Lecture 8- Outsourcing and Integrating the SC



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Supply Chain Operations Reference- SCOR 12.0 Model



APICS (2017)

Main Drivers of Internationalization

 Globalization offers companies opportunities to simultaneously grow revenues and decrease costs



Christopher (2013) Trade-offs in global logistics

Main Risks

- Global supply chains are made more complicated by uncertainty and difficulty of control
- Uncertainty arises from longer lead times and lack of knowledge over risks and local market conditions
- World markets are not homogeneous, there is still a requirement for local variation in many product categories

'Supply chain challenges' hit revenues at Nike



posted by *Will Green* in *Risk, Supply chain* 19 March 2021

Nike has said port congestion delayed inventory supply and held back the company's growth in North America.

The company said revenue dropped 10% in North America in the three months to 28 February 2021 due to "supply chain challenges", which included global container shortages and US port congestion.

In an earnings call Matt Friend, executive vice president and CFO, said: "Disruption in the global supply chain due to container shortages, transportation delays, and port congestion has interrupted the flow of inventory supply.

"The result has been supply shortages relative to continued strong marketplace demand.

"In North America specifically, inventory supply was delayed by more than three weeks, impacting the timing of wholesale shipments and growth in the quarter."

Nike said inventories were up 15% year-on-year to \$6.7bn, largely because of "higher in-transit inventory in North America due to US port congestion and temporary store closures in EMEA".

Logistics implications of internationalisation

- Inventory
- •Handling
- •Transport
- Product obsolescence

Global Logistics Strategies

- Focused Factories
- Centralized Inventory
- Postponement
- Location
- •Layering and Tiering

Focused factories: from geographical to product segmentation



(a) Focused markets: full-range manufacture for local markets(b) Focused factories: limited range manufacturing for all markets

Harrison et al (2012)

Centralized Inventories

- Rather than have a large number of local distribution centres, bringing these together at a small number of locations can save cost
- •Savings can be achieved in this way by:
 - coordinating inventory management across the supply pipeline.
 - Therefore duplication eliminated
 - safety stocks to be minimized,
 - thereby lowering logistics costs and overall distribution cycle times.
 - lower factory-to-warehouse distribution costs because shipments can be consolidated into full container loads.

Stages in the implementation of postponed manufacturing: global starting point



Harrison et al (2012)

Outsourcing

What is it?

- Involves the procurement of products or services from an outside supplier
- Make vs Buy decision
- •Outsourcing engages the services of a third-party provider to complete internal operations

•By outsourcing non-essential operations, the company can direct its focus on its core competencies

Let Amazon pick, pack, and ship your orders | Fulfillment by Amazon (FBA)



https://www.youtube.com/watch?v=1AVOHlpA9Mg

Why Outsource?

- Re-engineering supply chain processes forces companies to focus on outsourcing all non-core activities and development of a global supply network
- The company can direct its focus on its core competencies
- Frees up management time which can be utilized for managing the supply chain endto-end



Why Outsource?



Deloitte (2016)

Park (2017)

Onshore vs. Nearshore vs. Offshore - Outsourcing

•Onshore Outsourcing - within your own country

•Offshore Outsourcing - to companies in other countries

•Nearshore Outsourcing - to a neighboring country

Supply Chain Management Outsourcing

- SCM outsourcing is allowing another company to be part of the process that sees the product go from development to consumer
- •SCM outsourcing usually **does not involve outsourcing production to another company** in a country where production costs are cheaper.
- SCM outsourcing will use other firms that specialize in supply chain management and logistics in order for them to handle the company's distribution needs, with domestic transportation, warehousing and freight forwarding

Supply Chain Management Outsourcing

- •Gartner suggested that 85% of supply chain managers expect their outsourcing budgets to grow by 5% (Gartner 2019
- Today, more businesses rely on third-party logistics providers (3PLs) for functions including packaging design and management of company-owned assets

Extent to Which Logistics Outsourcing Is Helping the Organization Achieve Objectives

