Transportation Management System Functions and Performance Amplifying the Span of Small Scale Firms

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Abstract

The modern world is largely encompassed with transportation management system as the world aspires newer and wider products and the business fulfils their aspirations with the assistance of effective transportation management system. The present research explicates some of the important functions performed by transportation management system. The research is carried out on small scale firms operating in District Udhampur of J&K State. The empirical analysis of the research is done on the basis of primary data gathered from small scale firms' managers. The variables/functions taken into consideration for the research purpose are: "Transportation cost and service quality", "Routing and mapping", "Carrier selection and management", and "Real time Tracking". The results of the ranking table exposed that the variable "Routing and mapping" secured first rank, "Transportation cost and service quality" achieved rank second. Third rank is secured by the variable "Carrier selection and management" and "Real time Tracking" gained fourth rank. Further, the results of the linear hierarchal regression revealed that transportation management system ensures proper routing and mapping of the stock in small scale firms.

Keywords: Transportation Management System (TMS), Small Scale Firms, Functions, Performance

Introduction and Literature Review

A Transportation Management System (TMS) focuses on the transportation logistics that assists in making supplies possible in least effective costs and time. It usually acts as a link between Order Management System (OMS) and Warehouse/Distribution Center (DC) of the businesses. The major job of procurement and shipping or transportation to the respective place is done by the transportation management system today. The procurement, generally known as inbound and transportation/shipping, known as outbound logistics assist in selecting the least cost provider with the best available means/mode of transportation. All the tracking and routing is done through electronic load tendering. However, TMS performs many functions such as tracking, vehicle maintenance, fuel costing, warehousing communications, EDI implementations, accounting, traveler and cargo handling, inbound and outbound transportation mode, vehicle load, shipment batching of orders, scheme simulation, cost controls, optimising terrestrial transport rounds, freight audit and payment, yard management, order visibility, carrier management, advanced shipping and many others. The present research focuses on only four functions performed by Transportation Management System namely, routing & mapping, transportation cost and service quality, carrier selection and management, and real time tracking because the nature of firms is small and they are not well advanced with the latest functions of TMS. The managers of these small scale firms are worried for many things regarding transportation system to be adopted because of considering multiple attributes when making decision, exhibiting their attention on cost and transit time as the primary decisive factor. Selecting the mode/medium choice, carrier choice, negotiating rates, service levels, evaluating carrier performance etc. are the basic relevant transportation performance variables that are given due consideration before going for transportation management system (Monczka, Trent, & Handfield, 2005). It has been

found in many researches that transportation costs count between 20 to 35% of total production and logistics costs of a product (Russell & Taylor, 2003: Pedersen & Gray, 1998). However, transportation costs reduction techniques could be quite helpful for a business to be competitive and transportation management system is of the techniques (Reimann, 1989). The performance and cost of the transport carrier had the power to influence the efficacy of the intact logistics compartment of a business.

The role of transportation is gaining momentum at a rapid pace as the trade had shifted from local to national boundaries and from national to international boundaries (Tolley & Turton, 1995). The transport modes now-a-days cater to the need of high performance product at lower maintenance costs, minimisation of the life-cycle-cost and in maintaining reliability, consistency and availability of products. Further, an effective transportation management module is well known for reducing costs through better route planning, load optimisation, carrier, improved accountability with seeking into transportation chain, greater flexibility to make changes in delivery plans, supply chain execution requirements timely completion (Black, 2001). Transport affects the logistics activities, production & sale, delivery plans according to different industries. The present study explicates some of the functions performed by transportation management system influencing the transportation choice and selection in small scale firms operating in Udhampur district of J&K state.

Hypothesis Formulation

The following is the main hypothesis of the study:

Hyp1: Transportation management system ensures proper routing and mapping of the

stock in small scale firms.

Obj1: The objective is to analyse whether transportation management system ensures

proper routing and mapping of the stock besides other important functions performed by it in small scale firms.

