major raw material wood is used and at present the scarcity is there due to environment problem but there is lot of demand of paper packed products in world due to cost factor and easy transportation. In this paper, the market survey is done that how industries are affected with the shortage due to non-availability of product in quality and cost effective. The investigation in all aspect is done starting from source of supply of raw material till the product reaches to customer. The problems related to packaging have been discussed with industries and after studying the constraints models have been developed. As a part of study, the fruit product is taken and packed in corrugated boxes of different sizes as per the requirement to pack from 10 kg to 20 kg. The testing of paper is done on bursting strength tester, then after packing compressive test is done to see with how much weight the carton can carry. In manufacturing process the flutes sizes are changed and with different flute sizes and making 2 ply sheet to 5 ply sheet by putting both the sheets vertically and horizontally to increase strength and the it is technically checked. Once the boxes are made, suitability of the boxes is checked at industry itself. Suggested measures to remove constraints for the entrepreneur and for the food industry. Linkages and agreement with suppliers can help to grow production with right price, right quality and right cost.

Key-Words:- Paper Packaging, Testing, Flutes, Paper Mills, Cost

I. INTRODUCTION

At the current scenario, paper is in demand due to its easy utilization in production process and it helps in paper packaging of different commodities and solving unemployment problem. The main role of paper in mass communication and education is the positive factor. One side it is the basic raw material of paper packaging industry; other side its required in print media for publicity and industries are investing a lot only for publicity to get customers attention as well as to increase their sale of products easily. More awareness is required in consumers and industry to fully appreciate such kind of revolution. In this paper industry, different segment are available one is the raw material manufacturer like Paper Mills by utilizing pure bamboo which is mostly available in south India and some of the industries like Orient paper mills, Sandeep Paper Mill, Andhra paper mill, star paper Mills. Raw material like silicate, adhesives for paper pasting are used to make boxes and the stitching wire used for stitching boxes. These industries are more in small scale sector which is meeting the 60-70% of demand in MSME sector and there are agencies taking care of research in this field as the newer packages are introduced for adaption. Due to advancement techniques available in manufacturing sector for mass production, there is bulk requirement majorly in food processing industries to save money and to increase shelf life of food products packed in boxes.

II. PROBLEM STATEMENT

During packing material in cartons the bursting strength of the paper is not tested and papers of different weight like 80 to 140 gram are used and by using more weight of paper the cost of corrugated boxes are effected as the boxes to carry weight of different product.

During manufacturing process the advanced techniques are not used to increase its strength which can be done by using narrow flutes in pasting vertically and horizontally together in lesser ply like 3ply, 5ply7 ply.

During corrugation process the flutes to be made in different sizes which can save the cost of paper.

By obtaining the raw material in Right quantity, Right quality, Right price, Right time by utilizing the production capacity, packaging and transportation, distribution and the marketing strategies can be planned which is not done properly.

Case study to be taken to pack fruit to save not only cost of product but also the cost of raw material paper.

If the Corrugated box is of imperior quality the box may destroy and the whole product kept inside box may not be good as per standard of company.

III. ADDITIONAL CHALLENGES IN PAPER INDUSTRY

1. Rising raw material costs

In recent times, the flexible packaging industry has witnessed a steep rise in the prices of these raw materials. Also, the prices for polypropylene, used in resins, bottles, and packaging films have been on a rise due to reduced supply.
2. Perishability of contents
Flexible packaging companies not only have the pressure to innovate in their offerings but at the same time must also ensure that their products are designed to protect the packaged contents from the external environment.

3. Problems faced by the industry are mainly due to the shortage of raw materials in the country. With the increase in population, there is a constant increase in the use of all types of wood.

4. Majority of the industrial units are located in remote places which seldom attract the attention of young generation. This leads to the lack of work force which further affects the production of the industry.

5. The Indian paper industry is going through one of its toughest phases in history with the novel coronavirus (Covid-19) pandemic affecting supply, compounded by non-availability of shipping containers and China importing huge quantities of craft paper from India.

IV. OBJECTIVE OF THESIS
In view of vast scope of Paper packaging Industry in India, the constraints pertaining to Inputs, processing and marketing need to be removed for rapid developments keeping in view the above prospective, the objective of the study have been set as follows

1- To study the constraints of paper packaging Industry in India pertaining to Inputs, processing as well as marketing.
2- To suggest measures for removing constraints and enhancing the growth of the Industry.
3- To develop models for a prospective packaging entrepreneur by considering the size of production plant, forecasting of demand, cost, structure, investment, product mix and the linkages/agreements with suppliers.

Generally, A and B flutes are in use. The functional performance of the board depends on the type and direction of flute which is related to the type and weight of the article to be packed.