 Approximately 70% of respondents stated that functional, end-to-end (E2E) supply chain and overall business objectives have been met or exceeded with the help of logistics outsourcing counterparts, such as thirdparty-logistics providers (3PLs)



Source: Gartner (December 2019)

The advancement in party logistics 1PL 2PL 3PL 4P 5PL 6PL



Aklogisticsandsupplychain (2020)

1PL: 1st Party Logistics

What is 1PL? 1PL refers to a company or individual that transports and delivers their own goods, using their own vehicles. There will be no other companies involved in the movement of the goods. For example: a manufacturer makes tools and delivers the tools on their own vehicles directly to shops for sale.

2PL: 2nd Party Logistics

What is 2PL? Probably the one we are all most familiar with, if not the term itself. A 2PL solution involves a company using a separate transport company, a subcontractor, to move their goods. A 2PL logistics provider will be 'asset-based' and will own the means of transport.

3PL: 3rd Party Logistics

What is 3PL? 3PL was first used in the early 1970's to identify intermodal marketing companies in transportation contracts. Now 3PL is the first solution that includes outsourcing part of the supply chain. A 3PL logistics provider will offer first stage supply chain integration in the forms of:

- Transport and freight forwarding
- · Warehousing including inventory management and cross docking
- Packaging and labelling

So, a manufacturer can outsource all their transport, storage, packing and distribution of their goods using a single 3PL company. Most 3PL companies are flexible so that you can select to use as many or as few of their services depending on your requirements.

4PL: 4th Party Logistics

What is 4PL? The 4th Party Logistics solution involves an independent, or 'neutral' lead logistics provider, effectively acting as an agent. A 4PL company will liaise and co-ordinate one, or more, 3PL provider companies in order to provide and tailor the best service for the customer. Therefore 4PL will include all the benefits of 3PL providers but also include:

- Project Management, sourcing and negotiation
- Logistics strategy and analytics
- Impartial service advice
- A single point of contact



5PL: 5th Party Logistics

What is 5PL? 5PL involves a fully integrated logistics solution to encompass the whole supply chain from beginning to end through multiple outsourced service providers. The integration must be achieved through the application of IT solutions to provide full visibility throughout the supply chain in 'real-time'. The 5PL logistics provider would need to control the entire supply chain regardless of how many different service providers were involved. With the focus on technology the 5PL solution is best suited to e-commerce.

6PL: 6th Party Logistics

What is 6PL? Still mostly theoretical, 6PL is a fully integrated and partly automated supply chain solution monitored by artificial intelligence (AI), often referred to, as '*artificial intelligence driven supply chain management*'. While the concept is still mostly theoretical, it is evident that the application of AI across the supply chain would give huge technological advancements. For example: an incorporated AI could monitor the whole supply chain using trends, ordering patterns and forecasting models and proactively send instructions upstream. This could automatically trigger goods production, send instruction to deliver stock or highlight anomalies.

Outsourcing vs Offshoring

- Outsourcing relies on an outside vendor to complete tasks
- Outsourcing occurs when a company contracts a specific process out to a third party



- Offshoring is when production operations are performed in another country
- Offshoring allows companies to maintain complete control over the operation and production of the business

Nearshoring

•The practice of getting work done or services performed by people in neighboring countries rather than in your own country



Integrating the supply chain

Integrating the supply chain

- The vision is **flow logistics** based on end-customer demand
- The supply chain needs to act as a **Synchronised Network**
- Results in:
 - immediate availability of products at the point of sale

or

• rapid configuration and delivery of customer-specified products



(b) after sychronisation Christopher (2016)

Extended Enterprise and the Virtual Supply Chain

- 'Need to reduce the separation between vendors, distributors, customers and the firm
- The extended enterprise is a common information 'highway'.
- Value-added exchange of information- that enables
 - cross-functional and horizontal management to become a reality
 - **responsive flow of product** from one end of the pipeline to another
- Fostered through **Strategic Collaboration**



Christopher (2016)