The Research Framework

The research framework of the study is prescribed below:

Sampling and Area Selection

The research was conducted in Udhampur district of Jammu & Kashmir state. In Udhampur district there are registered firms operating under DIC (District Industries Centre). The number of registered firms is 49 out of which 44 of them were found operational. So, the sample for the study was the whole population of small scale firms and with the assistance of census method the research work was carried. The area chosen for the research purpose was having dearth of research due to newly developed small scale industrial sector in the area. All the 44 small scale units contacted for the study were categorised into ten lines of operations which were similar in their nature of production and products. For more simplicity, the names of those units were segregated with their respective numbers is: cement (8), pesticide (3), steel (3), battery/ lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3), and miscellaneous (11). The miscellaneous (not falling in any category) category embraced 11 small scale units namely M/s Supertech Industry, M/s Luxmi Electronics Works, Shaj Nath Vanaspati Ltd., M/s Aditiya Cables, Poles and Transformers, Shankar Lime Industry, M/s Unique Carbon Industries, M/s B.S Traders, M/s Vijay Candles, Everest Health Care Products, M/s J.K Petro Chemicals, and M/s Ajay Ice Factory.

Research Instrument

The research instrument for the present research was questionnaire which was self-prepared after consulting outstanding academicians, scholars, existing literature review and the same was discussed with academicians and research scholars in order to maintain the content validity of the construct. The questionnaire comprised general questions regarding respondents profile and the other important questions regarding transportation management system. The questions in the questionnaire were ranking questions, dichotomous questions and five -point Likert scale, where 1 stands for strongly disagree and 5 for strongly agree. Here in this study, ranking tables and linear regression were used in order to make the study comprehensive and elaborative.

Data Collection

The primary data for the resent research were collected with the help of research instrument called questionnaire from the respective managers of the small scale firms. The research was conducted with the help of censure method of data collection. The respondents were duly approached in accordance to their time feasibility in order to gather more pure and intensive response. The managers were made comfortable with the ease of language and with the

assistance provided to them regarding any matter there in questionnaire. All ethical contemplations were kept in mind and were followed while collecting response/ conducting survey. The secondary source of data which acts as backbone of research was also given due recognition and the relevant information was collected from different sources: internet, books and empirical papers from referred journals. In the present study only ranking tables and regression analysis were used for eliciting consequential inferences.

Data Analysis and Results Interpretation

The primary data for the study were collected from small scale firms' managers with the assistance of questionnaire and were tabulated in tabular form in order to make it more consequential and comprehensible. Table 1 lays out the mean ranking associated with the various functions performed by transportation management system in the small scale firms operating in Udhampur district of J&K state. The number of 44 small scale firms had been mainly classified into ten lines of operations i.e. the small scale manufacturing units having similar types of businesses are categorised into consistent headings namely cement (8), pesticide (3), steel (3), battery/lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3), and miscellaneous (11). The factors that were identified as the main functions which are performed by the small scale firms are: "Transportation cost and service quality", "Routing and mapping", "Carrier selection and management", and "Real time Tracking".Overall, the variable "Routing and mapping" secured first rank as the managers were of the perception that transportation management system will definitely assist them in providing exact routeing and mapping at low possible cost. "Transportation cost and service quality" secured second rank. Third rank is secured by the transportation management system function "Carrier selection and management" and rank fourth was achieved by "Real time Tracking" variable. Overall mean response to the various performed by transportation management system in descending order are 1.7 (Routing and mapping), 2.3 (Transportation cost and service quality), 2.6 (Carrier selection and management), and 3.2 (Real time Tracking) respectively. The variables so ranked by the small scale firm managers divulged that small scale firm managers are quite conscious of transportation management system and the benefits in terms of different functions it's providing. Fig. 1 represents the various variables that determine the key processes for effective transportation management system:

