

SUPPLY CHAIN FLEXIBILITY

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Abstract

To be flexible means to have the ability to vary as you like, according to the needs. Flexibility is the ability to adapt, in a reversible manner, to an existing situation, as opposed to evolution, which is irreversible. Companies must realize the real competition is not firm-to-firm, but supply chain-to-supply chain.

Introduction

One strategy for gaining and keeping a competitive advantage in a dynamic environment is to create a flexible organization.

Flexibility is the organization's ability to meet an increasing variety of customer expectations without excessive costs, time, organizational disruptions, or performance losses.

To be useful in achieving company objectives, flexibility should be viewed from a value chain perspective (satisfying customer needs) rather than from an equipment or process perspective. From a customer's perspective, cross-functional and cross-company efforts are needed to eliminate bottlenecks, increase responsiveness, and create a level of performance that enables firms to build lasting competitive advantage. Therefore, value chain flexibility is broadly defined to include product development, manufacturing, logistics, and spanning flexibilities.

Flexibility may be defined as the ability to change or react with little penalty in time, effort, cost or performance. Flexibility can improve the company's competitiveness, particularly for the decision-making process of implementing technologies. But managers do not have a comprehensive view of flexibility because they focus more on machine flexibility than on total system flexibility.

Flexibility in supply chains may well represent a potential source to improve the company's efficiency and may be a significant measure of supply chain performance.

Supply chain flexibility is defined to encompass those flexibility dimensions that directly impact a firm's customers and are the shared responsibility of two or more functions along the supply chain, whether internal (marketing, manufacturing) or external (suppliers, channel members) to the firm.

Flexibility: concept and types

Flexibility is a complex and multidimensional concept, difficult to summarise. Flexibility is defined as an attribute of a system technology for coping with the variety of its environmental needs.

Flexibility reflects the ability of a system to change or react with little penalty in time, effort, cost or performance.

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There has even been a proliferation of papers that review the flexibility literature. The published reviews consider different aspects of flexibility such as definitions, classification and measurement of flexibility, choices, interpretation and requests for flexibility:

- functional aspects (flexibility in operations, marketing, logistics),
- hierarchical aspects (flexibility at shop, plant or company level),
- measurement aspects (focused on global flexibility measures vs context specific ones),
- strategic aspects (centred on the strategic relevance of flexibility),
- time horizon aspects (long-term vs short-term flexibility),
- object of change (flexibility of product, mix, volume).

Flexibility types in the manufacturing literature can be reviewed through different frameworks. The classical approach to flexibility frameworks has a bottom-up structure related to a manufacturing hierarchy with three hierarchical flexibility levels:

1. basic- comprise flexibility of the system components: machines, the material handling units and the transporting network.
2. system: the basic flexibility types at the manufacturing system level; an important type of system flexibility with implications for the supply chain system is routing flexibility.
3. aggregate levels: the aggregated attributes of the manufacturing system technology enabling it to cope with the variety of changes and needs at the strategic level.

Supply chain flexibility components

A complete definition of supply chain flexibility components will include the flexibility dimensions required by all the participants in the supply chain to successfully meet customer demand.

Flexibility in the supply chain adds the requirement of flexibility within and between all partners in the chain, including departments within an organization, and the external partners, including suppliers, carriers, third-party companies, and information systems providers. It includes the flexibility to gather information on market demands and exchange information between organizations.

Six components of supply chain flexibility have been identified from the literature on manufacturing flexibility, strategic flexibility and the limited writings on supply chain flexibility:

1. Operations system flexibility (both manufacturing and service) – ability to configure assets and operations to react to emerging customer trends (product changes, volume, mix) at each node of the supply chain.
2. Market flexibility – ability to mass customize and build close relationships with customers, including designing and modifying new and existing products. . A critical need in today's competitive environment is the ability to design and introduce new products as customers' needs, materials, and technologies change.
3. Logistics flexibility – ability to cost effectively receive and deliver product as

sources of supply and customers change (customer location changes, globalization, postponement).

4. Supply flexibility – ability to reconfigure the supply chain, altering the supply of product in line with customer demand. The flexibility of supply includes flexibility in establishing the relationships with partners. Companies may choose to solicit short-term bids, enter into long-term contracts and strategic supplier relationships, form joint ventures, form consortiums, create problem-solving councils or vertically integrate.

5. Organizational flexibility – the ability to align labor force skills to the needs of the supply chain to meet customer service/demand requirements.

6. Information systems flexibility – the ability to align information system architectures and systems with the changing information needs of the organization as it responds to changing customer demand.

Dimensions of supply chain flexibility

Supply chain flexibility takes into account two main aspects:

a. process flexibility of each supply chain plant, concerning the number of product types that can be manufactured in each production site (supplier or assembler);

b. logistics flexibility, related to the different logistics strategies which can be adopted either to release a product to a market or to procure a component from a supplier.

The flexibility dimensions are:

a. Product flexibility, defined in a supply chain framework as the ability to handle difficult, non-standard orders, to meet special customer specifications, and to produce products characterised by numerous features, options, sizes, and colours.

b. Volume flexibility, defined as the ability to effectively increase or decrease aggregate production in response to customer demand). Volume flexibility directly impacts supply chain's performance by preventing out-of-stock conditions for products that are suddenly in high demand or by preventing high inventory levels.

c. Routing flexibility- is the capability of processing a part through varying routes by using alternative machines, flexible material handling, and flexible transporting network; this flexibility reduces the negative impact of environmental uncertainty and unforeseen inefficiencies in the production process.

d. Delivery flexibility is the company's capability to adapt lead times to the customer requirements; an example of high delivery flexibility is JIT, when suppliers deliver the products to the customer at the right quantity, place and time.

e. Trans-shipment flexibility involves movement of stock between locations at the same echelon level where physical distances between the demand locations and the supply locations are small .