Digital Supply Chains Ecosystems | PWC Strategy&



https://www.youtube.com/watch?v=pdcJJpsOPGw

Integrating Internally and Externally

Internal- Function to Function

- Reduce functional barriers between purchasing, manufacturing and distribution
- Use Intranets



Arc of Integration Harrison et al (2012)

Electronic integration

- Traditional done by means of electronic data interchange (EDI)
- Internet technologies to facilitate
 B2B transactions such as:
 - Purchase orders, invoices, order and advanced shipment notices, load tendering and acknowledgements, and freight invoices and payments
- Use of:
 - Extranets
 - e Marketplaces
 - e Trade



e Supply Chain Harrison et al (2012)

Information sharing: the electronic sharing

• Trading partners are given access to a system with shared information

• Shared information may include:

- point-of-sale data
- product descriptions
- pricing
- promotional calendars
- inventory levels
- shipment tracking and tracing
- Uncertainty is reduced Visibility
- Supports independent planning

- Therefore, can access data from customers on sales or product usage
- Enables:
 - alert their suppliers of forthcoming requirements
 - Continuous replenishment

Collaborative planning forecasting and replenishment (CPFR)

- It enables trading partners to work together to understand
 - future demand better
 - put plans in place to satisfy such demand profitably
- •Trading partners collaborate on:
 - new product planning
 - demand forecasting
 - replenishment planning

Continuous Replenishment (CR)

- Send demand quickly to the manufacturer
- Using electronic point of sale (EPOS) data to track customer demand through the till
- Suppliers replace quickly what has been sold today, so that stock availability on the shelf is maintained at the retailer



Daily sales data drives the replenishment order system Christopher (2016)

Replenishment strategies- Capabilities

- Joint inventory management;
- Cross-dock operations;
- Effective logistics strategies and product flows;

• Enabling Technologies:

- Bar-coding
- Other scanning technology- **RFID**



The Way Wal-Mart uses RFID Technology in Managing Its Inventory Kosasi et al (2014)

Global Organisation Structure
Functional Structure- Export Department

- With increase in exports turnover, an independent exports department is often setup and separated from domestic marketing
- Exports activities are controlled by a company's home-based office through a designated head of export department, i.e. Vice President, Director, or Manager (Exports)



How Apple Is Organized for Innovation: The Functional Organization Harvard Business Review



https://www.youtube.com/watch?v=5hENFA3CJUY



International division structure

- As the foreign operations of a company grow, businesses often realize the overseas growth opportunities and an independent international division
- The head of international division, who directly reports to the chief executive officer, coordinates and monitors all foreign activities



Global functional division structure

- Focus the attention of key functions of a firm
- Each functional department or division is responsible for its activities around the world



Global product structure

- Corporate product division is given worldwide responsibility for the product growth
- Heads of product divisions do receive internal functional support associated with the product from all other divisions, such as operations, finance, marketing, and human resources.



Global geographic structure

- Firm's global operations are organized on the basis of geographic regions
- Generally used by companies with mature businesses and narrow product lines
- Independent heads of various geographical subsidiaries can focus on the local market requirements and respond quickly and effectively



Cadbury Schweppes- Case Study

- Organized into:
 - Regions
 - Global functions
- Each region is focused on commercial operations in its geographical and product area, and also maintains teams from each of the six functions
- Each function has a small central team and regional presences which are coordinated by the central team



Cadbury Schweppes regions and global functions Harrison et al (2012)



Global matrix structure

- Integrated organizational structure, which super-imposes on each other more than one dimension.
- The global matrix structure might consist of:
 - product divisions intersecting with various geographical areas or functional divisions



Transnational network structure

- Globally integrated structure
- Represents the ultimate form of an earth-spanning organization
- Eliminates the meaning of two or three matrix dimensions.
- It encompasses elements of:
 - function, product, and geographic designs
- Rely upon a network arrangement to link worldwide subsidiaries



