MEASI INSTITUTE OF MANAGEMENT

CHENNAI-14

Approved by All India Council of Technical Education and

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MASTER OF BUSINESS ADMINISTRATION

PMF 25 SUPPLY CHAIN MANAGEMENT

NOTES

Course Material Prepared

By

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ELECTIVE COURSE – XXV

Subject Code	Subject Name	L	T	P	S	C
PMF25	SUPPLY CHAIN MANAGEMENT	3	0	0	1	3

Course Objectives	
C1	To familiarize the students to the basic concepts of Supply Chain management
C2	To provide insights on Supply chain synergies.
C3	To throw light on Sales & Operation Planning
C4	To elucidate on Customer value and supply chain management
C5	To create awareness on supply chain analytics.

SYLLABUS

Unit. No.	Details	Hours
Unit I	**Introduction to Supply Chain** Historical perspective Understanding Supply Chain; key issues in supply chain management Objectives, importance, Decision phases - Examples of supply chains Supply chain strategies, The supply chain becomes value chain Supply chain as a competitive weapon.	9
Unit II	**Supply chain synergies** Collaborate with supply chain partners Supply Chain Drivers and Design Drivers of supply chain performance; Framework for structuring Facilities, including warehouse, Inventory, Transportation, Information, Sourcing and Pricing – Yield management /Revenue management.	9
Unit III	**Sales and Operations Planning** Demand management Demand forecasting, Aggregate Planning and Managing Supply, Demand and Inventory Aggregate Planning in a Supply Chain; role, aggregate planning problems, strategies, role of IT, Implementation Responding to predictable variability in supply chain – Types of supply chains-creating responsive supply chains lean and agile supply chain their characteristics.	9
Unit IV	**Customer value and supply chain management** Dimensions of customer value-value added services –customer value measures Push-pull boundary –mass customization and supply chain management outsource - Third and Fourth - Party Logistics providers –managing risk in supply chains Creating a sustainable supply chain.	9
Unit V	**Supply chain analytics**	9

	Use of computer software in supply chain problems -Electronic commerce –emerging mega trends supply chain of the future – seeking structural flexibility –The multi-channel revolution 2020 vision.	
	TOTAL HOURS	**45**
Reference Books		
1.	Coyle, J., Langley, J., Gibson, B. and Novack, R., A Logistic Approach to Supply Chain Management, Cengage Learning, 2009.	
2.	Handfield, R. and Monczka, R., Sourcing and Supply Chain Management, 5th Edition, Cengage Learning, 2012.	
3.	Hugos, M., Essentials of Supply Chain Management, 3rd Edition, John Wiley and Sons, 2011.	
4.	Liu, J., Supply Chain Management and Transport Logistics, Routledge, 2011.	
5.	Sinha, A. and Kotzab, H., Supply Chain Management; A Managerial Approach, Tata McGraw-Hill Education, 2011.	
6.	Sople, V.V., Supply Chain Management; Text and Cases, Pearson, 2011.	
E-Sources		
1.	http://www.scmr.com/article/global_supply_chains_prepare_for_uncertain_economy	
2.	http://www.scmr.com/article/supply_chain_crime_can_be_addressed_by_blockchain_strategy_says_deloitte_st	
3.	https://ocw.mit.edu/courses/engineering-systems-division/esd-273j-logistics-and-supply-chain-management-fall-2009/lecture-notes/MITESD_273JF09_lec01.pdf	
4.	https://ocw.mit.edu/courses/engineering-systems-division/esd-273j-logistics-and-supply-chain-management-fall-2009/lecture-notes/MITESD_273JF09_lec03.pdf	
5.	https://ocw.mit.edu/courses/engineering-systems-division/esd-273j-logistics-and-supply-chain-management-fall-2009/lecture-notes/MITESD_273JF09_lec05.pdf	
6.	http://www.nitc.ac.in/app/webroot/img/upload/Supply%20Chain%20Management%20-%20Note.pdf	
7.	https://kenyanexams.com/college-exams/supply-chain-management/warehousing-operations-stock-controlnov-2011/	

Assessment Tools Used			
1.	Assignments	6.	Group Discussions
2.	Internal Assessment Tests	7.	Role play
3.	Model Exam	8.	Quiz
4.	Seminar	9.	Simulation

5.	Case Studies	10.	Management games

Content Beyond Syllabus	
1.	Supply Chain Process and Relationships
2.	Warehousing Operation & Cost Control
3.	Modern Material Handling
4.	Recent Developments in Supply Chain Management
Additional Reference Books	
1.	W.J. Hopp and M.L. Spearman. Factory Physics; Foundations of Manufacturing Management. Irwin, McGraw-Hill, 1996.
2.	N. Viswanadham. Analysis of Manufacturing Enterprises.Kluwer Academic Publishers, 2000.
3.	Sridhar Tayur, Ram Ganeshan, Michael Magazine (editors).Quantitative Models for Supply Chain Management.Kluwer Academic Publishers, 1999.
4.	R.B. Handfield and E.L. Nochols, Jr. Introduction to Supply Chain Management.Prentice Hall, 1999.

