SUPPLY CHAIN PLANNING UNDER POSSIBLE JOB ACTION

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EXTENDED ABSTRACT

Research on supply chain risk management primarily deals with managing operational risks, such as uncertainty in demand, uncertainties in supply lead times and the like. Disruptive risks, such as the ones caused by natural disasters, labor disputes, and terrorism are less studied. These latter require design of resilient supply chains. The West Coast dockworkers lockout strike in 2002 caused disruptions that were partially resolved by building inventories. That was only effective primarily for low cost items and when the disruptions were imminent, or could be predicted with reasonable confidence. Many high cost items moved via air during 2002 at considerably higher costs.

In this presentation the results of a study that aimed to develop quantitative decision support tools to assist management decision-making in the light of possible job actions by the unions and/or terminal operators in the West Coast seaports of the United States will be discussed. The problem involves, in addition to uncertainties in demand and uncertainties in supply lead times (e.g. "slow-steaming" by shipping lines), disruptive risks due to labor disputes. Decision makers have various courses of action in the face of varying degrees of uncertainty of a possible dockworker work stoppage or slow-down, or a lockout by terminal operators. This is not a hypothetical scenario as it had happened in 2002 and there was possibility of it is happening in 2014, which was not averted. There are still major problems and both sides are discussing arbitration. There is a huge backlog of containers that the operators are trying to clear.

The courses of action available to decision makers are use of airfreight (a roughly 10 times more expensive transportation mode than the sea lines), use alternate seaports in Canada or Mexico (with considerable additional transshipment costs), and/or build up inventory (necessitating cost of re-adjustment of the production plans at the source manufacturers, in addition to incurring considerable inventory holding costs). Since there is over-capacity on Pacific sea-lanes other than in Q4 of each year, all of these and any combination of them are possible. When one considers the multi-item, stochastic, and dynamic nature of this production-transportation-distribution system, intractable nature of this problem becomes clear. In the presentation various modeling approaches, such as multi-stage stochastic programming, will be proposed and computational feasibility of these models will be discussed.