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Empirical Review of Elements Contributing To Supply Chain Management in Infrastructure/Construction Project Execution

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Abstract- The construction industry is more popular being a laggard when it comes to productiveness enhancement. This study pinpoints the elements curbing relationship and offers a design for creating a collaborative system strategy. Extreme fragmentation in the industry along with disparate venture management operations and non-standardized data is impeding effectiveness results. There were several scientific studies regarding relationship in the industry. This paper takes an explorative view of the procedures that underpin the associations in the construction sector to determine how venture arises and discovers elements conquering efficiency enhancements. The goal of this paper is to review elements inhibiting relationship also to figure out how effort could possibly be much better in the construction sector.

Index Terms-Supply chain integration, Lean management, multi-criteria decision-making, industrialized building systems, supply chain planning, Total Factor Productivity, Critical Path Method

1. INTRODUCTION

Even though the awareness of joining up and supply chain integration (SCI) has enhanced in numerous sectors, there is certainly still deficiencies in detailed conceptual and functional frameworks that make it possible for each a detailed along with systemic perception of integration in project-based supply chains. In this particular paper a strategic review is formulated, determined by general SCM, Lean and SCI literature, and still taken to a project-based framework. Integration in project-based supply chains is a multi-dimensional construct, like the four measurements strength, opportunity, timeframe, and degree of integration. It is necessary to identify various factors affecting and/or supporting Supply Chain Management (SCM) in infrastructure management. Construction is a backbone of overall growth, hence to streamline each process is a crucial need of future. Further section provides an overview of SCM, Lean management and integration analysis literature study.

2. LITERATURE REVIEW

This research proposes a multi-criteria decision-making (MCDM) framework and demonstrates the impact of competitive conditions on supplier evaluation process for construction supply chains. The paper focuses on the supply chain of a large-scale housing project in order to illustrate the role of competitive capability and supplier's profile and its influence on supplier evaluation based on prevailing supply/market conditions. Various scenarios are investigated to demonstrate the impact of competition on supplier evaluation. The contribution of the study lies in highlighting the impact of supply/market conditions on MCDM decisions causing supplier evaluation 'imbalance' and MCDM usage. This study is useful for project management, construction, supply chain management, sourcing professionals [1].

The factors impacting the adoption of industrialized building systems (IBS) technology is gaining increasing attention. The research methodology is embedded in an interpretative phenomenological paradigm that is applied through semi-structured face-to-face interviews with a group of 27 experienced construction stakeholders from across the industry. The 'inter-project perspective' is contextualized through an interpretative content analysis that synthesizes varied accounts of interviewees to identify the influence of different factors on IBS adoption. It is suggested that the IBS adoption

decision is complex and influenced by many interconnected 'aspects', beyond government incentives, cost, attitudes and skills. Moreover, a more integrative approach that considers all factors is needed to make the IBS adoption decision. However, because the intensity of influence of these factors/aspects may differ country to country, as may the nature of the construction industry, any attempt to develop a strategy or policy to increase IBS adoption or integration needs to be targeted [2].

The interest in lean thinking in the UK's civil construction industry is on the rise. The research presented in the paper evaluates the adoption of lean thinking in the highways construction sector by investigating 7 motivation factors, 20 lean techniques and 16 barriers through in-depth interviews with 20 sector managers and a questionnaire survey of 110 responses. The findings show the existence of strong external motivational factors for lean thinking such as clients' push and companies' expectation of winning more contracts alongside lean's operational benefits. Limited adoptions of the lean techniques, mostly in the stepwise process improvement cycle, the Last Planner System and Visual Management, were determined. This raises concerns about 'pseudo-lean' practices in the sector. Lack of standardization, insufficient benefit capturing, insufficient know-how, insufficient control of the entire value stream and limited view to the techniques were found as the top barriers [3].

This study aims to identify and categorize common on-site problems from a supply chain management (SCM) perspective and to trace the origin of these problems in the construction project process, the supply chain or in the intersection between these processes. This allows for identification of how on-site problems affect SCM in construction projects and how they can be mitigated. It is suggested that supply chain planning (SCP) can facilitate on-site problem mitigation in construction project management. This extends the body of knowledge of SCP in construction project management and supports the development of effective on-site construction project management. The results show that SCP can aid construction project management in handling on-site problems earlier in the project process [4].