Course Outcomes

CO. No.	On completion of this course successfully the students will;	**Program Outcomes (PO)**
C325.1	Be able to familiarize the students to the basic concepts of SCM.	PO6, PO7
C325.2	Possess insights on Supply chain synergies.	PO6
C325.3	Have insights on Sales & Operation Planning	PO6, PO7
C325.4	Learn about Customer value and supply chain management.	PO6, PO7
C325.5	Have better understanding on supply chain analytics.	PO2, PO4, PO6, PO7

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1; Placement: To equip the students with requisite knowledge skills and right attitude necessary to get placed as efficient managers in corporate companies.

PEO 2; Entrepreneur: To create effective entrepreneurs by enhancing their critical thinking, problem solving and decision-making skill.

PEO 3; Research and Development: To make sustained efforts for holistic development of the students by encouraging them towards research and development.

PEO4: Contribution to Society: To produce proficient professionals with strong integrity to contribute to society.

Program Outcome

PO1: Problem Solving Skill

Apply knowledge of management theories and practices to solve business problems.

PO2: Decision Making Skill

Foster analytical and critical thinking abilities for data-based decision making.

PO3: Ethical Value

Ability to develop value based leadership ability.

PO4: Communication Skill

Ability to understand, analyze and communicate global, economic, legal and ethical aspects of business.

PO5: Individual and Leadership Skill

Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.

PO6: Employability Skill

Foster and enhance employability skills through subject knowledge.

PO7: Entrepreneurial Skill

Equipped with skills and competencies to become an entrepreneur.

PO8: Contribution to Community

Succeed in career endeavors and contribute significantly to the community.

SUPPLY CHAIN MANAGEMENT

UNIT 1: Introduction to Supply Chain

Historical perspective Understanding Supply Chain: key issues in supply chain management Objectives, importance, Decision phases -Examples of supply chains Supply chain strategies, The supply chain becomes value chain Supply chain as a competitive weapon

UNIT II: Supply chain synergies

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UNIT III: Sales and Operations Planning

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Dimensions of customer value-value added services –customer value measures Push-pull

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Unit V: Supply chain analytics

Use of computer software in supply chain problems -Electronic commerce –emerging mega trends supply chain of the future –seeking structural flexibility –The multi-channel revolution 2020 vision

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UNIT 1: INTRODUCTION TO SUPPLY CHAIN

Historical perspective Understanding Supply Chain: key issues in supply chain management Objectives, importance, Decision phases -Examples of supply chains Supply chain strategies, The supply chain becomes value chain Supply chain as a competitive weapon

SUPPLY CHAIN MANAGEMENT - MEANING

Supply Chain Management can be defined as the management of flow of products and services, which begins from the origin of products and ends at the product‟s consumption. It also comprises movement and storage of raw materials that are involved in work in progress, inventory and fully furnished goods.

Supply chain management (SCM) is the broad range of activities required to plan, control and execute a product's flow, from acquiring raw materials and production through distribution to the final customer, in the most streamlined and cost-effective way possible.

The supply chain encompasses all activities involved in the transformation of goods from the raw material stage to the final stage, until the goods and services reach the end customer.

Example: For a simple product like soap, the HUL supply chain involves ingredient suppliers, transporters, the company‟s manufacturing plants, carrying & forwarding agents, wholesalers, distributors and retailers.

SCM encompasses the integrated planning and execution of processes required to optimize the

flow of materials, information and financial capital in the areas that broadly include demand planning, sourcing, production, inventory management and storage, transportation or logistics and return for excess or defective products. Both business strategy and specialized software are used in these endeavors to create a competitive advantage.

DEFINITIONS:

The design and management of seamless, value-added process across organizational boundaries to meet the real needs of the end customer.

-Institute for Supply Management

Christopher (1998) defined the supply chain as the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer.

Chopra and meindl (2001) "A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request".

