

Increasing The Profitability of Manufacturing Industry By Reducing The Transportation Expenses

Hithesh Kumar B¹, Dr. M Mohanram², Mr. Basavaraju G³

¹M.Tech Scholar, Department of Industrial & Production Engineering, The National Institute of Engineering, Mysuru, India.

²Associate Professor, Department of Industrial & Production Engineering, The National Institute of Engineering, Mysuru, India

³Manager, Material Management Department, RANE (MADRAS) LIMITED Mysuru, India.

Abstract-Manufacturing industries are constantly affected by the price volatility that equally affects the contractors and transportation agencies. Transportation of materials from and to the industries is quite expensive and hence the annual operating plan will obviously increase. So brainstorming session was conducted to access the problems existing during transportation. From the outcomes of the activity undertaken, the problems that are responsible like claiming wrong weight, duplication in billing, improper planning of collection, more number of bills, Rejection return freight expense to the industry etc. the objective of the project is to look deep into the flow of operations in the transportation that occur at Rane madras Ltd. (RML), Mysuru, from the perspective of transportation agencies. The study results indicated that number of methods in practice can be improved to reduce the transportation cost.

Keywords-Transportation, logistics, Freight Cost reduction, Why-Why Analysis, Brainstorming,

I. INTRODUCTION

The manufacturing industry is the one in which there will be production of the products which are supplied to its customers. For the production, there is a need of raw materials as well as subcontracted materials. Thus there is an intensive use of the logistics which incorporates transportation vehicles. The transportation modes may include road, railways, waterways and premium modes like airways.

There is a considerable amount of Annual operating plan (AOP) for the transportation of materials. Hence the project comprises of the work that had been undertaken to reduce the transportation expenses thus increasing the profitability in the industry.

II. SURVEY ON LITERATURE

The present work is to minimize the transportation cost incurred. It is required to have deep understanding of the transportation aspects. Hence to gain more inputs of this

aspect, several works have been referred. The various journals referred are as follows,

[1] Minimization of Transportation Cost in Courier Service Industry

International conference on Innovations in engineering and technology-2014

- *Muthu karthikeyan et.al* suggested a real time sample testing system which was developed and the task performed using **k-means clustering** and **nearest neighborhood method**.
- They utilized the nearest route method and optimized path which resulted in the reduction of travelling distance between the customer points and also the number of vehicles required for convening.
- Thus reducing the transportation cost considerably.

[2] The Role of Transportation in Logistics Chain

- *Yung-yu TSENG et al.* covered broadly from logistics activities to transportation systems and attempts to determine the role of transportation in logistics systems through extensive review.
- The main contents of the research include a review of logistics development, the characters of various transport operations in logistics activities, the applications of logistics in various fields, city logistics, future direction in logistics development, and its cooperation with transport systems.

[3] To Develop a Framework to Understand the Effects of the Transportation Time to Inventory

- *Hannu Multanen et.al* in their work concentrated on the relation of transportation time and inventory.
- The overall aim of the study was to develop a framework to understand the effects of transportation time to inventory.
- The original need for the research came from a case company, which wanted to investigate how inventory costs would change if transportation time would be reduced.

It was proven in the empirical research that inventory carrying costs could be reduced when reducing the transportation time

[4] The Impact of Green Supply Chain Management on Transportation Cost Reduction in Turkey

International Review of Management and Marketing, Vol. 2, No.2, 2012

Mehmet SARIDOGAN PhD student - Okan University, This study suggests that green supply chain management encompasses potential to make cost saving in transportation. A relationship formula between fuel consumption & repairing expenditure (FCMRE) and transportation cost was developed. This study proves the existing relation between GSCM and FCMRE. After proving this relation and using the relation between FCMRE and TCR (Transportation cost reduction), This study explains the impact of GSCM on transportation cost. Also, these research findings suggest that green their supply chains management affect not only fuel consumption, maintenance and repairing cost, but also through these variables affect transportation cost indirectly.

[5] A methodology for the assessment of rail-road freight transport policies

Umberto Crisalli et al.

SIDT Scientific Seminar 2012

A methodology had been suggested to evaluate freight policies such as new services and incentives for long distance freight transport by using a mixed what-if/what-to approach. It uses a specific mode service choice model to share the freight demand among alternatives and a service network design model to identify new freight services. This methodology is designed to be easily integrated within a decision support system to allocate the freight transportation policies. In order to show the applicability of the proposed approach, some application examples were carried out to support Italian ministry of transport in development of the new Italian national transport plan.

[6] Improvement of functionality of logistics processes in a selected public road transport company

Ewa Kulińska et al.

