Centre of Excellence in Supply Chain Management

10th Workshop on Logistics and Supply Chain Management

Louvain School of Management
Université Catholique de Louvain

November 23th, 2009
Facultés Universitaires de Saint Louis, Brussels

PROGRAM

12:30 - 13:15	Sandwiches in the meeting room
13:15 - 14:00	**Luo KAI,** "*Two-Capacitated-Supplier Two-Stage Periodic-Review Supply Chain Problem Investigation*" HEC, Paris
14:00 - 14:45	**Johan LUNDIN,** *" Redesigning a closed-loop supply chain exposed to risks : network flow modeling of a cash supply chain "* Lund University, Sweden
14:45 - 15:00	Break
15:00 - 15:45	**Jean-Charles LANGE,** "*Should logistic containers be accumulated in regional depots? A business case "* Université Catholique de Louvain, Belgium
15:45 - 16:30	**Amir GHAREHGOZLI,** "A Shared stacking policicy to stack export containers based on their retrieval times " Rotterdam School of Management, Erasmus University, The Netherlands
16:30 – 17:15	**Hoda DAVARZANI** *" Contingent Management of Supply Chain Disruption : Effects of Dual or Triple Sourcing "* Lund University, Sweden

Summary of Abstracts

Two-Capacitated-Supplier Two-Stage Periodic-Review Supply Chain Problem Investigation

Luo KAI

Abstract

In this paper, we investigate a two-product-two-capacitated-supplier, single-retailer, periodic-review supply chain problem dealing with inventory-allocation. Any unsatisfied demand is lost. We approach the optimal solution by solving sub-models sequentially and give managerial insight through numerous numerical examples. A model with random-yield assumption is formulated after that.

Redesigning a closed-loop supply chain exposed to risks : network flow modeling of a cash supply chain

Johan LUNDIN

Abstract

Supply chain management includes coordination and motivation of independently operating partners. Therefore, it is important to align logistics structures, processes and incentives, especially when making major redesigns involving those components. Traditionally, cost, quality and service have served as performance indicators for supply chains, but lately risk is also taken into consideration (Tang,2006).

A supply chain facing risk in terms of antagonistic threats, but also of high societal interest, is the cash supply chain (CSC), which provides society with notes and coins (Rajamani et al., 2006). It typically consists of independent cash manufacturers, a central bank, and logistics service / security providers. Together, they form a closed-loop supply chain (Guide and van Wassenhove,2006) that through their warehouses and transport means supplies cash to their customers (banks and retailers), whom in turn enables society's cash consumption. The CSC studied in this paper has during the last couple of years made several redesign attempts in network structure (e.g. reducing number of warehouses), processes (outsourcing), and incentive mechanisms (payment schemes and policies). Most attempts were carried out in order to decrease operating cost, but decreased cost must be balanced with security and risk.

The purpose of this paper is to present a network flow model that enables us to evaluate and analyze supply chain redesign decisions based on operating costs and risks. Previous studies on redesigning supply chains with regards to risk are focused on minimizing the total risk for transports of hazardous materials (Kara and Verter, 2004; Erkut and Gzara,2008), Typically, these studies are delimited to routing a truck from A to B and the design of the underlying road network between these locations. This motivates a model that can capture more aspects of a supply chain design, which in this paper is illustrated by using a number of redesigns implemented or discussed in the risk exposed cash supply chain.

The results show the importance of performing proper analyses before major supply chain redesigns in order to avoid misalignments leading to counter productive results with increased costs and risk, in order words increased total cost. It is also shown that incentives and policies for consolidating transports and local recirculation of cash can reduce risk costs as well as total cost. Furthermore, it is noted that a reduction in warehouses reduces operating costs but increases risk costs. In conclusion, decisions to reduce operating costs and risks are in practice not always aligned when it comes to redesigning a closed-loop supply chain exposed to risks.

Should logistic containers be accumulated in regional depots? A business case

Jean-Charles LANGE

Abstract

Reverse logistics is now recognized as an important matter in supply chain management. In this paper, we focus on the return flow of reusable items such as pallets, bottles or trestles. We examine an important strategic question that originally came from a glass producer: should depots be introduced in the return network? The optimization model we propose allows evaluating the cost of this option, including transportation and holding. Furthermore, several insights are offered about the network design: how many and where depots should be positioned, to which clients and factories are they related, what should be the frequency of the shipments, how many items are needed in the network, etc. Thanks to realistic assumptions, a continuous model is formulated, which further has the advantage to decompose into a simple problem and a linear-like program. We then build on this to propose a simple iterative heuristic, which allows solving large problems in a reasonable amount of time. Finally, we apply our method on a realistic illustrative example (10 factories and 500 clients) and provide experiments to analyze the impact of various parameters of the problem.