Handfield & Nichols (1999) "A supply chain encompasses all activities associated with the flow and transformation of goods from the raw material stage, through to the end user, as well as the associated information flows".

A supply chain may be defined as an integrated process wherein a number of various business entities like;

a) Suppliers

b) Manufacturers

c) distributors and

d) Dealers, Retailers etc.,

The **key benefits of supply chain management** are as follows −

- Develops better customer relationship and service.

- Creates better delivery mechanisms for products and services in demand with minimum delay.
- Improvises productivity and business functions.
- Minimizes warehouse and transportation costs.

- Minimizes direct and indirect costs.
- Assists in achieving shipping of right products to the right place at the right time.
- Enhances inventory management, supporting the successful execution of just-in-time stock models.
- Assists companies in adapting to the challenges of globalization, economic upheaval, expanding consumer expectations, and related differences.
- Assists companies in minimizing waste, driving out costs, and achieving efficiencies throughout the supply chain process.

OBJECTIVES OF SCM

A well designed SC is expected to support the strategic objectives of:-

1. Solving supplier‟s problems and beyond his level.
2. Customer service performance improvement.
3. Reduction of pre & post production inventory.
4. Minimizing variance by means of activities like standardization, variety reduction, etc.
5. Minimum total cost of operation & procurement.
6. Product Quantity control.
7. Achieving maximum efficiency in using labour, capital & plant through the company.
8. Flexible planning and control procedures.

The objective of Supply Chain performance is to achieve low cost through tradeoffs through;

1) Collaborations

2) Enterprise Extensions

3) Integrated Service Providers

1) Collaborations: Is the mutually benefiting performance, resulting in low cost and high efficiency

-Channel partners/function, which **performs the same tasks** can collaborate to improve efficiency of each other.

-The collaboration also reduces the time and provides a greater value to the customers.

-Collaboration can be also seen between competing organizations to share resources, increase efficiency as well to reduce the cost of operations

-**Ex**: Distribution of products of online marketers

2) Enterprise Extensions: Different firms with similar functions or different functions can extent their enterprise support for effective and efficient as well cost effective performances to deliver maximum value to their customers.

Example: **McDonald's Corporation** along with its franchises, Joint ventured companies, the 3rd Party Logistic Partners, the Marketing and Advertising agencies, Suppliers of Raw materials as well kitchen equipment, building services as well as Toys manufacturing and carry away package suppliers are extended enterprises.

3) Integrated Service Providers: Outsourcing of certain services, so as to better focus on their core function.

-Those functions, which requires high set up cost as well large base of human resource, are mainly outsourced.

Ex: A company wants to use Tele-Calling services for better customer relationship management (CRM), can outsource BPO services.

IMPORTANCE OF SUPPLY CHAIN MANAGEMENT

Supply chain management is an integral part of most businesses and is essential to company success and customer satisfaction. The main importance of Supply Chain Management are:-

REDUCE OPERATING COSTS

- **Decreases Purchasing Cost** - Organizations generally prefer quick distributions of costly products and raw materials to avoid expensive inventory
- **Decrease Production Cost** - A reliable supply chain delivers materials to assembly plants and avoid any costs that may occur due to delays.

IMPROVE CUSTOMER SERVICES

- **Right quantity and quality** - Customer expects delivery of right quantity and quality of products.

- **On-time delivery** - Customers expect to receive the correct product mix and quantity to be delivered on time. A reliable supply chain can help in avoiding any bottlenecks and ensure customers get their products in the promised time frame

- **Services –** After sales services is one of the important aspects in any business. If any kind of problem occur in the product, customer expects it to be fixed quickly. A right supply chain ensures that customers get the service they want.

