

Multiple-Material Flow Control in Construction Supply Chain with External Storage Site

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Abstract : Managing and controlling the construction supply chain (CSC) are very important components of effective construction project execution. The goals of managing the CSC are to reduce uncertainty and optimize the performance of a construction project by improving efficiency and reducing project costs. The heart of much SC activity is addressing risk, and the CSC is no different. The delivery and consumption of construction materials is highly variable due to the complexity of construction operations, rapidly changing demand for certain components, lead time variability from suppliers, transportation time variability, and disruptions at the job site. Current notions of managing and controlling CSC, involve focusing on one project at a time with a push-based material ordering system based on the initial construction schedule and, then, holding a tremendous amount of inventory. A two-stage methodology was proposed to coordinate the feed-forward control of advanced order placement with a supplier to a feedback local control in the form of adding the ability to transship materials between projects to improve efficiency and reduce costs. It focused on the single supplier integrated production and transshipment problem with multiple products. The methodology is used as a design tool for the CSC because it includes an external storage site not associated with one of the projects. The idea is to add this feature to a highly constrained environment to explore its effectiveness in buffering the impact of variability and maintaining project schedule at low cost. The methodology uses deterministic optimization models with objectives that minimizing the total cost of the CSC. To illustrate how this methodology can be used in practice and the types of information that can be gleaned, it is tested on a number of cases based on the real example of multiple construction projects in Kuwait.

Keywords : construction supply chain, inventory control supply chain, transshipment

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