The paper tackles a hybrid multi-criteria decision-making (MCDM) model related to supply chain management, problems, and the supplier selection problem. Modern management of materials and products requires continuous evaluation of numerous complex social, ecological, and economic factors. A group decision process using Analytic Hierarchical Process (AHP) approach presented to find the criteria weights. Measurement of conflict among criteria and decision makers presented with illustration and numerical example. Firstly, eight evaluation criteria, including cost, quality, distance, and delivery, reliability, reputation, and technology level, compatibility, and development ability identified [5].

The purpose of this study is to analyze the impact of smart city initiatives and big data on supply chain management (SCM). More specifically, the connections between smart cities, big data and supply network characteristics (supply network structure and governance mechanisms) are investigated. Smart cities have different implications to network structure (complexity, density and centralization) and governance mechanisms (formal vs informal). Moreover, this work highlights and discusses the future research directions relating to smart cities and SCM. Smart cities and big data alone have limited capacity of improving SCM processes, but combined they can support improvement initiatives. Nevertheless, smart cities and big data can also suppose some novel obstacles to effective SCM [6].

Until the early 1990s, studies focused mainly on how to view and manage a supply chain in the traditional molds of mass production. However, from this decade new concepts and tools began to emerge, which were being tested and interconnected SCM, mainly aspects of lean production. In this context, the objective of this article is to present a research panorama on Lean Supply Chain Management (LSCM), contributing to guide studies in the area. A research carried out methodologically characterized as a systematic review of the literature, of theoretical nature and qualitative approach [7].

There are several supply chain-related problems facing the construction industry, such as poor construction site logistics, lack of communication and trust. These problems can jeopardize construction projects through delays and cost overruns. Supply chain planning, a part of supply chain management (SCM), can be used as a tool to deal with these problems. The purpose of this study presented how linkages between common supply chain-related problems in construction can be illustrated and to demonstrate how they could be resolved through supply chain planning. Firstly, author identified how the linkages between common problems can be illustrated, and secondly the role of supply chain planning in resolving these problems is discussed. A conceptual model is developed that was verified using one case of supply chains. The study thus demonstrated how supply chain planning can aid in resolving supply chain

problems. The paper contributes by bringing planning back into the picture and by showing how supply chain planning can help to adopt SCM in construction [8].

Productivity is an endemic issue that challenges the Hong Kong construction industry. Studies addressing labor productivity abound; however, few have investigated and analyzed the key influencing factors that affect the Total Factor Productivity (TFP) by using correlation analysis. This study identified the key influencing factors to the TFP growth and provides insights and solutions to enhancing construction productivity at industry, organization, and activity levels. A number of important measures were identified to improve the TFP growth, including young workers engagement and motivation, research & development investment in automated or semi-automated installations, assembly, and building industrialization, lean thinking, and project development incentives at industry level. Additional ones include addressing labor management, training and education at organization level, as well as labor co-operation and on-site learning at activity level. The findings contribute to a better more comprehensive understanding of construction industry productivity [9].

As per author, the knowledge and deepening of the Lean Construction methodology, as well as its practical application in the construction industry in Spain, can produce great benefits Target Value Design (TVD) seeks to achieve the highest value for the client as the main objective of the design and construction of the building. According to Professor Glenn Ballard of the University of Berkeley, California, USA, 2005, TVD is: "A management practice whose objective is to generate the maximum value for the client, at a fixed target cost, below the market price, and at the same time a method of continuous improvement and reduction of waste". Other writers such as Daria Zimina of Loughborough University, Leicestershire, UK, 2012, define it as:" A driver of design that seeks the highest value for the customer in terms of design, cost, schedule and constructability, and by this mode reduces waste, satisfying and even surpassing their expectations". Therefore, in both definitions we see that there are two basic factors of TVD, which are: Customer Value and Target Cost. Consequently, to deepen its study we must analyse both concepts [10].

Apart from TVD elements, Critical Path Method (CPM), a planning and controlling technique, is widely used in the construction industry. However, CPM is criticized for its lack of workflow and inability to schedule continuous resource usage. Location-Based Management System (LBMS) fill these gaps and has been implemented in many construction projects. We propose that LBMS will improve schedules and project performance, addressing CPM's main shortcomings. This study is composed of three case studies. CPM schedules were analyzed and were improved using LBMS tools. The resulting schedules show improved workflows, crew balancing, and resource usage and had fewer interruptions, without affecting project duration. Furthermore, LBMS schedules were optimized with only a few scheduling operations and fewer planning elements. The computational benefit of LBMS increases with the number of locations and tasks in a schedule. Project managers will benefit from a simpler scheduling process and better resource flow [11].