A shared stacking policicy to stack export containers based on their retrieval times

Amir GHAREHGOZLI

Abstract

Reshuffling is one of the most costly operations at container yards for loading export containers onto the containerships since it increases the berthing time of containerships. In this paper, a shared stacking policy is proposed to stack the export containers of multiple containerships and weight groups in one block of containers. A dynamic programming model is suggested to determine the exact storage positions of the export containers based on their retrieval times in order to minimize the expected number of reshufflings. The retrieval time is approximately calculated based on each container's weight and the containership to which it belongs. Dynamic programming model is not capable of solving realistically-sized problems in a reasonable time, so a heuristic algorithm is suggested. The main aim of the heuristic algorithm is to build decision trees which can be applied to solve both small-scale and large-scale problems. The decision trees summarize and generalize the results of the stochastic dynamic programming model achieved so far. They can be further involved when results of the exact model for larger size problems are available. The numerical results show that the shared stacking policy performs better than the dedicated stacking policy. The efficiency and effectiveness of the heuristic algorithm are also depicted in the numerical example section.

Keywords*: Container yard, Shared stacking policy, Retrieval time, Dynamic programming, Heuristic algorithm, Decision tree*

Contingent Management of Supply Chain Disruption: Effects of Dual or Triple Sourcing

Hoda Davarzani

Abstract

As a result of globalization in the past two decades, supply chains are encountering more unknown conditions and disruptions that could block the material flow and that may even result in end-product manufacturing failure. Researchers addressed different mitigation (Tang, 2006, Pochard, 2003, Marley, 2006, Craighead et al., 2007) and contingency (Tomlin, 2006) strategies for reducing the impacts of disruptions. But the problem is lethal when a single source of the firm is disrupted and cannot continue its role anymore.

This paper studies a single product setting in which a firm can source from multiple suppliers. One supplier has unreliable capacity while other suppliers are reliable but have lower product quality. The addressed context (where a case study has been made) is disruptions due to sanctions which cause failure in the supply from the unreliable source. The important question which emerges here is how the companies should use different strategies for single/dual/multiple sourcing to handle those potential disruptions. Previous studies represented the idea of dual sourcing as a mitigation strategy (Pochard, 2003) and rerouting as a contingency strategy (Tomlin,

2006), but in their study disruption will not last until the end of study-horizon; while in this research sanction is a rare but long disruption and influences the strategic decisions.

In this paper two possible strategies are addressed and compared as the combinations of mitigating and contingent plans, which are dual and triple sourcing. Dual sourcing provides the firm with the opportunity of rerouting (from a low quality supplier) after disruption. However, problems of monopoly rise after the disruption and the buying firm lose bargaining power. In this situation, the remaining supplier could increase/renegotiate the prices due to the monopoly situation (which has been seen in the case study). Whereas, in triple sourcing, the setup cost could be higher, but after the disruption there would still be competition between two suppliers and the price would not increase unreasonable.

Further, already when asking for future prices the buyer could screen the proposed prices offered for non-sanction and sanction scenarios and potential renegotiation closures. The scenarios of being one of two versus three suppliers would probably impact the suppliers' offers.

The main focus of current work is on defining the share to give each supplier, and define which sourcing policy (dual or triple) to apply for different probabilities of disruption. In the dual sourcing option, supply share should just be calculated before disruption. The problem for triple sourcing is vaster and the step of calculating supply share before disruption follows with investigating supply share after disruption. The above decisions are made to minimize the long run average cost and in both options, the main costs are categorized into set-up cost, ordering cost, inventory cost, quality cost and lost order cost.

One research question is to define for which probabilities of disruption the triple sourcing strategy would be more cost effective: ordering cost and unit prices would be higher before a sanction, but if a sanction occur the lower post unit price (due to no monopoly situation) might outbalance this.

Keywords: supply chain disruption, dual-sourcing, triple-sourcing, sanction.

References

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