1st International Conference Green Cities 2014

Suggested the functionality if transport and communication companies involve service activities trying to satisfy transport needs. There are many computer aided management systems designed specifically for transport companies, supporting transport processes by streamlining the meeting of transport needs. The functional problems occurring in a road transport company before implementing an enterprise resource planning (ERP) computer system are identified. While conducting the analysis, a number of problems occurring in the company are

noticed. The most serious problem was found in the sphere of information flow and especially in the lack of data consistency. The analysis of the results of the solutions implemented was carried out. The examined company set the direction of the management development through the introduction of ERP. The results achieved support the company management with the use of ERP system. On the basis of the analysis carried out, they concluded that the role of computer aided enterprise management system helps in solving the functional problems occurring in an enterprise through the use of ERP system.

A very important rationale behind choosing ERP system in their nature allowing to match them to the company specific.

This resulted in better use of the resources, proper organization of the management process and operational flexibility.

This enhances the companies competitiveness, improvement of the customer service and attracting new ones.

[7] Logistics Costs Based Estimation of Freight Transportation Demand

Michael F. Gorman et al.

Journal of the Transportation Research Forum, Vol. 44, No. 1 (2005)

They suggested Optimization-based methods to forecast potential modal conversion in specific geographies. By modeling the shipping decisions at a microeconomic level and applying them to a large-scale shipping database, the potential demand for intermodal rail service can be estimated. Deviations from model predictions may have many causes, such as model error, bounded information, rail capacity, previous shipper satisficing, previous experience and preferences, union contract issues, or a host of others. Model results are tested for sensitivity to input data errors and found the model predictions to be robust. The resulting modal conversion marketing opportunities that are based on this methodology are identified and implications discussed.

III. PROBLEM IDENTIFICATION

The costs in a manufacturing industry can be classified as fixed costs and variable costs. A fixed cost is one that does not change in total within a reasonable range of activity. While a fixed cost remains constant in total, the fixed cost per unit of output or input will change inversely with the change in the quantity of output or input. Many manufacturing overhead costs are fixed and the amounts occur in large increments. Include depreciation on a company-owned

factory, depreciation on machinery and equipment, salaries and benefits of manufacturing supervisors, factory administration costs, etc.

The variable cost ratio is an expression of a company's variable production costs as a percentage of sales, calculated as variable costs divided by total revenues. It compares costs that change with levels of production to the amount of revenues generated by production. This contrasts with fixed costs that remain constant regardless of production levels.

The variable cost ratio quantifies the relationship between revenues and the specific costs of production associated with the revenues. It is a useful evaluation metric for a company's management in determining necessary minimum profit margins, making profit projections and in identifying the optimal sales price for a product as part of price setting.

Further this variable cost can be classified into following two categories

- Selling variable cost
- Manufacturing cost

3.1 Elements of manufacturing variable cost for the year 2016-17

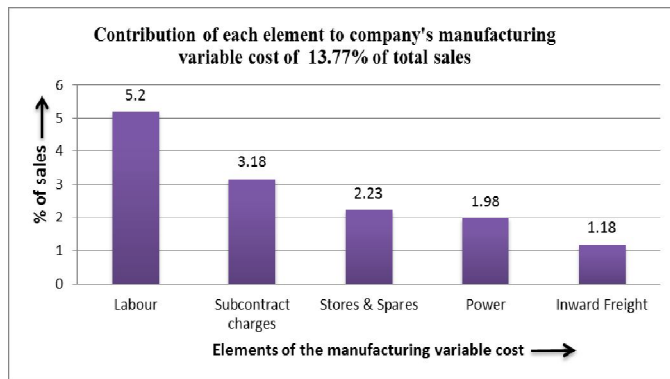


Fig: 3.1 Contribution of each element of variable costs for the year 2016- 17

The above graph shows that the company is spending large amount of variable manufacturing cost for the year 2016-17. Which include labor cost 5.2%, subcontract charges 3.18%, power cost 1.98%, stores & spares cost 2.23%, inward freight 1.18%.

3.2 Contribution of Each Element of Manufacturing Variable Cost on Sales

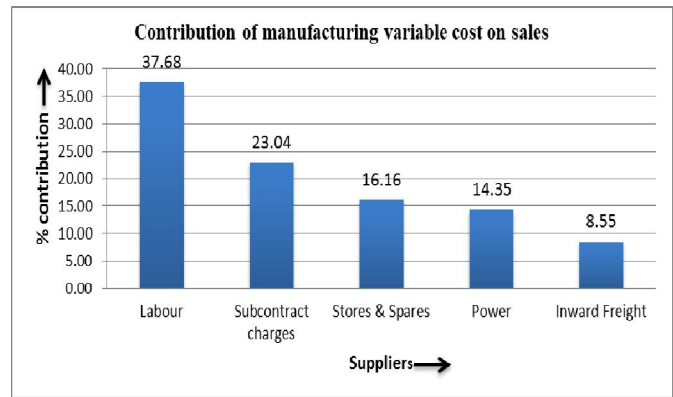


Fig: 3.2 contribution of each element of manufacturing variable cost on sales

From the Fig: 3.1 and Fig: 3.2, it can be seen that the inward freight cost contributes quiet significantly. Hence the objective of the present work is to reduce the manufacturing variable cost by reducing the inward freight cost.