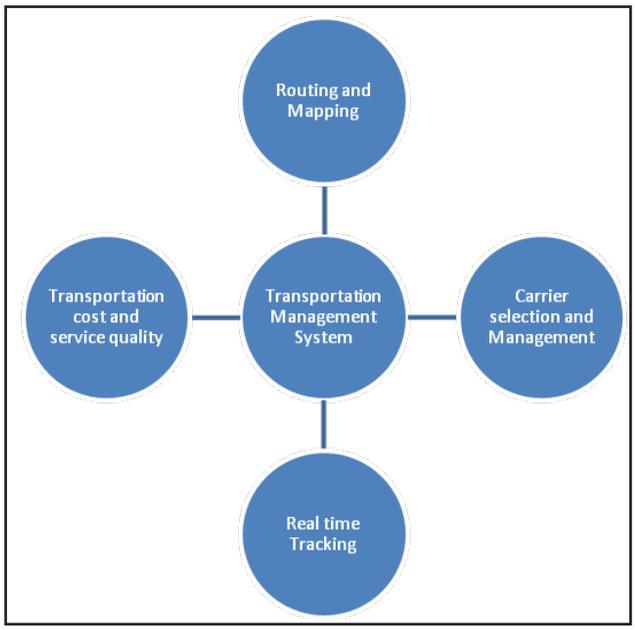

Fig. 1: Functions Performed by Transportation Management System

The mean ranking of the various transportation functions performed by transportation management system are as follows:

Cements

This category was the substantial part of the research as the maximum numbers of units were found operating under this category. Their number counted to be eight namely M/s Associated Cements, Zenith Cement Industry, Shivalik Cements, M/s Continental Cement Industry, Wullar Cements, M/s Shri Nath Industry, and Uma Cement Industry being found enrolled as small scale firms. As far as mean ranking associated with the various functions performed by transportation management system in these small scale firms in concerned, these small scale firms very consciously assigned number one rank to the factor/ function "Transportation cost and service quality" as it acted as the main function of transportation management system. "Routing and mapping" was accorded rank two by almost all the small scale units which appeared to be the second important factor/function to be considered important of transportation management system. "Carrier selection and management" was positioned with rank three and subsequently "Real time Tracking" secured rank four by these small scale cements firms. Therefore, the afore made ranking made it very much clear that

transportation management system mainly assists in benefitting by providing the small scale firms with best possible low transport cost and service quality.

Battery/Lead/Alloy

The second small scale firms sector related to battery/ lead/alloy which was encompassed with a total of five small scale units named as Radha Industries, Pilot Batteries, Durga Batteries, Suraksha Batteries, and Avtar Batteries. The mean ranking remunerated by this group of small scale firms were as follows. "Carrier selection and management" was given rank one as it seems to be basic function of transportation management system by the small scale firms operating. "Transportation cost and service quality" was accorded rank two amongst all the competent variables/functions. "Real time Tracking" function was declared to be third as these small scale firms found this function to be of less paramount importance. Accordingly, "Routing and mapping" scored rank four as represented in Table 1.

Pesticides/Insecticides

Pesticides/insecticides stood to be third main category which responded in terms of the functions/benefits performed/remitted by the transportation management system. The famous three main reputed firms operating under this category were M/s Dhanuva Agritech Ltd., Safex Chemicals Ltd., and M/s Modern Insecticides. The mean ranking linked with the various functions performed by transportation management system under this category is as follows. "Transportation cost and service quality" was given rank one,

"Routing and mapping" emanated with rank two,

"Real time Tracking" was given rank three, and

"Carrier selection and management" was accorded rank four respectively.

Conduit Pipes

Conduit pipes ensured two successful competitors namely M/s Pee Kay Products and Rukhmani plastics, found functioning under this sector. As far as mean ranking associated with the various functions performed by transportation management system in these small scale firms in concerned: "Routing and mapping" function appeared to be number one amongst all the prescribed functions of transportation management system. "Transportation cost and service quality" appeared with rank two by this category. "Carrier selection and management" was given rank three. "Real time Tracking" was allotted rank four. The mean ranking related to the variables/functions performed by transportation management system by these two strong competitors is that Routing and mapping was the main focus of these firms in terms of transportation management system.

