

A REVIEW PAPER ON EFFECTS OF SUPPLY CHAIN MANAGEMENT IN HIGHWAY CONSTRUCTION

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Abstract: The paper intends to study the effects of the supply chain management in highway construction projects. The highway construction plays a major role in the development of any nation by providing a transportation services to the various sectors of the economy. However the construction of highway has a number of problems related to it. They have been unduly delayed due to poor management of supply chain system in the sector. The study intends to explore the effects of supply chain in highway construction in order to enhance project delivery, as construction supply chain management is a promising approach to successfully achieve integration between the several disciplines of the chain i.e. internal and external suppliers, designers, vendors, contractors or sub-contractors and internal and external clients.

Index Terms - Supply Chain Management, SCM in highway construction.

I. INTRODUCTION

The construction industry is viewed as unique by the majority of commentators due to its complexity. It is an industry that is of significant importance to economies not only from an employment perspective but also because of the financial contribution it provides to an economy as a whole. However construction is also an industry which has and continues to be severely criticized for poor performance at almost every level of its operation. The key characteristics of any construction projects is the complex series of sequential and separate operations and tasks undertaken by individual parties resulting in construction projects being reliant on hundreds of organization, especially when delivering major construction projects like highway construction. The complex series of participants or providers is also referred to as the supply chain. The term supply chain is used to describe the linkages of companies which turn a series of basic material, product or services into a finish product for the client. Construction projects are unique and are characterized by one time activity. According to Vollman, Cordon and Raabe(1998),the construction supply chain must be considered as an integrated set of practices aimed at managing and coordinating the entire chain from raw material to end customer.

II. LITERATURE REVIEW

Alfredo Serpell and Boris Heredia (2003) This paper determines about the diagnostic study of the relationships between the participants of the supply chain management in construction. A questionnaire carried out, which was the part of the survey. It provides a methodology which is known as PDCA (plan-do-check-act).The steps of the methodology are initial analysis of the supply chain, planning and redesign of the supply chain, implementation of improvement actions, monitoring control and improvement. [1]

Chirag Patel and Bhavin Kashiyan The paper states about the fundamentals and objectives of supply chain. A simplified model for the supply chain management in construction has been introduced i.e. 1) the procurement process and 2) the construction service process. The procurement process deals with the supply of materials, equipment and labor to the construction site. The stakeholders in this process are the material producers, equipment manufacturers, the wholesalers, supplier's contractors and the sub- contractors. The chain in this process called 'procurement chain'. The construction service process essentially consists of clients, architects, designers, construction manager, contractors, sub-contractors, and the so formed chain can be named as construction chain. The methodology in this consists: - 1) supply chain assessment, 2) supply chain redesign, 3) supply chain control, 4) supply chain continuous improvement. [2]

Diego Souza and Lauri Koskela The aim of the paper is a discussion on improvement in construction supply chain management.It presents five managerial practices to be studied and implemented in construction supply chain management are suppliers development performance measurement, benchmarking, knowledge management, waste identification and elimination. [3]

Dr.Ghaith Al-Werikat The supply chain construction management plays a major role in construction market competition. The supply chain assists enterprises through helping to improve competition, increase in profits and control over the project. The paper discusses about the characteristics, problems, benefits and challenges of the supply chain management in construction sector. [4]

Eric Zimmer and Richard Shell The aim of the paper is on investigating improvement opportunities in the construction companies by utilizing the lean supply chain management. A field case study is performed with the help of a local contractor for the assessment with the lean supply chain: specifically fabrication, and logistics management of deliveries and the inventory. [5]

Kati Korbe Kaare and Ott Koppel(2012) The author of this paper gave an overview of road construction supply chains, performance measurement systems, the development of related Information and Communications Technology (ICT) in Estonian road construction management. The aim of this paper is to determine if there is need to develop and implement a national performance measurement system that gives feedback of road construction. The performance of measurement is done by key performance indicators which are reliability, major projects, safety, maintenance customer satisfaction and efficiency. [6]

M. Agung Wibowo and Moh Nur Sholeh (2015) The paper states about the supply chain performance measurement on road projects through a combination of survey and the simulation model. Performance measurement is done through supply chain operation references as a key performance indicator .SCOR is a reference model that is based on supply chain process. This model contains three main elements which are reengineering, benchmarking and process measurement. This will identify key performance indicator (KPI) that influences construction supply chain performance. The research strategy will compare the data from interviews and the questionnaire based on SCOR KPIs. [7]

Magdalene Wanjiru Kamaru(2012) The paper provides the information about the lean supply chain practices in urban road construction projects, Kenya. The practices include: emphasizing on proper customer focus; developing avenues for waste reduction in the activities; practicing continuous improvement in their processes and adopting just in time technique of inventory management. A questionnaire was prepared and data analysis is done through mean and standard deviation. [8]

Mohammed Saad,Martyn Jones and Peter James(2002) The paper overwrites about the early progress towards the adoption of supply chain management relationship in construction with the help of literature review and survey of the views of construction practitioners. The paper examines about the features of 'fifth generation innovation' which are: a multi factor process, a long process, a process comprising a number of stages including the need to innovate knowledge awareness planning and implementation, top management commitment. Rothwell (1992) defines fifth generation innovation as a multifactor process requiring high levels of integration at both intra and inter-organization levels. [9]

