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A CRITICAL REVIEW ON THE APPLICATION OF TRANSPORTATION PROBLEM IN BUSINESS ENTITY

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ABSTRACT
This paper reviews the existing literature and application of transportation problem with respect business and all functional areas. Modern business entity is no doubt facing vibrant competition in all the business models. The change management concept added with technical know-how and technological influence affected in all core business decision. It is imperative everyone wants to live and pace up with continuous rise in production cost, logistics changes, distribution techniques; extension of e-commerce added the fuel to the fire. Unless the companies are not keen on the competitive edge, then it will be thrown- out business circle and loose its market. In order to stay and compete the companies are vigorously apply various mathematical modelling techniques to solve their business problems. The main purpose of this paper is to illustrate the historic nature of transportation problem and related development and application for the business function and decision science.

Keywords: Transportation problem, business application, business performance

1.1. INTRODUCTION

Transportation is said to be major and frequent problems in the business world. The method is very complex. The result is in the form of a table. We might say that it is not a friendly user-interface. Transportation problem is kind of OR and widely used in business studies namely personal planning and inventory control, production scheduling, communication network, warehouse and supply chain management. In order succumb pressure on cost cutting methods, hectic competition; organizations are forced to take better ways of production, distribution or delivery of product to meet industry demands. Identifying least cost approach, shortest span of time, ideal production times, customer satisfaction are the core today business changing business environment. Mostly it is applied for minimizing cost with mixed constraints and multiple objectives with mathematical model.

It is understood that the transportation is a O.R. technique which is applied Low cost principle involving production of goods and transportation and warehouse management different places. It is kind of linear programming taking in to consideration movement of goods and from one place to another that is physical distribution.

The problem involves determination of optimum routes to minimize shipping costs from supply source to destinations. This optimum allocation of the commodity from various sources to different destinations is called transportation problem. The transportation problem involves the distribution products starting from manufacturing units to the warehouse, retailers, or the customers. These are very useful for business and the industries since it is a useful method that is used for the supply and distribution of goods to the final end-users.

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Definition

The transportation problem is kind of linear programming problem. The objective of LP is to cutting cost and distribution to various designated places originated from various sources (factory unit). The natural limitation of supply conditions will affect the demand pattern The cost of transport from a source to a target is directly comparative to the number of units transport.

1.2. TRANSPORTATION MODELLING

Industries require transporting their products available at several sources or production centers to various destinations. In this it involves high shipping expenses. This lowering cost produces organizational benefits and thereby increase the company profit, this is possible by the application of transportation model. It is noteworthy that it is widely applied in the field of scheduling, personnel, product strategy etc. This model is really not confined with ant distributive problems.

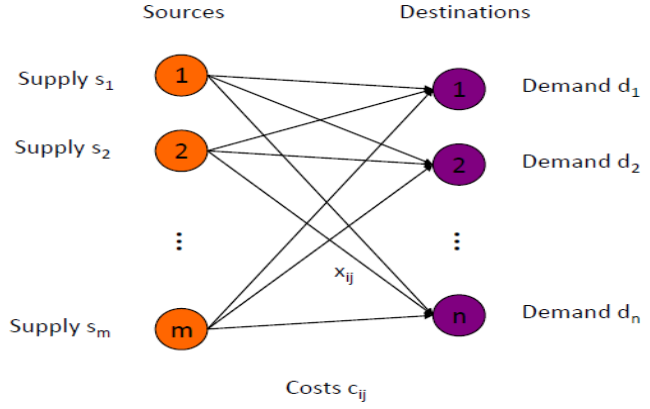
1.3. OBJECTIVE OF TRANSPORTATION PROBLEM

The objective of transportation is to minimize the costs of transporting goods and maximizing the profits of the company. Business and industry are focused with *"economic optimizations*" and "*cost minimization*" in order to find "*Best optimal possible way*". The transportation problem is optimization of the transportation problem to minimizing the transportation cost with the help of the optimizing the routs, staffs and different parameters which is money involve and calculating the transportation cost and the amount to be saved from the optimized value is to be used in the increasing the plant efficiency.

1.4. TRANSPORTATION PROBLEM AND ITS APPLICATION

The transportation problem is said to be kind linear programming; the objective is to control production designation to all the channels of distribution cost, number of designation, number of origin resulting to minimize cost of operations. If we consider the producer has got three plants namely P1, P2, P3 which are manufacture same products. The plant p1, the plantp2, the plant3 and the same distributed to the distribution points like three warehouses W1, W2 and W3.

Figure No.01. Simple Network Representation



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The year (1941), is the date for the transportation model came into existence. Hitchcock submitted a study says 'The allotment of a Product from Several Sources to Numerous Localities'. This gave importance to transportation problems. Koopmans (1947) called optimum usage of transportation System. These two presentations were the starting point of transportation models to meet two designations. Each shipping has got different designations and different market associated with cost conditions. The purpose is to decrease the charge of shipping while meeting the necessities at the objective. This transportation problem consists movement of goods form specified place to another designations vz, wholesaler, retailer, final consumer and retail outlet.