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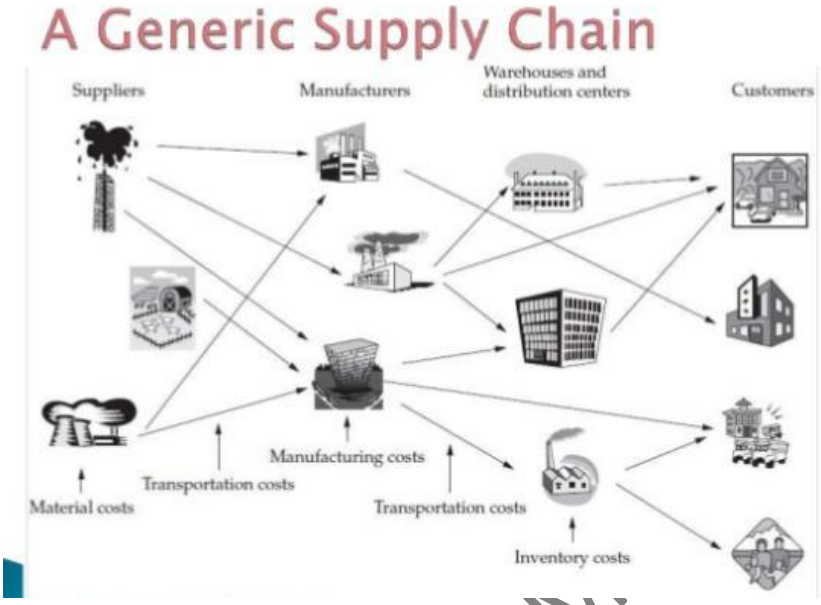


ADVANTAGES OF SUPPLY CHAIN MANAGEMENT

1) Reduced Costs

2) Increased Efficiency

3) Increased Profits

4) Increased productive Output

KEY ISSUES OF SUPPLY CHAIN MANAGEMENT

The supply chain management issues concern activities of the firm at various levels of decision making, ranging from operational level to strategic level via tactical level.

GLOBALIZATION:

- One of the biggest challenges that companies are facing is how to reduce their supply chain cost. In order to satisfy customers‟ price expectations, companies have opted to relocate manufacturing to low cost countries around the world in an effort to reduce direct and indirect costs and to minimize taxes. But, having global suppliers contributes significantly to complexity that comes from extended delivery lead times. Customers not only want lower prices, but they also want their products on time.

***CUSTOMER PREFERENCES*:**

- As stated above, global supply chains are complex. Add to that product features that are constantly changing, and the challenge is even greater. A product is released and customers rapidly pressure companies to come up with the next big thing. Innovation is important since it allows companies to stay competitive in the market, but it‟s also a

challenge. To enhance a product, companies have to redesign their supply network and meet market demand in a way that‟s transparent for customers.

***MARKET GROWTH*:**

- Another factor that presents a challenge is the pursuit of new customers. The cost of a developing a product, from R&D to product introduction, is significant. Therefore, companies are trying to expand their distribution to emerging markets in order to grow revenues and increase market share. Companies all around the world are expected to expand in their home and foreign markets. The introduction to new markets is difficult due to trading policies, fees, and government policies.
- The effectiveness and efficiency of the Supply Chain depends upon the contribution and performances of the channel partners and the processes with which they will be operated.

EVOLUTION AND HISTORY OF SUPPLY CHAIN MANAGEMENT

History of Supply Chain Management: The History of Supply Chain Management can be studied under different eras.

THE EVOLUTION OF SUPPLY CHAIN MANAGEMENT

1	Creation Era	The term supply chain management was first coined by an American industry consultant in the early 1980s. However the concept of supply chain in management, was of great importance long before in the early 20th century
2	Integration Era	This era of supply chain management studies was highlighted with the development of Electronic Data Interchange (EDI) systems in the 1960s and developed through the 1990s by the introduction of Enterprise Resource Planning (ERP) systems.

3	Globalization Era	This era is characterized by the globalization of supply chain management in organizations with the goal of increasing competitive advantage, creating more value-added,

		and reducing costs through global sourcing
4	Specialization Era Phase - One Outsourced Manufacturing and Distribution	In the 1990s industries began to focus on "core competencies" and adopted a specialization model. Companies abandoned vertical integration, sold off non-core operations, and outsourced those functions to other companies.
5	Specialization Era Phase Two - Supply Chain Management as a Service	Specialization within the supply chain began in the 1980s with the inception of transportation brokerages, ware house management, and non asset based carriers and has matured beyond transportation and logistics into aspects of supply planning, collaboration, execution and performance management.
6	Supply Chain Management 2. 0 (SCM 2. 0)	Web 2. 0 is defined as a trend in the use of the World Wide Web that is meant to increase creativity, information sharing, and collaboration among users.