Normal, the direction of flutes or corrugation in a box is vertical, to provide the maximum stacking strength. A-flute is used when top-bottom compressive resistance is important as in the case of non-supporting products stacked to a great height in the warehouse. Fragile articles are also packed in A-fluted corrugated box. High density products are better packed in B-fluted boxes. C-flute construction gives a compromise between A and B-flutes with reasonable good stacking strength and a fair amount of stiffness. E-flute is used for special purposes and is not so common as A, B and C-flutes. In double-wall and multi-wall corrugated board it is possible to have two or more types of flutes combined to obtain better performance characteristics.

V. METHODOLOGY
In this method the paper is used as the raw material along with adhesive in machine to make corrugated boxes and different machines are used in the process as shown in methodology block diagram.

In the previous cases, the box made is designed by having flutes horizontal only due to which the strength of the box was not increased therefor technically once we use flutes vertically and horizontally by making 5 ply or 7 ply strength increases and for this by having different flute size when the box is made it not only saves cost but also saves food product kept in box as in research fruit guava is taken as a part of study and found in different models with different weight and resulted cost effective.

Different testing machines were used like bursting strength tester and vibrating machine and other machines

![Dimensions of Flute](https://example.com/dimensions_of_flute.png)

*Source-Handbook of Paper Industry, 1971*
VI. RESULT ANALYSIS

The investigator visited 30 industries out of which 10 major industries have been asked to fill the questionnaire. The responses were received only from three industries. The data gathered from the filled up questionnaire are presented in Table. It is observed that all the three industries utilization of production capacity is different due to the delay in raw material supplies and non-availability of quality packages on time. The cartons spoiled during physical distribution/transportation and the proper testing was not done. The corner of the cartons damaged and the cartons opened due to bad quality of stitching wire used. This shows that technical points are not considered. The proper testing machines needs to be utilized.

VII. RESEARCH FINDINGS-

In this research, the main concern as per the objective was taken on priority by considering all factors effecting cost, distribution, quality and technical measures. The Research finding is that in case of Guava packaging, the flute having size of 0.273 vertical height given 98% of improvement in bruising which has resulted to show that the quality of packages can help to reduce loss of Guava while packed in boxes during transportation. In the study, the quality and improvement are suggested.

VIII. CONCLUSIONS

After going through research, the proper attention is to be given in technical field and proper raw material to be used e.g. as in case of stitching, the wire if not of suitable quality will destroy the packed item in box. During packing and testing, found the corners of packed boxes to be damaged due to non-technical inputs. It is therefore suggested to do proper planning before production. It has been observed that the whole process is done on mechanically operated machines therefore during production process the productivity to be linked in paper industry.

IX. LIMITATIONS

Packaging Industry in India is far behind the Packaging Industry in advanced countries. There is great need to develop packaging industry in India at a rapid rate.

The need for developing Industry in India can be fully understood if we realize that nearly 20-25% of fresh fruits and vegetables, 30% of produce of animal husbandry including dairy and meat products, 10-11% of food grains and 7-10% of cement, chemicals and manufactured articles are lost due to improper packaging annually.

Our economy is still largely based on agriculture. The recognition of the need to upgrade agricultural based industries and to give that extra impetus to the agricultural sector. A strong food processing sector, it was felt, would help accelerate agricultural activities, aid the diversification and commercialization of agricultural products and give it an orientation towards increased exports on the one hand and create greater opportunities to nutritional enhancement, employment and income generation in rural areas on the other.

A diverse agriculture sector with varied soils and climates provides a wide ranging and large raw material base suitable for producing a rapidly growing range of processed foods.

Rapid urbanization increasing numbers of working women and rising per capita income have all contributed in the rapid growth and change in demand patterns. India provides vast opportunities for investment and growth in the processed food sectors.
X. RECOMMENDATION

More analysis needs to be done on paper availability as it affects cost and as more number of trees are destroyed which is creating issue for paper industry. At present, the availability of raw material is affected, therefore the environment needs to be protected so the production of food products can be increased and cost of production process can be reduced and for this further research needs to be done to save country revenue; as at present this industry is playing a major role for employment generation and can create good revenue as per the survey of literature.

References:

7. Anon PET, its time has come ,Food Engineering International, March 1985,40
11. https://www.thehindubusinessline.com/markets/commodities/how-the-paper-industry-has-been-affected-by-the-3-c-factors/article34131826.ece
20. Facts Figures, National Horticultural Board, Ministry of Agriculture, Govt. of India, Gurgaon.
24. Hoare, W.E, Hedges, E. S and Barry. B.T.K The Technology of tin plate,