Nadia Zamer, Ilias P.Tatsiopoulos(2016) The paper deals for improving the construction supply chain management. The study is done on the basis of literature view regarding the definition of the supply chain, benefits, problems and characteristics of the supply chain in construction. This proposes managerial practices in order to achieve improvement in supply chain management in construction which are suppliers and subcontractor's development performance measurement, benchmarking, information technology, human resource and training. It also deals with major benefits that organization can achieve by applying supply chain management are: reduced real cost, delivery of better underlying value to the client, on time delivery, greater confidence in long term planning and better relationships between parties, more repeat business with key clients and better relationships between parties. [10]

Purnima Bajpai ,Megha Kalra and Ambardar Sunyna Bushanchandar (2016) The objective of the paper is to determine the risk that affect the supply chain management of the road infrastructure projects. Supply chain management identifies the issue that slow down the process of road construction. The methodology involved in this is a thorough literature review which was conducted to identify the major factors that causes delay in the completion of the road projects to form questionnaire survey. Risk Priority Number (RPN) analyzes the top ten risk factors from the questionnaire survey by the help of Failure Mode and Effect Analysis Technique. The top ten factors are land acquisition, delay in financial closure, delay in permits and permissions, delay in progress payment, delay in approvals and revision of design, drawings and documents, environmental clearance, legal risks. [11]

R.P. Mohanty and Anand Prakash(2015) The construction supply chain performance is done on the basis of process modeling and performance measurement. Process modeling is done for analysis of process based industry. It is done using the Supply Chain Operations Reference (SCOR) and the Global Supply Chain Forum. SCOR model is a tool for representing, analyzing supply chain for the purpose of benchmarking of processes and extraction of best practices. It is basically based on five management processes that are plan, source, make, deliver and return. The second GSCF identifies core supply chain processes that are customer relationship management, customer service management, demand management, order fulfillment, supplier relationship management and return management. Performance measurement is done for analyzing supply chain by assigning appropriate measures to the processes is always important for the purpose of informing, steering and controlling. Measures have been based on financial data as it is widely available for long. [12]

Reini Wirahadikusumah and Dewi Sulistyaningsih The paper aims to study about the role of owners in the supply chain of highway construction projects. A case study was done for comparisons of the three cases through intensive interviews with project managers and the different role of owners had been explored. The comparison considered among the three cases are human resource management and organization, the perception of value delivery; company finances; trust among parties; subcontractors / suppliers procurement; main contractor management; support from top management; supplier management; policies on scm. [13]

Roberto Arbulu and Glenn Ballard The paper tells to improve the management of supply systems in construction using lean principles and techniques. The aim is to assure on-time delivery of information and materials to project sites at least cost and maximum value for the final customer. This also illustrate about the combination of variability in demand and supply which has a direct impact on project performance increasing cost and time and reducing quality and safety. The basic need for lean supply chain is to accomplish supply management functions with least waste; e.g. low supply and demand reliability, large inventories not needed to absorb variability and physical waste. [14]

Ruben Vrijhoef and Lauri Koskela The paper defines about the four roles of supply chain management in construction. Firstly the focus is on the site activities supply chain. The aim is to reduce costs and duration of the site activities, the second focus is on the supply chain itself with the aim to reducing cost relating to logistics, lead time and inventory, third focus is on the transferring activities from the earlier stage and the last focus is on the integrated management and improvement of the supply chain on the site activities. In the last scm leads to the improvement in the understanding of supply chain construction problems. [15]

Shilpa Parkhi(2015) The paper is about the study of evolution and future of supply chain management. Various definitions by various authors have been identified by reviewing various papers. The literature review method is used for the answering of various research questions. It tries to find out the trends in evolution of the supply chain management. The methodology adopted in this are identification of areas, searches in various databases, sorting the literature for review and with the identification of major supply chain dimensions long term relationship, concurrent engineering, strategic purchasing. [16]

Sudhir Yadav and Gargi Sojitra Ray (2015) This paper gives an overview of supply chain management in the Indian construction industry. The author studied the supply chain management practice followed by case study approach in it .It tells about the improvement in the supply chain in Indian construction industry but also tells that there is a lack of maturity in it. It considered four flyover projects of the government authority which served as a client. It implemented a Love, Irani and Edwards's seamless scm model in the methodology. The paper defines that the main contractor is at the centre with links to clients, sub-contractors, suppliers and design services and agents involved in it have very limited knowledge about the supply chain management. [17]

III. CONCLUSION

The paper will summarize the research of the supply chain management in highway construction as highways are important for all over all social and economic development of any region. The aim of the supply chain management is to arrange the material and machinery and to simplify the operations so that practically no orders are necessary. The manufacturing is industry is using scm and implementing scm to get the satisfactory result. Highway Construction being different from manufacturing and other industries has many unique problems. The adoption of scm by highway construction companies will result in higher customer satisfaction, better quality product and higher share and stakeholder's satisfaction.

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