Menthol

Again this sector was encompassed with two competitive small scale units namely M/s Harikripa Perfumes Pvt. Ltd. and M/s Mahadurga. The mean ranking rendered by these small scale firms and the managers response for the same in respect of the various functions performed by transportation management system is that these small scale firms assigned rank one to "Real time Tracking" as it assists in noticing down the time-to-time stationing of the transported materials. However, rank two was aligned to the factor/benefit "Carrier selection and management" as it also conveyed the important functionality of transportation management system. Rank three was attained by the factor "Transportation cost and service quality" as it gives justification to appeal for transportation management system. The fourth and last rank is dedicated to "Routing and mapping" which appeared to be last benefit by this sector of firms.

Guns

The sixth main line of operations in small scale firms were related to manufacturing of guns. M/s Gulab Gun Factory and M/s Hunter Gun factory were two main competitors operating under this category. The two units were quite competent and followed each otherin terms of strategies and policies. Both of them bestowed rank one to "Real time Tracking" subsequently followed with rank two by "Routing and mapping". "Transportation cost and service quality" was dispensed with rank three and "Carrier selection and management" was assigned rank four. The ranking is portrayed in Table 1.

Steel

This small scale firms' category encompassed with three main units namely M/s Maha Luxmi Steel Fabricators, M/s Faqir Chand Sanak Raj, and M/s Gupta Furniture. As

far as mean ranking associated with the various functions performed by transportation management system in these small scale firms in concerned, the benefit/variable "Routing and mapping" attained rank one as it seems to be the main benefit of planning for transportation management system. "Transportation cost and service quality" availed ranked two, "Carrier selection and management" divulged with rank three, and "Real time Tracking" scored rank four respectively.

Gates/Grills/Varnish/Paint

The present research emphasized on the functions of transportation management system and divulged that the main function of this group (M/s Balaji Industries, M/s Wazir Engineering Works, ISRO Products, Shakti Engineering Works, and M/s Everest Paints) was found to be"Routing and mapping" as it espoused with rank enlisted by this group of small scale firms. "Carrier selection and management" was allotted rank two by these units, "Transportation cost and service quality" attained rank three, and "Real time Tracking" acquired rank four respectively in this grouping (Table 1).

Atta/Maize/Dal mills

This group was efficient in floor/grindings etc. and the three main small scale units operating under this group were Shalimar Floor Mills, M/s Udhampur Dal Mills, and M/s Sharda Enterprises. As far as mean ranking associated with the various functions performed by transportation management system in these small scale firms in concerned, "Routing and mapping" scored rank one among all the other variables available. "Transportation cost and service quality" was consigned rank two by these small industrial units. "Carrier selection and management" was curtained with rank three. "Real time Tracking" came up with rank four. It implies that atta/maize/dal mills small scale firms' basic function to approach for transportation management system is routing and mapping as depicted in Table 1.

Others (Miscellaneous)

This group was having eleven small scale dissimilar units operating and depicting the major portion of small scale firms. Their names appeared to be M/s Supertech Industry, M/s Luxmi Electronics Works, Shaj Nath Vanaspati Ltd., M/s Aditiya Cables, M/s Unique Carbon Industries, M/s B.S Traders, Poles and Transformers, M/s Vijay Candles, Everest Health Care Products, Shankar Lime Industry, M/s J.K Petro Chemicals, and M/s Ajay Ice Factory. As far as mean ranking associated with the various functions performed by transportation management system in these small scale firms in concerned, "Routing and mapping" was assigned rank one by almost all of the small scale firms, "Carrier selection and management" was given rank two by these small scale units, "Transportation cost and service quality" was allocated rank three, and "Real time Tracking" was given rank four representing the sequence of function performed by transportation management system.

Overall, all these small scale firms operating under ten lines of operations were actually functioning under SIDCO & SICOP (DIC) connotes Routing and mapping as the main function performed by these small scale firms which was followed by Transportation cost and service quality, further followed by Carrier selection and management and subsequently after that Real time Tracking(Table 1).