Sustainable SCM





The triple bottom line: planet, people, profit



Coca Cola-Sustainable Business

https://www.coca-colacompany.com/sustainable-business

WATER STEWARDSHIP

Goals: Improve water efficiency by 25%, help ensure healthy, resilient freshwater systems through conservation efforts with World Wildlife Fund and replenish 100% of the water we use



ENERGY AND CLIMATE

Goal: Reduce CO2 emissions embedded in 'the drink in your hand' by 25% through our entire value chain



PACKAGING

Goal: Reach a 75% recovery rate in developed markets of the equivalent amount of bottles and cans we introduce into the marketplace



AGRICULTURE

Goal: Sustainably source key agricultural ingredients



Unilever- Planet and Society

https://www.unilever.com/planet-and-society/



Zero waste to landfill across Unilever's global factory network | Unilever



https://www.youtube.com/watch?v=W700bpAPdQw

Key Measures

- Reduce Greenhouse gases in the supply chain
- Reducing the transport-intensity of supply chains
- •4 R's- Reduce, re-use, re-cycle, recover

Supply chain decisions impact the resource footprint

Design	Source	Make	Deliver	Return
 The choice of materials for both the product and the packaging. The physical characteristics of the product. Focus on opportunities for re-use and recycling. 	 Location of suppliers can impact differentially on a resource footprint. Environmental implications of supply source, e.g. 'food miles'. Society and ethical issues. 	 Improve energy efficiency. Reducing waste, rework and scrappage. Reduce/ eliminate pollution and emissions. 	 Optimise network configuration. Minimise transport intensity. Reconsider transport modes. 	 Develop 'reverse logistics' capabilities. Manage product end of-life. Create 'closed-loop' supply chains.

Christopher (2016)

Demand Planning and Forecasting

Role of Forecasting in a Supply Chain

- The basis for all planning decisions in a supply chain
- Used for both push and pull processes
 - Production scheduling, inventory, aggregate planning
 - Sales force allocation, promotions, new production introduction
 - Plant/equipment investment, budgetary planning
 - Workforce planning, hiring, layoffs
- All of these decisions are interrelated

Characteristics of Forecasts

- 1. Forecasts are always inaccurate and should thus include both the expected value of the forecast and a measure of forecast error
- 2. Long-term forecasts are usually less accurate than shortterm forecasts
- 3. Aggregate forecasts are usually more accurate than disaggregate forecasts
- 4. In general, the farther up the supply chain a company is, the greater is the distortion of information it receives

Components and Methods

- Companies must identify the factors that influence future demand and then ascertain the relationship between these factors and future demand
 - Past demand
 - Lead time of product replenishment
 - Planned advertising or marketing efforts
 - Planned price discounts
 - State of the economy
 - Actions that competitors have taken

Components and Methods

- 1. Qualitative
 - Primarily subjective
 - Rely on judgment
- 2. Time Series
 - Use historical demand only
 - Best with stable demand
- 3. Causal
 - Relationship between demand and some other factor
- 4. Simulation
 - Imitate consumer choices that give rise to demand

Basic Approach

- 1. Understand the objective of forecasting.
- 2. Integrate demand planning and forecasting throughout the supply chain.
- 3. Identify the major factors that influence the demand forecast.
- 4. Forecast at the appropriate level of aggregation.
- 5. Establish performance and error measures for the forecast.

Forecasting In Practice

- Collaborate in building forecasts
- •Share only the data that truly provide value
- •Be sure to distinguish between demand and sales

Time-Series Forecasting Methods

•Three ways to calculate the systematic component *–Multiplicative*

S = level x trend x seasonal factor

-Additive

S = level + trend + seasonal factor

-Mixed

S = (level + trend) x seasonal factor

Adaptive Forecasting

- •The estimates of level, trend, and seasonality are adjusted after each demand observation
- •Estimates incorporate all new data that are observed

Role of Aggregate Planning in a Supply Chain

- Capacity has a cost and lead times are often long
- Aggregate planning:
 - process by which a company determines levels of capacity, production, subcontracting, inventory, stockouts, and pricing over a specified time horizon
 - goal is to maximize profit
 - decisions made at a product family (not SKU) level
 - time frame of 3 to 18 months
 - how can a firm best use the facilities it has?

