

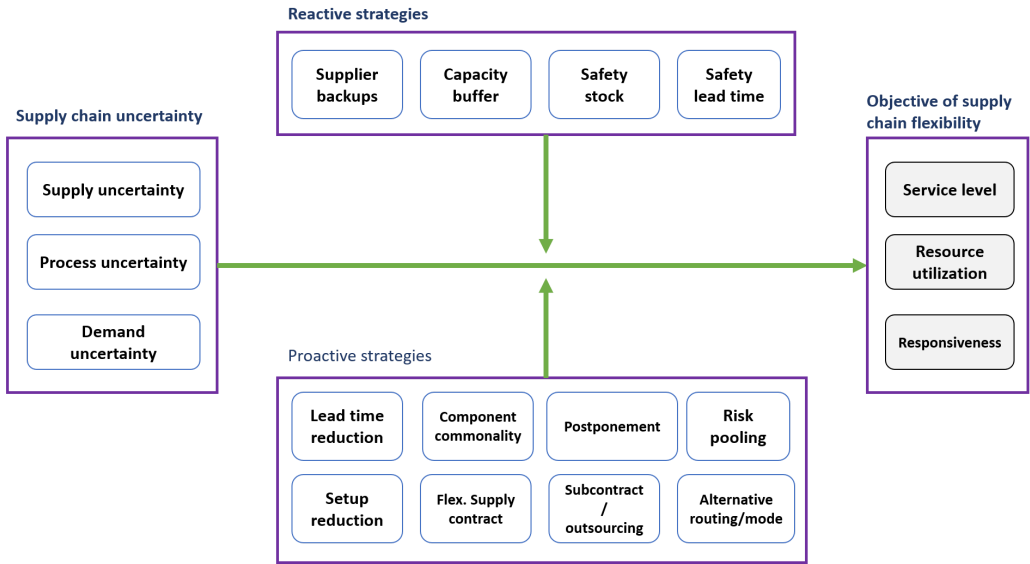
1. Problem Statement

Manufacturers to produce products with quality that can be accepted by customers and deliver these products at competitive costs with very reliable delivery times. Achieving high levels, on time delivery, and efficient processes throughout supply cannot be relied on by a single organization, but must be ensured through collaboration and coordination with trading partners.

2. Research Question

Research Question: (1) What strategies have companies pursued to improve flexibility in the supply chain? (2) In dealing with uncertainty, do companies tend to reactively buffer themselves or use more proactive strategies?

3. Model Conceptual



4. Case Studies

1. A project-based company of producing new ships and repairing old ones respond to customer orders.
The production process consists of five stages. It begins with body construction, pipe fitting, installation of machinery or engine, electrification and, finally, running tests.
2. A supplier of packing items such as plastic bottles and tubes for the consumer goods industry
The production process is fairly simple, with only a few steps, including molding, printing, and stamping.
3. Company C produces circuit breakers for several industry sectors (telecommunication, transportation, watercraft and special vehicles, industrial equipment)
Production processes for one type of product are different from those for other types and the processing times vary significantly. Even variants within the same product type could have different processes.
4. Company D produces pharmaceutical products, operating three plants. Materials are categorized into four: main material, supporting material, primary packaging, and secondary packaging.
There is high process similarity across different products. Production capacity for each product type is fixed, but there is a possibility to increase production volumes through the use of overtime hours.

5. Analysis

5.1 Typology of Supply Chain Uncertainty

	Low	Moderate	High	
Case 1	Low	Moderate	High	Demand
Case 2	Low	Moderate	High	
Case 3	Low	Moderate	High	
Case 4	Low	Moderate	High	
Case 1	Low	Moderate	High	Supply
Case 2	Low	Moderate	High	
Case 3	Low	Moderate	High	
Case 4	Low	Moderate	High	
Case 1	Low	Moderate	High	Process
Case 2	Low	Moderate	High	
Case 3	Low	Moderate	High	
Case 4	Low	Moderate	High	

5.2 Flexibility Strategies Adopted

	Case 1	Case 2	Case 3	Case 4
Safety Stock	Low	High	High	Moderate
Safety Lead Time	High	Low	Low	Low
Capacity Buffer	Low	High	Low	
Backup Supplier	High	Low		High
Component Commonality	Moderate	High	Moderate	Low
Postponement	High	High	Moderate	
Subcontracting	High			

5.3 The Impacts of Power Structure in Supply Chain Relationships

	Most Obvious Flexibility Attributes	Problems	Impacts
Case 1	Ability to produce various types of products	Problems with cash availability that prevents the company to obtain sufficient materials in due time	Poor on-time delivery (only about 70%) Idle resources because of waiting for materials
Case 2	No frozen schedule, customers are allowed to change orders any time	Long setup time Frequent breakdown	Large inventory buffer (up to 6 weeks demand) Fluctuated capacity utilization
Case 3	No limit on minimum order quantity, some customer orders have a quantity of one unit Ability to produce a very large number of products variants	There is only one very dominant supplier that limits supply flexibility Long supply lead time	Poor on-time delivery reliability to customers High inventory of raw materials (about 3-4 months)
Case 4	None looks obvious in Case 4	Limited warehouse capacity that prevents forward buying for materials	On-time delivery of about 90% which is quite low for highly predictable demand Lost sales

- Figure 1 illustrates the power structure and flexibility configuration of Case 2. The single direction arrow from customers to the company indicates the dominating power of the customers, while the two-way directions between suppliers and the company indicates balanced power between the two.
- Figure 2 illustrates the power structure and flexibility configuration of Case 3 seems to be positioned between dominant, inflexible suppliers and demanding customers. As a consequence, the company has to absorb uncertainties regarding inventory of materials.

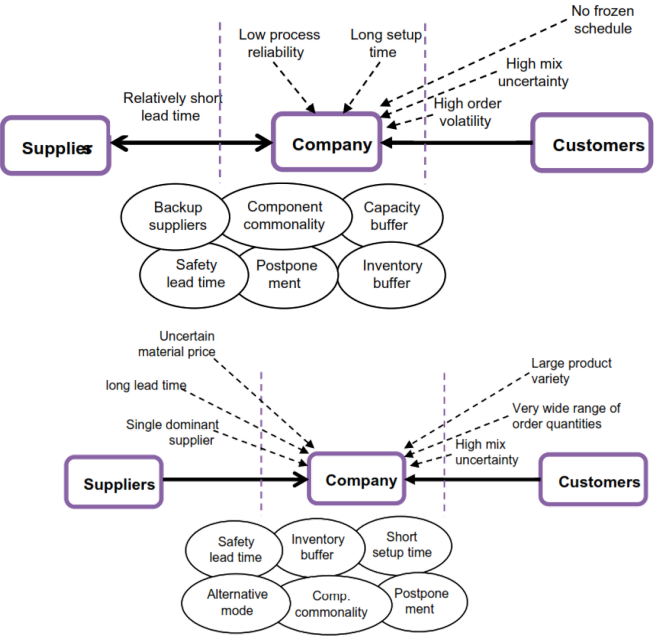


Illustration of power structure and flexibility configuration for Case 2 and 3 (Fig. 1 & 2)

6. Results

- First, companies tend to use reactive rather than proactive strategies.
- Companies seem to be more inward than outward-looking when there is a need for higher flexibility.
- There is not much evidence of collaborative improvement of flexibility across the supply chain network through, for example, flexible supply contracts, outsourcing, or supply lead time reduction.