CIPS KNOWLEDGE

Traditional / Open Loop / Forward Supply Chain

This knowledge paper is supportive of Procurement professionals operating at Managerial level of the CIPS Global Standard

01 CPD HOURS

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Introduction

In the open-loop supply chain, which is the traditional supply chain system, products do not return to the original producer. Unlike in the closed-loop or reverse supply chain, here the products are either recovered by other parties willing and able to reuse the materials or products, or are disposed in landfills (Andel, 1997). In the closed-loop system, materials are returned and reused by the same originator, as suppliers or manufacturers bring products back in and remanufacture or refurbish them before resale to the secondary market.

The complexity of a traditional supply chain is defined by a number of echelons or cost centres, where an echelon is a place for holding inventory. Usually each echelon is characterised by a perceived demand for products, a production (value-adding) process, information on current performance, disturbances (e.g. breakdowns, delays), decision points where the information is brought together, transmission lags for all activities and decision rules based on all company procedures, for example, changing stock levels, placing new orders, production requirements (McKinnon et al., 2010).

Performance of a traditional supply chain depends on a range of issues which generally include: (1) Strategic longterm partnerships between companies and their suppliers, referred to as strategic partnerships; (2) Customer relationship management; (3) Sharing of strategic information with suppliers; (4) Information quality (5) Internal lean process, including the processes of waste elimination and value creation; and (6) Postponement as a practice of dealing with some activities within the supply chain (Li et al., 2005).

Companies can also improve performance through simplifying material flow by achieving unbiased and noise-free information flows, compression and standardisation of lead times across all processes and choosing the smallest planning horizon (Towil, 1999 in McKinnon et al., 2010). Bullwhip can be a good indicator and measure of supply chain performance (McKinnon et al., 2010).

In order to maximize the added value of supply chains, Lean and Agile paradigms are being pursued. Lean and Agile, though distinctly different, can be and have been combined within successfully designed and operated total supply chains. They incorporate a Just-in-time approach.

Agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile market place. They focus on customer responsiveness.

First used by the Iacocca Institute (Iacocca Institute, 1991), the concept of agility has roots in other approaches such as time-based competition. Agile includes:

1. Produces to order
2. Meets the customer's specific needs
3. Achieves a speed and flexibility required by fast moving demand.
4. Involves late customisation and postponement;
5. Adopts new ways of working when these facilitate agility (i.e. cross-functional teams)

Lean means developing a value stream to eliminate all waste, including time, and to enable a level schedule. Waste is defined as any activity which does not add value. Lean can be summarised in the following way:

> 'Specify what creates value from the customer perspective; Identify all steps across the value stream; Make those actions that create the value flow – carry out the required activities; Only make what is required – Just in Time (JIT) and Strive for continuous improvements across the production line – which will remove any waste.' (Bailey et al 2015)

Definition

Traditional (also known as open loop or forward) supply chain is a "system whose constituent parts include material suppliers, production facilities, distribution services and customers linked together by the feed forward flow of materials and feedback flow of information" (Stevens, 1989). It is characterised by a supply chain in which there is no flow back from the customer is referred to as an ‘open loop supply chain’ (Debo et al., 2002).

Successful application

When designing a traditional supply chain some decisions must be considered, from the operational to strategic. Strategic planning refers to the identification of the number, location and capacities of serving facilities, such as distribution centres (DC) and warehouses. Tactical decisions, such as selection of suppliers or assigning products to DC and warehouses in the supply chain network, include a shorter planning horizon and are revised on a monthly or quarterly basis. Operational level supply chain decisions include scheduling and touting activities, day-to-day flow of products through the network or the amount of inventory to be held by the facilities, and can be modified on a daily/weekly bases (McKinnon et al., 2010).

Steps to successful application

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Hints and tips

1. Network optimisation: design the least cost network focusing on customer demand.
2. Network simulation: test alternative models to predict supply chain behaviour.
3. Policy optimisation: develop best operating rules (e.g. how much inventory to carry for each product line).
4. Design for robustness: anticipate unforeseen circumstances and possibilities. This final step is the most difficult, and the most important.

