Chapter 66
Prioritizing the Enablers of Construction Supply Chain in the Industry 4.0 Environment

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ABSTRACT

Industry 4.0, the fourth-generation industrial revolution, is not only changing the manufacturing industry but others also, like the construction industry and the related supply chain issues. The construction industry has its own challenges (e.g., temporary work and involvement of high coordination, among others). This study is an attempt to explore the enablers to overcome these issues and prioritize them. Decisions are more complex if they are intangible, non-expressible, qualitative, etc. To overcome this problem in the present study, AHP technique is used. With the help of AHP, 4 enablers and 14 sub-enablers of construction supply chain are prioritized. E-supply chain management is ranked first followed by digitization, tracking and localization, and cloud computing. In the case of sub-enablers, web service technology comes at first rank whereas management information system comes at 14th rank. This study will help the managers and professionals in construction organizations in building a good setup by focusing on these explored enablers.

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INTRODUCTION

First industrial revolution began in 1800s with the emphasis on mechanization and generation of mechanical power. It involved the transition from manual to manufacturing. The second industrialization in 1900s began with the use of electrification, resulting in mass production followed by third industrial revolution. The third phase of revolution started in 1960s with the use of digitization, use of microelectronics which facilitates the flexible production (Man and Strandhagen, 2017) with different production line controlled by programmable machines (Rojko, 2017). Such production systems still do not have flexibility regarding to the quantity.

In today's era, due to the development of information and communication technology, industry is compressed with increasing competition and fast changing consumers preferences. Moving ahead from Industry 3.0 which utilizes ICT tools to bring competitiveness the next revolution is being notified as Industry 4.0

This industrial revolution is termed as fourth generation revolution (Industry 4.0) (Gertler, 2003). Which emphasizes on functioning of smart factories with the help of Internet of Things (IOT), Cyber-Physical system and Big data. This concept comes from Germany which involves the decentralized control of manufacturing processes with advanced connectivity features and smart automation. Industry 4.0 organizations are not only limited to the use of advanced technology but also the decreasing cost, fast production and better quantity. According to Industry 4.0 organization could result in reduction of production, quality management and logistics cost up to 30%, 20% and 30% respectively. Additionally Industry 4.0 will also be beneficial in terms of shorter supply time, mass production, more human friendly work environment, and effective utilization of resources (Kagermann et al., 2013).

Despite the ever increasing application of Industry 4.0, the companies from the field of construction are not able to integrate these practices to keep pace with the counterparts like automotive and electronic sector (Hampson & Sanchez, 2014). One of the reasons could be attributed to the nature of industry itself. As, the construction value system is the result of collaboration of sub-contractors, unorganized workers and customers itself hence it is difficult to make of them innovative and tech savvy. Numerous interrelated processes and sub-processes, construction at different locations makes the construction industry more complex (Dubois and Gadde, 2002; Arayici and Goates, 2012).The output in the form of unique project requires high degree of customization, limited time, face locational challenges, coordination among the small and medium suppliers (Dubois and Gadde, 2002). Supply chain management playing an important role in increasing the productivity of construction industry (London, 2004; Prakash and Mohanty, 2014).

In spite of the fact that the construction procedure is extraordinary, SCM can be helpful and successful in construction. The SCM in construction includes a number of internal and external parties which work in coordinated manner to get the work done within the stipulated time interval. The SCM can play a significant role to achieve integration between internal and external suppliers, designers, contractors, subcontractors etc.

In view of that a number of researchers have reported the various factors affecting the efficiency and effectiveness of SCM in the field of construction. Some of them includes Lack of coordination, Design problems, Poor quality of materials, poor planning and control Akintoye et al., (2000), Ofori, (2000).

To get the winning edge of the SCM at global level it is important to design and implement a highly coordinated supply chain at global level to get the competitive advantage. While that all sounds great, the greatest obstacle to finishing this change is that a large number of the supply chain managers as of now in administration positions are not set up to bridle the capacities of this new transformed coordi-