The empirical study was carried out in an industrial plant construction project. The company analyzed in this study, holds a huge volume of contracts in Brazil for exploration and production, logistics, distribution and petroleum refining and derivatives. Industrial construction management increasingly needs to integrate processes, technologies, and people to support strategic objectives and seeks to eliminate waste to achieve more efficient results. From this, the synergistic use of building information modeling (BIM) and lean construction (LC) principles can bring continuous improvements to the construction industry. This paper proposes a novel methodology for interdisciplinary management of construction projects by integrating BIM into LC. the research proposes the Digital Obeya Room framework for visual management of industrial pipelines manufacturing. A real-world application evaluates this new proposal on production planning and control of an industrial construction. From this experiment, the study presents results from a focus group that correlates the applied BIM functionalities and lean principles with the PDCA stages of industrial construction. This paper contributes to planning predictability, integration among stakeholders and usage of lean and BIM for continuous improvement of engineering management [12].

Traditionally, construction organizations with a track record of successful project completion were considered successful construction organizations. However, if construction projects were successful, then it is not always necessary for the construction organization to also have been successful. They can even fail and go bankrupt. Therefore, there is a need to think about the success of construction organizations at a corporate level rather than focusing only at the project level. The objective of this study was to identify and to evaluate the successful attributes for construction organizations.

The research methodology involved seeking responses from experts in the construction industry through a questionnaire survey. This study presents the factors that contributed to the success of construction organizations that operate in the National Capital Region of Delhi, India. Factor analysis of responses extracted eight critical success factors: experience and performance, top management's competence, project factor, supply chain and leadership, availability of resources and information flow, effective cost control measures, favorable market and marketing team, and availability of qualified staff. The top management's competence emerged as the most critical success factor against various performance factors. The success factors that were identified in this study should provide a guideline to construction organizations for their success [13].

The urban centers in India are experiencing a rapid transformation, both controlled and uncontrolled, supported by the growing economy in the past two decades. However, this rapid urban growth has led to failure of urban authorities to regulate and implement safe building standards and practices, resulting in risk accumulation in the urban centers. Building regulation is an important tool to address the problems of uncontrolled development and increasing disaster risk. In spite of existence of various codes and guidelines (BIS codes, NDMA guidelines, and PWD/CPWD manuals), nothing has proved accountable enough to scale down the magnitude of the vulnerabilities of building stocks. In India, state governments, local bodies (urban and rural), development authorities, special and new town development agencies, etc. are directed to modify, revise, and revamp the existing building regulations, planning, and safety standards in line with the National Building Code (NBC) 2015 with due consideration for the local variations. But implementation has remained a challenge due to weak institutional and financial capacities of the urban local bodies and non-emergence of specified agencies/expertise in the country. The strengthening and capacity building of various building development and regulating agencies with adequate level of expertise for proactive responses need to be supported by the building professionals and builder's lobby [14]. Interface management is one of the major keys for a successful construction project. During the project, many interface problems may arise, and their severities may vary and affect the overall project performance. This research was conducted to identify the causes of design–construction interface problems in large building construction projects in Palestine. To achieve the research objectives, a comprehensive literature review, pilot study and questionnaire survey were carried out to collect information on these causes. Responses from 34 consultants and 30 contractors were analyzed. The results revealed that the top 10 extreme significant causes are 'unstable client requirements', 'lack of proper coordination between various disciplines of the design team', 'awarding the contract to the lowest price regardless of the quality of services', 'lack of skilled and experienced human resources in the design firms', 'lack of skilled human resources at the construction site', 'delaying of dues payments', 'lack of specialized quality-control team', 'lack of professional construction management', 'delaying the approval of completed tasks' and 'vague and deficient drawings and specifications' [15].

3. CONCLUSION

There's hence recently been equivalent enhancement in the consistency, persistence, and simplicity to design studies of construction/infrastructure supply chain management. The future ought to notice much more multi-criteria decision-making assistance strategies in supply chain purposes, along with methodological developments, such as life cycle dependent optimization designs, powerful supply chain operations, sustainable supply chain operations, and also software implementations of new research strategies. In summary, it will be possible how the comparatively higher influence of supply chain operations on organization decisions is not just associated with comparatively minimal usage of the strategy by decision makers in operation, but additionally to reasonably minimal relevance of conventional supply chain management for these kinds of requirements.

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