Backup Contracts for Managing Disruption Risks in Supply Chains

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Supply Disruption:
Disruption that happens at the supplier side which means *the quality of products fails, expected shipments are late or fail* to arrive due to various reasons, such as production failures, strikes, fires and others, and a supplier’s business fails. Supply disruption will break down the connectivity of the supply chain and it accounts for over 70% of supply chain failures.
Motivation

• Many companies have experienced supply disruptions during the series of tragic disasters over the past few years.

• Such disruptions can negatively affect an enterprise’s financial performance, such as lowered stock prices and a slower growth rate.

• Companies that have a pre-determined backup plan not only responded quickly to the disruptions, but also sustained and even improved their market competitiveness.
Supply Chain Coordination: to achieve profit maximization along the supply chain and allocate the increased profit properly so that each party on the chain can be benefited from the coordination.

Backup agreement: A contract to provide a service which includes the method of performance, the fees, the duration, the services provided, and the extent of security and confidentiality maintained.
Research Goal

- Our research is trying to help managers build a flexible supply network to deal with supply chain disruptions.
  - an investigation into the impact of various risk environmental factors on the supply chain continuity;
  - adaptation of existing contracts for disruption management;
  - new forms of supply contracts are designed to provide guidelines given the firm’s environmental conditions.
Research Questions

Risks
- Demand uncertainty
- Supply disruption
- Recurrent supply uncertainties

Maximize
- Buyer’s profit
- Backup supplier’s profit

through

Different Contracts
Research Plan

- **Case study and literature review:**
  Summarize and analyze how disruption has affected supply chains and how disruption management has been done *in real world* from case study or has been researched from literature review of risk management and disruption management.

- **Modeling the decision on whether or not using a backup supplier:**
  Considering various disruption scenarios on frequency, magnitude and time as well as the buyer’s risk preference, demand pattern etc., deduce *the buyer’s cost and profit function to help OEM make decision*.

- **“Backup agreement” study**
  Using mathematical model and tools (such as Matlab) to simulate supply chain disruption and examine the impact of various environmental factors. Based on *Game Theory* and analysis above, develop contracts to deal with disruption and maximize global profits.

- **Comparative study**
  Choosing the *better contract type* after a comparison of the existing contracts and new types based on efficiency and profitability.
Framework for Contract Design

Questions to be answered

● What is the execution procedure of using a backup supplier?

● What is the relationship between the OEM and its backup supplier?

● What information should be provided by the OEM to the backup supplier?

● How much is the cost required by the OEM to the backup supplier?

● What is the time frame of the backup agreement?
My Work

Supply Contracts
- "Achieving Better Coordination through Revenue Sharing and Bargaining in a Two-Stage Supply Chain"
- "A Coordinated Revenue-Sharing Contract for a Two-Stage Supply Chain with Linear Stepwise Unit Inventory Holding Costs"
- "Research on the Two-part Revenue-sharing Contract under Demand Disruption"

Supply Disruption
- "The Decisions on Backup Supply in the Presence of Supply Disruptions"

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- "Coordination with a Backup Supplier through Buy-back Contract under Supply Disruption"
- "Make-to-order Contract with a Backup Supplier under Recurrent Supply Uncertainties and Disruption Risks"
Thank You!

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