3.3 Transportation cost for the year 2016-17

The Annual operating cost for the transportation of the materials will be made such that each of the suppliers are considered for the allotment of the plan. Hence the graph shows the expenditure that is planned for each of its supplier. This is according to the forecast of the materials that has to be procured from the suppliers.

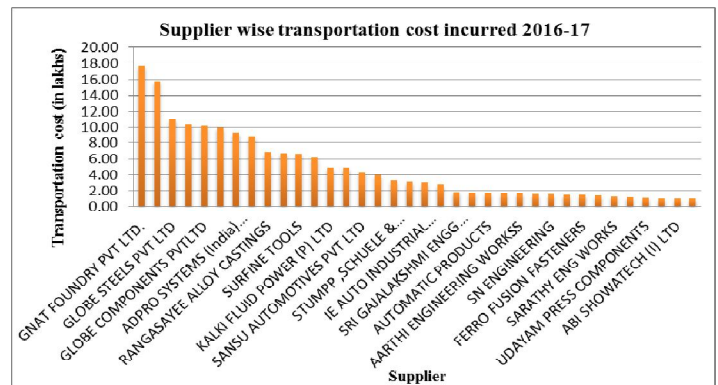


Fig: 3.3 Freight cost incurred for the year 2016-17

The Fig 3.3 represents the transportation cost incurred on the industry for the year 2016-17, which will be responsible for annual operating plan.

IV.OBJECTIVES

The objective of the present work is to increase the profitability of the RML by reducing the transportation expenses incurred for the year 2016-17.

The total annual operating plan (AOP) specified for the year 2016-17 is 248.62 crore

The inward freight value allotted according to the AOP is 2.93 crore which accounts about 1.18%

The objective of the present work is to reduce the inward freight cost of 1.18% to 1.08%.

1.08% of the freight cost results to 2.68 crore

Thus the savings to be achieved=2.93-2.68
=24.86 lakhs

Thus the savings to be achieved per month=2.07 lakhs/month.

V. METHODOLOGY

5.1 WHY -WHY ANALYSIS

WHY-WHY analysis is an interrogative technique used to explore the cause-and-effect relationships underlying a particular problem. The primary goal of the technique is to determine the root cause of a defect or problem by repeating the question "Why?" Each answer forms the basis of the next question.

5.2 BRAINSTORMING

It is a group creativity technique by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members. The term was popularized by Alex Faickney Osborn in 1953 through a book "Applied Imagination".

VI. ANALYSIS

An in-depth analysis had been carried out for finding the problems which resulted in the high inward costs at RML. Accordingly the following points have been noted down for further analysis.

6.1 Outcomes of Brainstorming

Sl. No.	BRAINSTORMING SESSION RESULTS
1	Price increase
2	Improper weight claimed by the transporter
3	Local collection not planned properly
4	Storage Charges
5	Schedule not met
6	Product improvements not updated
7	Waiting charges
8	Supplier specified transporter

9	More number of bills
10	Long payment terms
11	Unloading Charges
12	Duplication of bills
13	Using Premium Freight
14	Bill submission period
15	Rejection return freight to RML account
16	Usage of one time transporters frequently

Table: 6.1 outcomes of brainstorming session

A brainstorming session was been undertaken to find the possible problems that influenced the high inward charges and the above list of problems have been identified.

6.2 Fish Bone Diagram for the Results of the Brain Storming Session

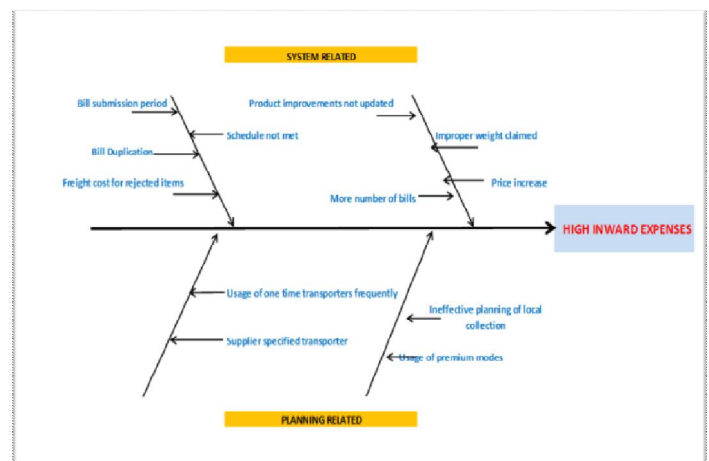


Fig: 6.1 fishbone diagram for the brainstorming outcomes.