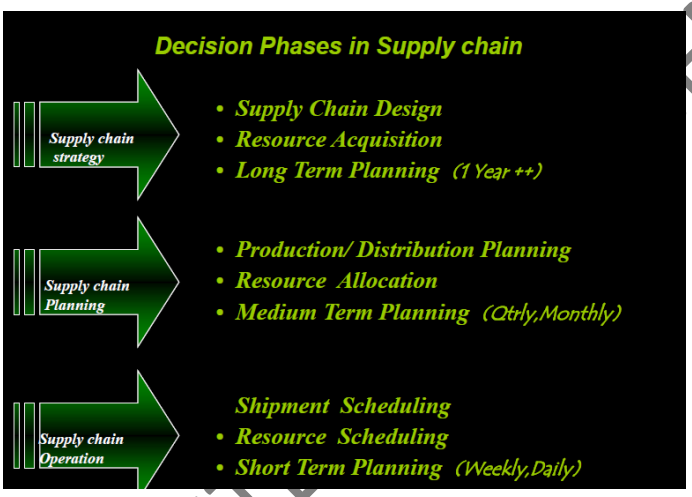
SUPPLY CHAIN MANAGEMENT - DECISION PHASES

Decision phases can be defined as the different stages involved in supply chain management for

taking an action or decision related to some product or services. Successful supply chain management requires decisions on the flow of information, product, and funds that fall into three decision phases.

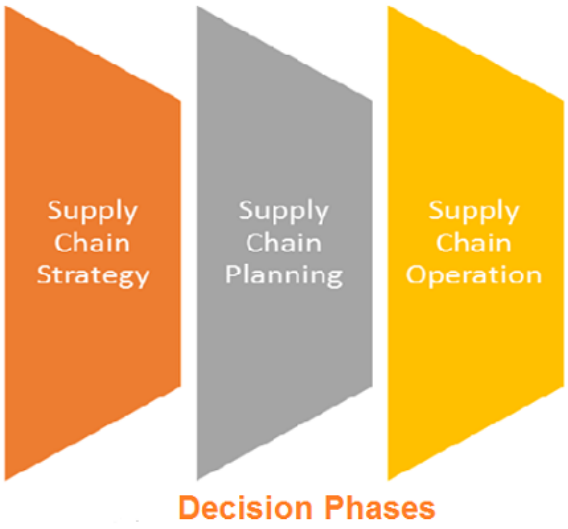
SUPPLY CHAIN STRATEGY

In this phase, decision is taken by the management mostly. The decision to be made considers the sections like long term prediction and involves price of goods that are very expensive if it goes wrong. It is very important to study the market conditions at this stage.



These decisions consider the prevailing and future conditions of the market. They comprise the structural layout of supply chain. After the layout is prepared, the tasks and duties of each is laid out.

All the strategic decisions are taken by the higher authority or the senior management. These decisions include deciding manufacturing the material, factory location, which should be easy for transporters to load material and to dispatch at their mentioned location, location of warehouses for storage of completed product or goods and many more.



SUPPLY CHAIN PLANNING

Supply chain planning should be done according to the demand and supply view. In order to understand customers‟ demands, a market research should be done. The second thing to consider is awareness and updated information about the competitors and strategies used by them to satisfy their customer demands and requirements.

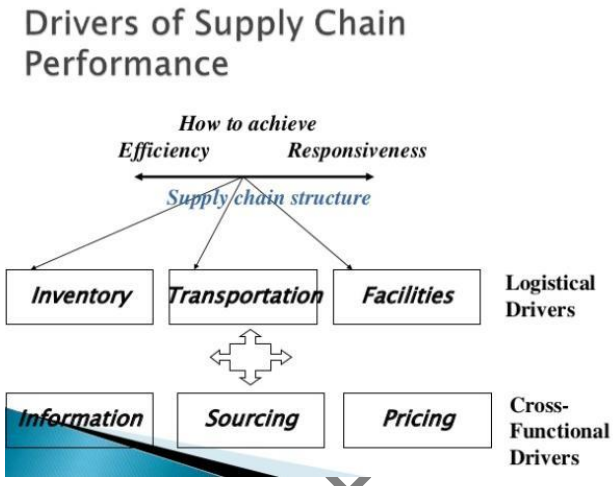
This phase includes it all, starting from predicting the market demand to which market will be provided the finished goods to which plant is planned in this stage. All the participants or employees involved with the company should make efforts to make the entire process as flexible as they can. A supply chain design phase is considered successful if it performs well in short-term planning.

SUPPLY CHAIN OPERATIONS

The third and last decision phase consists of the various functional decisions that are to be made instantly within minutes, hours or days. The objective behind this decisional phase is minimizing uncertainty and performance optimization. Starting from handling the customer order to supplying the customer with that product, everything is included in this phase.