1.5. CRITICAL REVIEW ON LITERATURE ON DEVELOPMENT OF TRANSPORTATION BUSINESS APPLICATION

Author	***Major findings***
Hitchcock (1941)	• Mathematical model of the transportation problem came into existence.
Charnes and Cooper (1954)	• New stepping stone approach • Another approach to simplex method information.
Dantzig(1963)	• Simplex method and transportation problems • Primal simplex transportation method
Klein (1967)	• Primal method for minimal cash flows • Assignment and transportation problems
Hadley(1972)	• Linear Programming.
Kwak (1979)	• Improved transportation problem
Monge (1781)	• *The transportation problem by French mathematician*
Currin (1986)	• TP with inadmissible routes
Dantzig (1963)	• *Simplex method in the transportation problem*
Harold Kuhn (1955)	• *combinatorial optimization algorithm* • *Assignment problem in polynomial time*
Roy and Gelders (1980)	• *They modelled the customer allocation*
Arsham et al., (1989)	• *New algorithm for solving TP*
Tzeng et al., (1996)	• *Multi-objective transportation problem*
Das et al., (1999)	• *Fuzzy programming technique.*
Schrijver(2002)	• Transportation and maximum flows
Okunbor(2004)	• Transportation problems through goal programming
Rao & Mishra (2005)	• Linear Programming
A.C. Caputo et al., (2006)	• *Presented a methodology for optimally planning* • *Aggregation of customer orders*

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Putcha (2009)	• Developed a method which gives adequate number of entries for starting the transportation simplex algorithm
Klibiet al. (2010)	• Stochastic multi period location transportation problem
Chakraborty (2010).	• *Cost-time minimization in a transportation problem*
Korukogluand (2011)	• Proposed an improved VAM method for transportation problem
Alfred Asase et al. *2011*	• Transportation model of manufacturing goods
Veronica Ablordeppey et al.	• ABL • MODI • QMW • VAM
Tanveer Hussain 2011	• Optimization of Production System and Reliability
Atanu Das et al 2012	• Algorithm for solving this TP
Sudhakar et al. (2012)	• Optimal solution for TP
Gaurav Sharma et al. 2012	• Dual simplex and two phase method.
Mollah Mesbahuddin Ahmed et al. 2012	• Linear Programming Problem (LPP)
Rekha Vivek Joshi el al. 2012	• Three variables of transportation problem
Anudhya Mishra et al2012	• Assessment of coal quality of some Indian coals the coal samples collected for the study
(Rodrigue *et al.*, 2013).	• Global supply chain management
Rekha(2013)	• Optimization techniques for TP of Three Variables
Taylor(2013)	• Unbalanced transportation problem
Ajibade & Babarinde (2013)	• Transportation technique to determine the cost
Bangar A.(2013)	• Minimization of Inventory and Transportation Cost
Loch *et al.* (2014)	• Computational study -Feasible solution for TP
Kumaraguru *et al.* (2014)	• Had presented the comparative study of various methods for solving transportation problem.
Loch & Silva (2014)	• Computational study on the number of iterations to solve the transportation problem.
Afroz & Hassan (2015)	• They found out that it would be hard and time consuming to compute manually using the simplex method
Zhang Q. (2015).	• The Optimization of Transportation Costs in Logistics Enterprises with Time-Window Constraints

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Singh(2015)	• Transportation problem.
Amiolemhen, (2016).	• Studied Transportation cost minimization of a manufacturing firm using genetic algorithm approach.

CONCLUDING THOUGHTS

In the business world, a Manager must recognize the typical task of allocating units from sources of supply to destinations of demand to minimize cost and that various transportation techniques which are applied effect this allocation of units. How to distribute products so as to control cost the minimize the total cost of their distribution constitutes a good example of an everyday problem those transportation techniques can be applied to solve.

REFERENCE:

- A.R.Khan "A re-solution of the transportation problem: an algorithmic approach" Journal of Science, 2011.
- Abdallah A. Hlayel, Mohammad A. Alia "Solving transportation problems using the best candidates method" Computer Science & Engineering: An International Journal (CSEIJ), Vol.2, No.5, October 2012.
- Arsham, H. and Khan, A.B. (1959). A simplex type algorithm for general transportation problem: An application to stepping. Information and quantitative science, University of Baltimore, USA. Pages 219-226.
- Atanu Das, Manjusri Basu, Debiprasad Acharya "Fixed charge capacitated non-linear transportation problem" Journal of Engineering, Computers & Applied Sciences, Vol. 2, Dec 2013.
- C.U.Onianwa and F.I.Sadiq "A platform for solving transportation problem using an interactive system for optimal solution" African Journal of Computing & ICT, Vol 5, May 2012.
- Caputo, A.C. (2006). The genetic approach for freight transportation planning, industrial management and data system .*Vol.106,* No.5. Page 719-738.
- Chakraborty A. And Chakraborty M. (2010). Cost-time minimization in a transportation problem with fuzzy parameters: a case study. *J Transpn Sys Eng & IT, 2010*, 10(6), 53−63.
- Charnes, A. and Cooper, W.W. (1954). The stepping stone method for explaining linear programming calculations in transportation problem. *Management sciences 1*(1), 49-69.
- Chin Wei Yang, Hui Wen Cheng, Tony R. Johns and Ken Hung. "Nonlinear integer programming transportation models: an alternative solution" Advances in Management & Applied Economics, vol.1, 2011.
- Dantzig, G.B. (1963). Programming and extension Princeton University press. Princeton.
- Das, S.K., Goswami, A. and Alam, S.S. (1999). European journal of operational research: multi-objective transportation problem with interval cost, source and

ISSN: 2278-4632
Vol-10 Issue-6 No. 14 June 2020

destination parameter. Department of mathematics, Indian institute of technology, Kharagpur, India. *Volume 117*, issue 1, pages 100-112.

- Dhakry N. S. and Bangar A. (2013). Minimization of Inventory and Transportation Cost of an Industry"-A Supply Chain Optimization. *Nonihal Singh Dhakry et al. Int. Journal of Engineering Research and Applications. Vol. 3, Issue 5, Sep-Oct 2013, pp.96-101.*
- Edokpia, R.O. and Amiolemhen, P.E. (2016). Transportation cost minimization of a manufacturing firm using genetic algorithm approach. *Nigerian Journal of Technology (NIJOTECH) Vol. 35, No. 4, October 2016, pp.* 866 – 873.
- Gaurav Sharma, S. H. Abbas,Vijay Kumar Gupta "Solving transportation problem with the various method of linear programming problem" Asian Journal of Current Engineering and Math's, May – June 2012.
- https://brainly.in/question/4834291#readmore
- https://towardsdatascience.com/operations-research-in-r-transportation-problem-
  https://www.researchgate.net/publication/270810963_The_role_of_the_engineering
- https://sites.google.com/site/ijcsis/vol-8-no-8-nov-2010
  https://www.huffpost.com/entry/top-15-causes-of-car-accidents_b_11722196 1% -
- https://mywestford.com/blog/significance-of-warehousing-in-logistics-and-supply-chain-management/
- https://www.slideshare.net/shubharna/transportation-problem-51092991
  https://www.skubana.com/demand-forecasting-help-your-business/
- http://www.wbuthelp.com/chapter_file/1245.pdf
- https://towardsdatascience.com/operations-research-in-r-transportation-problem-
- - http://ecoursesonline.iasri.res.in/mod/page/view.php?id=2959
- https://brainly.in/question/4834291
- https://www.ijraset.com/fileserve.php?FID=9948
- https://www.slideshare.net/agniere68/transportation-problem-11656517
- https://www.slideshare.net/priyankayadav91/transportation-model-and-assignment-
  http://www.expertsmind.com/questions/engineers-role-on-
  transportation-problems-https://arxiv.org/pdf/1307.1891
- http://ijmaa.in/v6n4/251-256.pdf
  http://www.sapub.org/global/showpaperpdf.aspx?doi=10.5923/j.ajor.201909001
- https://www.researchgate.net/publication/301660695_A_literature_review_of_transportation_problems http://www.ijptonline.com/wp-content/uploads/2016/04/3554-3570.pdf
- https://www.scribd.com/document/391959250/Final-Final-Coca-Cola-Company-2010
  https://www.slideshare.net/Brainmapsolutions/hungarian-assignment-problem
  http://article.sapub.org/10.5923.j.ajor.20190901.01.html
- https://www.caluniv.ac.in/academic/department/Commerce/Study/Sem-II-AM-S-
- https://www.worldatlas.com/articles/the-25-largest-internet-companies-in-the-tml
- https://www.researchgate.net/publication/314086499_OPERATION_MANAGEMENT_ https://academic.oup.com/ajae/article/100/2/381/4819102

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- https://www.marketwatch.com/investing/stock/EDCI/SecArticle?symb=EDCI&guid=
- https://brainly.com/question/14494662
- https://www.researchgate.net/publication/276196320_Solving_Transportation_
- https://ca.linkedin.com/in/sadhak-gautam-2515a4103
- http://article.sapub.org/10.5923.j.ajor.20160603.01.html
- https://www.sciencedirect.com/science/article/pii/0378475493900675
- https://www.researchgate.net/publication/320834536_A_Case_Study_on_the_Optim
  https://www.informs.org/Explore/History-of-O.R.-Excellence/Biographical-/Charnes-
- http://www.oalib.com/paper/3126098
- https://ijmttjournal.org/archive/ijmtt-v65i11p518