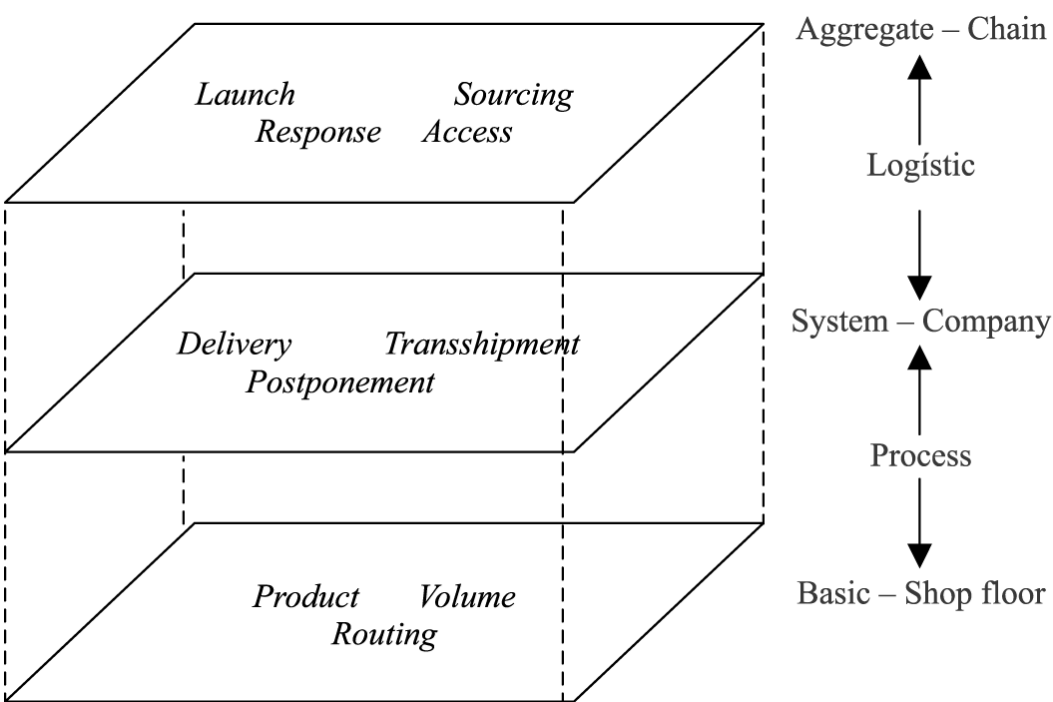
f. Postponement flexibility implies the capability of keeping products in their generic form as long as possible, in order to incorporate the customer's product requirements in later stages.

g. Sourcing flexibility is related to the company's ability to find another supplier for each specific component or raw material.

h. A flexibility dimension suitable to many industries is responsiveness to target markets (response to market flexibility). This flexibility captures the overall ability of the firm to respond to the needs of its target markets

- i. Launch flexibility – the ability to rapidly introduce many new products and product varieties is a strategically important flexibility that requires the integration of numerous value activities across the entire supply chain.
- j. Access flexibility – the ability to provide widespread or intensive distribution coverage. This flexibility is facilitated by the close coordination of downstream activities in the supply chain whether performed internally or externally to the firm.

Figure 1. Supply chain flexibility dimensions



Source: Angel Martínez Sánchez, Manuela Pérez Pérez

Conclusions

To be flexible means to have the ability to vary as you like, according to the needs. Flexibility is the ability to adapt, in a reversible manner, to an existing situation, as opposed to evolution, which is irreversible. This notion reflects the ability to stay operational in changing conditions, whether they are predictable or not, completely different or not from conditions known in advance. This adaptability is required from firms that, for economic reasons, are currently turning to efficient techniques of organization and management of the zero stock, just-in-time and tight-flow type which can make them fragile. Competition amplifies the development of the market by creating new situations. This aspect, combined with the above mentioned techniques of organization, reduces the stability of the firm. The impact of an unexpected event

immediately spreads across the structure because of the increased tension in the coordination links.

Companies used to operate in the context of a market that was prepared – because of the scarcity of the available goods – to absorb all proposed products and services provided if they were consistent enough with demand .

In such a situation the existence of inventories is an essential factor that guarantees uninterrupted operation. Building up stock is justified by the certainty of being able to sell it.

The current economic context leaves the conflict of scarcity more and more behind us, thus removing the certainty of selling; on the contrary, protection by means of stock becomes a danger in itself. Calling production for stock into question has thus led to just-in-time production. This kind of operation makes the production system more vulnerable.

As the classic organization of production, even though it is effective, high costs of operation are generated under these circumstances. It became necessary to create a new, efficient organization, complex to install, but capable of adapting itself continuously while, at the same time, optimizing the time required and the cost of change. This is how the flexible organization was born.

Flexibility in supply chains may well represent a potential source to improve the company's efficiency and may be a significant measure of supply chain performance .

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