Hicks (1999)

Potential advantages

- Open loop systems are 'traditional' systems. Consequently, more fine-tuning has been done during the years on the efficiency of system cost controls and overall return on assets and many structures and integration strategies have been tested in practice (Saccomano, 1998; Power, 2005).
- Quicker and more timely response to customer and market trends have been among the benefits demonstrated in practice through open-loop supply networks (Power, 2005).
- Traditional supply chain models have the potential for 'strategic' level improvements in supply through the use of benchmarking tools (McGrath, 1997).

Potential disadvantages

There is a lack of accurate measurement of the efficiency of open loop supply chains. Even models such as SCOR which are useful for assessing efficiency, fail to model the interfaces between trading partners (Huang and Mak, 2000).
Open loop systems can have some limitations or deficiencies in the areas of asset recovery, maintenance, repair and customer service (Saccomano, 1998).
Compared to the closed-loop supply chain systems, open loop supply chains include limitations regarding the environmental effects and regulation (Power, 2005).

Performance monitoring

- Metrics that can measure the effectiveness and efficiency of an open loop supply chain: fill rate, lead time, on-time performance, responsiveness (Lambert and Pohlen, 2001).
- Quantitative performance measures: measures directly associated with cost or profit, such as cost minimisation, sales maximisation, profit maximisation, inventory investment minimisation, return on investment maximisation (Beamon, 1998).
- Objective measures that are based on some measure of customer responsiveness: fill rate maximisation (maximise the fraction of customer orders filled on time), minimisation of products being late, customer response time minimisation, lead time minimisation, function duplication minimisation (Beamon, 1998).

Case studies

- Lack of coordination between supply and demand can create problems in the company due to the inefficient coordination of the supply chain. EMC Corp. claimed it missed its revenue guidance of US$2.66b in the second quarter of 2006 by around US$100m. This discrepancy was due to higher than expected orders for the new DMX-3 systems over the DMX-2, which resulted in the inability of the company's supply chain to respond effectively (Simchi-Levi et al., 2003).

- Herman Miller uses its supply chain to cut costs in a counter-intuitive way. The company sends its top suppliers bigger orders, thus gaining volume and discounts as a result. When industry revenue was down in the early 2000s, the company's strongest vendors were seeing an increase and the company received price reductions (CFO, 2003).

- Boehringer Ingelheim USA installed an Enterprise Research Planning (ERP) system across its supply chain in order to better organise it and ensure integration. The system has helped increase inventory turns from about 1.9 annually before December 2000 to 4.0 in 2003, and also reduced the number of customer back orders. According to the company, the improvements were not so much driven by the implementation of technology but mostly by the efficient and coordinated planning process (CFO, 2003).

- Benetton, provide a good example of late customisation and its benefits. Traditionally, knitted garments are made from dyed yarn, the colour of the garment being determined by the colour of the wool used. This meant for Benetton that there was a need to keep stocks of a given design of garment in several sizes and in several colours. The company felt that if garments could be made from undyed yarn, and stocked in this neutral colour, then when a demand for a particular colour arose the actual garment could be dyed. Suppliers at first said that this approach was unfeasible, in that dying a finished garment posed technical problems of some magnitude. However, persistent attempts to solve this problem finally paid off, and the company has enjoyed the benefit of much reduced inventory as a result (Bailey et al 2015).

Further Resources/Reading

Web

Ferrari-open loop supply chain
From traditional to closed loop supply chain
Key challenges of supply chain management
Open loop systems: benefits of collaboration in the supply chain
Industry Week: collaboration in open loop supply networks

Books

- Thin Air: How Wireless Technology Supports Lean Initiatives ISBN 978-1439804391
- RFID Applied ISBN 978-0471793656
- Product Lifecycle Management (PLM) ISBN 978-1743045527
- Challenges in The Management of New Technologies: 1 (Management of Technology) ISBN 978-9812708557
- Supply Chain Coordination in Case of Asymmetric Information: Information Sharing and Contracting in a Just-in-Time environment. (Lecture Notes in Economics and Mathematical Systems) ISBN 978-3642201318

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Video

Supply Chain Collaboration - Professor Richard Wilding
https://www.youtube.com/watch?v=K68zKQFRmec