Role of Aggregate Planning in a Supply Chain

- Specify operational parameters over the time horizon
 - Production rate

Subcontracting

- Workforce
- Overtime
- Machine capacity level

- Backlog
- Inventory on hand
- All supply chain stages should work together on an aggregate plan that will optimize supply chain performance

The Aggregate Planning Problem

- Given the demand forecast for each period in the planning horizon, determine the production level, inventory level, and the capacity level for each period that maximizes the firm's (supply chain's) profit over the planning horizon
- Specify the planning horizon (typically 3-18 months)
- Specify the duration of each period
- Specify key information required to develop an aggregate plan

Information Needed for an Aggregate Plan

- Aggregate demand forecast F_t for each Period t over T periods
- Production costs
 - Labor costs, regular time (\$/hr) and overtime (\$/hr)
 - Subcontracting costs (\$/hr or \$/unit)
 - Cost of changing capacity hiring or layoff (\$/worker), adding or reducing machine capacity (\$/machine)
- Labor/machine hours required per unit
- Inventory holding cost (\$/unit/period)
- Stockout or backlog cost (\$/unit/period)
- Constraints overtime, layoffs, capital available, stockouts, backlogs, from suppliers

Outputs of Aggregate Plan

- Production quantity from regular time, overtime, and subcontracted time
- Inventory held
- Backlog/stockout quantity
- Machine capacity increase/decrease
- A poor aggregate plan can result in lost sales, lost profits, excess inventory, or excess capacity

Identifying Aggregate Units of Production

- Aggregate unit should be identified in a way that the resulting production schedule can be accomplished in practice
- •Focus on the bottlenecks when selecting the aggregate unit and identifying capacity and production times
- •Account for activities such as setups and maintenance

Aggregate Planning Strategies

- Trade-off between capacity, inventory, backlog/lost sales
- Chase strategy using capacity as the lever
- Time flexibility from workforce or capacity strategy using utilization as the lever
- Level strategy using inventory as the lever
- Tailored or hybrid strategy a combination of strategies

Forecast Error in Aggregate Plans

- Forecast errors must be considered
- Safety inventory
- Safety capacity
 - Use overtime as a form of safety capacity
 - Carry extra workforce permanently as a form of safety capacity
 - Use subcontractors as a form of safety capacity
 - Build and carry extra inventories as a form of safety inventory
 - Purchase capacity or product from an open or spot market as a form of safety capacity
Implementing Aggregate Planning in Practice

- 1. Think beyond the enterprise to the entire supply chain
- 2. Make plans flexible because forecasts are always inaccurate
- 3. Rerun the aggregate plan as new data emerge
- 4. Use aggregate planning as capacity utilization increases

Responding to Predictable Variability in a Supply Chain

- Predictable variability is change in demand that can be forecasted
- •Can cause increased costs and decreased responsiveness in the supply chain
- •Two broad approaches
 - 1. Manage supply using capacity, inventory, subcontracting, and backlogs
 - 2. Manage demand using short-term price discounts and trade promotions

Managing Supply

- Managing capacity
 - Time flexibility from workforce
 - Use of seasonal workforce
 - Use of subcontracting
 - Use of dual facilities specialized and flexible
 - Designing product flexibility into production processes
- Managing inventory
 - Using common components across multiple products
 - Build inventory of high demand or predictable demand products

Inventory/Capacity Trade-off

- Leveling capacity forces inventory to build up in anticipation of seasonal variation in demand
- Carrying low levels of inventory requires capacity to vary with seasonal variation in demand or enough capacity to cover peak demand during season

Implementing Sales and Operations Planning in Practice

- 1. Coordinate planning across enterprises in the supply chain
- 2. Take predictable variability into account when making strategic decisions
- 3. Design S&OP to understand and manage the drivers of demand usage
- 4. Ensure that the S&OP process modifies plans as the reality or forecasts change