The Fig 6.1 shows a fishbone diagram that has been utilized for the ease of understanding of the problem.

6.3 Adequacy-Compliance-Effectiveness (ACE) Model for the current system

Adequacy-compliance-Effectiveness (ACE) Model for the current system						
Sl No.	Brain storming results	Current System	A	C	E	Validation
1	Price increase	No claim recorded from transporter	Y	Y	Y	INSIGNIFICANT
2	Improper weight claimed by the transporter	The weights in the LR is considered for billing	N	Y	N	SIGNIFICANT
3	Local collection not planned properly	Individual buyers are ordering the materials for collection	N	Y	N	SIGNIFICANT
4	Storage Charges	No extra charges are allowed as per contract	Y	Y	Y	INSIGNIFICANT
5	Product improvements not updated	No practice of updation in the product improvements	N	N	N	SIGNIFICANT
6	Schedule not met	90% of the supplier meet the schedule	Y	Y	Y	INSIGNIFICANT
7	Waiting charges	Waiting charges are not allowed as per contract.	Y	Y	Y	INSIGNIFICANT
8	More number of bills	Each LR may contain more number of bills	Y	Y	N	SIGNIFICANT
9	Long payment terms	Freight contract released after release of agreement terms.	Y	Y	Y	INSIGNIFICANT
10	Supplier specified transporter	Supplier not doing and also not interested	Y	Y	Y	INSIGNIFICANT
11	Unloading Charges	Cost per/kg is included for unloading charges	Y	Y	Y	INSIGNIFICANT
12	Duplication of bills	Bills are passed based on bill number and not on the LR number	N	N	N	SIGNIFICANT
13	Using Premium Freight	SOP is in place and followed	Y	Y	Y	INSIGNIFICANT
14	Bill submission period	Transporters are waiting for POD	Y	Y	N	SIGNIFICANT
15	Rejection return freight to RML account	Suppliers are billing RML for rejected materials	N	N	N	SIGNIFICANT
16	Usage of one time transporters frequently	No dedicated transporters from some suppliers	N	N	N	SIGNIFICANT

Table: 6.2 Adequacy-Compliance-Effectiveness model

VII. COUNTER MEASURES

The counter measures for the problems were found out by utilizing the why-why analysis.

7.1 Improper Weight Claimed By Transporter

Update material master file with the weight master which includes weight of all the materials that are being inwarded.

7.2 Ineffective Planning Of Local Collection

Categorize the local collection points for ease of the buyers as well as to introduce dedicated days for collection of the materials from each supplier.

7.3 Improvements in the Product Not Updated

Manual weighing of the products that had undergone vave analysis and updation in the SAP software as well as in the annexure.

7.4 Bill Duplication

Create a system to mitigate bill duplication.

Use remove duplicate options in Microsoft excel.

7.5 Freight Cost for the Rejected Items

Suppliers to use their own mode of transportation for rejected items. RML transporters should send separate bills for rejected consignments along with a debit note to the supplier thus avoiding the payment by RML account

VIII. RESULTS

The total annual operating plan (AOP) specified for the year 2016-17 is 248.62 crore

The inward freight value allotted according to the AOP is 2.93 crore which accounts about 1.18%

The objective of the present work is to reduce the inward freight cost of 1.18% to 1.08%.

After the implementation of the corrective actions, the freight costs turned out to be an average of 1.096%

1.096% of the freight cost results to 2.72 crore

Thus the savings to be achieved=2.93 crore-2.72crore
=20.88 lakhs/year

Thus the savings to be achieved per month=1.74 lakhs/month.

IX. CONCLUSION

In the project work carried out methods like brainstorming session had been carried out. This was utilized to find out the problems resulted in high inward costs. Adequacy-Compliance-Effectiveness model is utilized to access the significance of the problem and concentrate more on the problems of higher significance. WHY-WHY analysis to find out why these problems occurred in the first place. Thus counter measures have been found out for the problems and suitable actions have been taken to implement these counter measures.

Thus after the implementation of the counter measures, the results were looked into and found a substantial reduction in the transportation cost and also seamless billing ultimately resulting in the increased profitability of the industry.

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