Regression Analysis

The research hypothesis was tested with the assistance of hierarchical regression analysis. The linear regression model table (Table 2) comes with the value of R to be .700, stating 70% kinship/association between the two variables i.e. dependent variable (Routing and mapping) and independent variable (Transportation Management System). The R^2 value of .641 connoted 64% of variation in routing and mapping could be explained from Transportation Management System. Adjusted R^2 value .589 indicates the increase in the value of R^2, if anytime another independent variable is added. Further beta value reveals significant relationship of independent variable with dependent variable as depicted by its value. Change in R square is also found to be significant with F-values significant at 5% confidence level. Thus the hypothesis "Transportation management system ensures proper routing and mapping of the stock in small scale firms" is accepted as represented by its significance level $p < .05$.

Conclusion

Transportation had revolutionised the word by making the world as small village wherein any individual from any place or country can trade anywhere around the world and can purchase anything from host countries. Thanks to transportation that not only increased the standard of living of the society but have made the society feel and live comfortably and enjoy every moment of life. The present research divulges the mean ranking of the functions performed by transportation management system in

the small scale firms operating in Udhampur district of J&K state. Though transportation management system performs abundance of functions but the present research takes into preview four important functions into study. The factors/functions that were identified as the main functions which are performed by the small scale firms are "Transportation cost and service quality", "Routing and mapping", "Carrier selection and management", and "Real time Tracking". Overall, the variable "Routing and mapping" secured first rank as the managers were of the perception that transportation management system will definitely assist them in providing exact routeing and mapping at low possible cost. "Transportation cost and service quality" secured second rank. Third rank is secured by the transportation management system function "Carrier selection and management" and rank fourth was achieved by "Real time Tracking" variable. Overall mean response to the various performed by transportation management system in descending order are 1.7 (Routing and mapping), 2.3 (Transportation cost and service quality), 2.6 (Carrier selection and management) and 3.2 (Real time Tracking) respectively. Further linear regression model summary results exposed that transportation management system ensures proper routing and mapping of the stock in small scale firms as revealed by the respective significant values.

Limitations of the Study

The study is conducted in one area i.e. area specific, so the results of this study cannot have universal application as there could be diversity in other areas according to the environment and other factors associated.

The results depend upon the response of the respective respondents. Anyhow all the efforts were applied to make the study free from any sort of biasness but the rule of subjectivity cannot be avoided.

Future Research

Similar type of research could be conducted in large scale firms. Future research can also be conducted by taking into preview more than four functions performed by transportation management system.Moreover, the similar study could be considered for medium and large scale units operating in the other parts of the country.

Table 1: Functions Performed by Transportation Management System in Small Scale Industries

Units/Factors	Transport cost and Service Quality	Routing and Mapping	Carrier Selection and Management	Real time Tracking
Cement	2(I)	1(II)	3(III)	4(IV)
Battery/Lead/Alloy	2.6(II)	3(IV)	1.8(I)	2.7(III)
Pesticides/Insecticides	2(I)	1(II)	3(IV)	4(III)
Conduit pipes	2(II)	1(I)	3(III)	4(IV)
Menthol	3(III)	4(IV)	2(II)	1(I)
Guns	2.6(III)	2.4(II)	3(IV)	2(I)
Steel	2.6(II)	1.4(I)	2(III)	4(IV)
Gates/Grills/Varnish/Paint	2(III)	1(I)	3(II)	4(IV)
Atta/Maize/Dal mills	2(II)	1(I)	3.3(III)	3.6(IV)
Others (Miscellaneous)	2.3(III)	1.7(I)	2.8(II)	3.2(IV)
Mean & Rank	2.3 (II)	1.7 (I)	2.6 (III)	3.2 (IV)

Note: Where 1 denotes "highest rank" and 4 denotes "lowest rank"

Table 2: Regression Model Summary

Model	R	R2	AdjustedR2	Std. Error of Estimate	F value ANOVA	Sig. level	β	t	Sig. level
1.	.700	.641	.589	.1821	34.281	.000	.658	8.128	.019

a. Predictors: (Constant), Routing and mapping
b. Dependent Variable: Effective Transportation Management System

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