Improve Truck Utilization to Minimize Transportation Cost Study Case in Retail Distribution

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Abstract—Transportation cost should be the first thing taken into consideration in a retail distribution because of the low profit margin. This paper presents how retail distribution works and the costs that accompanied it, a problem solving method then formulate by evaluating and implementing truck utilization rate to reduce transportation cost. This study is limited to retail distribution network in business to customer channel. This case study shows that by improving truck utilization by 12%, a 0,05% reduction in transportation cost can be achieved.

Index Terms— Retail Distribution, Supply Chain, Transportation cost, Truck Utilization

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1 INTRODUCTION

Transportation is an irreplaceable part of the supply chain through which economic and social development are possible [], transportation in retail distributions is an activity to move goods that prepared in the distribution center and delivered according to the requirements of a point of sales.

As the part of the retail distribution activity, transport will have a contribution to overall performance and cost to retail process. The reduction in cost of transportation in retail distribution is of prime importance because of very low margin [2].

This paper describes a component of transportation cost in retail distribution and deals how to reduce the transport cost by implementing a review and analysis of truck volume utilization so retail transportation can be more efficient and can reduce transport cost.

2 LITERATURE REVIEW

Aim understanding of what it is transportation in retail distribution and what cost in the transportation process, the literature review was carried out.

2.1 Retail Distribution

According to Abate, M. A, [2] Distribution network in retail perspective includes the transportation from distribution center with a multi vehicle distribution vehicle delivery to multiple stores. [4]

Transport planning activity in retail distribution involves all the process in delivering the goods to the store from the DC. While dispatching the goods, three things are taken into consideration; they are Vehicle Plan, Route Plan and Loading Plan.

It should satisfy the following conditions:
(1) Each delivery path of each store demand and delivery of

the vehicle does not exceed the carrying capacity;
(2) The length of each distribution route delivery vehicles does not exceed the maximum travel distance delivery time (time window);
(3) Each delivery of goods cannot exceed the time required. A network design is considered as appropriate if it performs well with respect to revenue, costs and delays (i.e. Delivery time).
(4) Each store demand must be delivered with vehicle that not exceed the road class in each store that carry it.

2.2 Transportation and Cost involved

Transportation refers to the movement of item from point of source to point of consumption. Transport mode its self can be divided by 5 basic modes: road, rail, air, water, and pipeline. And each mode of transportation has different characteristics and cost. [2], [4], [6]

Transportation as the source of competitiveness often ignored [5]. In this paper, we focus on transportation in retail distribution that used transportation mode Road.

Transportation Cost consist of two components, fixed cost and variable cost. Fixed cost it's a cost that the requirement to provide the transportation like capital cost of the vehicle, insurance, overhead cost and so on, and variable cost it's a cost involved in transportation prices like fuel, repair & maintenance, tires &tube, oil & lubricant, and so on.

According to Abate, M. A, [1] transportation cost factor in retail distribution can be affected by Truck Utilization, Route Optimization, Turnaround Time (TAT), and Backhauling. All these cost factors will be affected and determine the transport cost. An improvement process or standard to these cost factors will be reduce the transportation cost. [3],[5]

$$Utilization\ truck = value\ of\ goods/Delivery\ truck$$

Truck utilization can be defined by the % truck capacity that's filled with goods. [3] There is some approach to calculate truck utilization:

1. Density / Volume of Goods
2. Weight of Goods
3. Value of Goods

The utilization approaches its different for every business process, for the retail distribution value of goods its more suitable for an economic evaluation process.

$$\% \, TC = Value \, of \, Goods \, delivered \, / \, cost \, for \, delivered$$

A factor that should be caused in truck utilization
1. Determine capacity in the vehicle
2. Determine allowance capacity in vehicle

3 RESEARCH METHOD

Following research method is adopted in this paper:

Step 1 – Study of retail distribution and the costs that involved

Step 2 – Defining the % transportation cost

In this paper, we are going to evaluate the transportation cost existing by % transporting cost.

$$\% \, TC = Value \, of \, Goods \, delivered \, / \, cost \, for \, delivered$$

Step 3 – Way to increase the transportation performance

An evaluation of the process and implementing a review and analysis of truck volume utilization, transportation by using the utilization truck formula to measure the improvement process.

Step 4 – Achieving a minimum % transport cost

Because of the very low margin % transportation cost should be minimized. Generally the cost of goods transferred

4 RESULT AND DISCUSSION

Vehicle Plan begins with the cubication calculation according to the zone setting & Clustering group, Vehicle Plan calculates the cubication of the volume of demand for existing goods and by looking at the facilities in the car box that have been set in the dry good route program table, the calculation of the volume in the program reads the vehicle and the facilities available, so that an existing package is formed.

In cubication calculation, the measurement used the height, weight, and length of the delivery box that use to deliver the product to the point of sales. And to determine the allowance that used in this cubication calculation used the dead space in the delivery box for the supporting material handling of the goods (i.e. Dolly truck).

The utilization, truck measured by the utilization, truck formula by value of goods, then evaluate the % transportation cost that occurred. Table 1 shows the before after evaluation

	Utilization Truck	**% TC**
Before	23,582,551.87	1.31%
After	26,465,182.59	1.26%

Table 1. Before after evaluation

5 CONCLUSION

Cost factor that affects the transport cost in retail distribution are Truck Utilization, Route Optimization, Turnaround Time (TAT), and Backhauling, improvement in cost factor can reduce the transport cost. This paper focus on the improvement truck utilization so the transportation cost can be reduced and showed by improving 12 % of truck utilization can minimize transportation cost 0.05%. A literature review was carried out to understand the condition and limitation in retail distribution. The paper presents a problem solving to reduce transportation cost in a case study by implementing the evaluation in truck utilization to minimize the transportation cost.

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