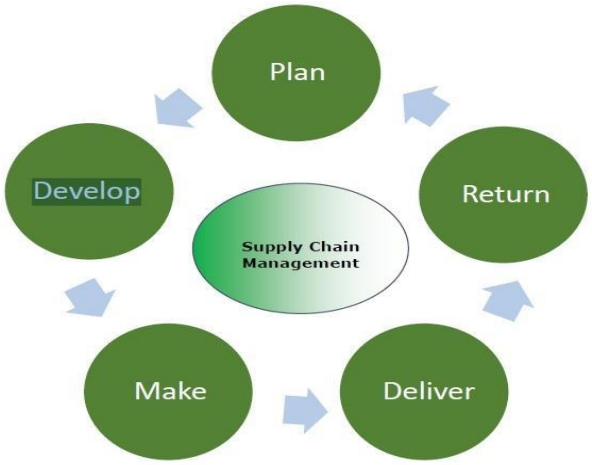
For example, imagine a customer demanding an item manufactured by your company. Initially, the marketing department is responsible for taking the order and forwarding it to production department and inventory department. The production department then responds to the customer demand by sending the demanded item to the warehouse through a proper medium and the

distributor sends it to the customer within a time frame. All the departments engaged in this process need to work with an aim of improving the performance and minimizing uncertainty.



COMPONENTS OF SCM

- ✓ Planning
- ✓ Sourcing
- ✓ Making
- ✓ Delivering
- ✓ Returning
- ✓ Enabling



PLANNING**-** Enterprises need to plan and manage all resources required to meet customer demand for their product or service. They also need to design their supply chain and then determine which metrics to use in order to ensure the supply chain is efficient, effective, delivers value to customers, and meets enterprise goals.

SOURCING **-** Companies must choose suppliers to provide the goods and services needed to create their product. After suppliers are under contract, supply chain managers use a variety of processes to monitor and manage supplier relationships. Key processes include ordering, receiving, managing inventory, and authorizing supplier payments.

MAKING **-** Supply chain managers coordinate the activities required to accept raw materials, manufacture the product, test for quality, package for shipping, and schedule for delivery. Most enterprises measure quality, production output, and worker productivity to ensure the enterprise creates products that meet quality standards.

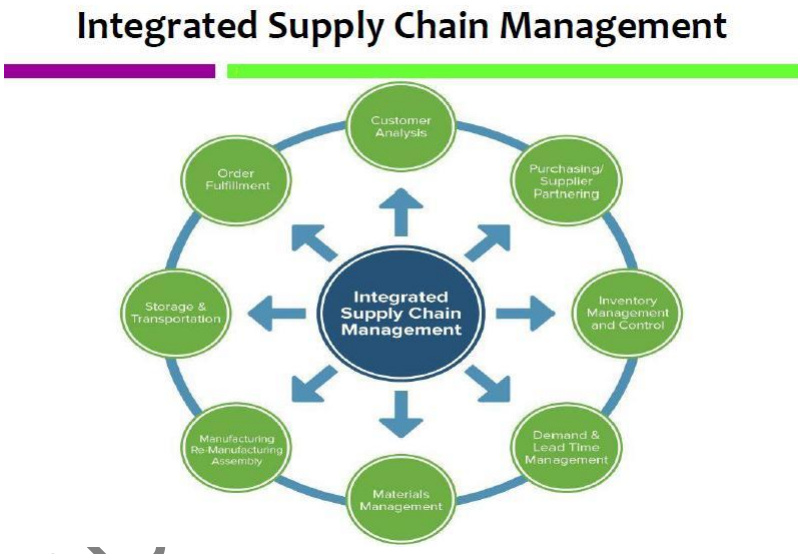
DELIVERING **-** Often called logistics, this involves coordinating customer orders, scheduling delivery, dispatching loads, invoicing customers, and receiving payments. It relies on a fleet of vehicles to ship product to customers. Many organizations outsource large parts of the delivery

process to specialist organizations, particularly if the product requires special handling or is to be delivered to a consumer‟s home.

RETURNING - The supplier needs a responsive and flexible network to take back defective,

excess, or unwanted products. If the produce is defective it needs to be reworked or scrapped. If the product is simply unwanted or excess it needs to be returned to the warehouse for sale.

ENABLING - To operate efficiently, the supply chain requires a number of support processes to monitor information throughout the supply chain and assure compliance with all regulations. Enabling processes include finance, HR, IT, facilities, portfolio management, product design, sales, and quality assurance.



Supply Chain Management is

• The processes of design and management

• Across organizational boundaries

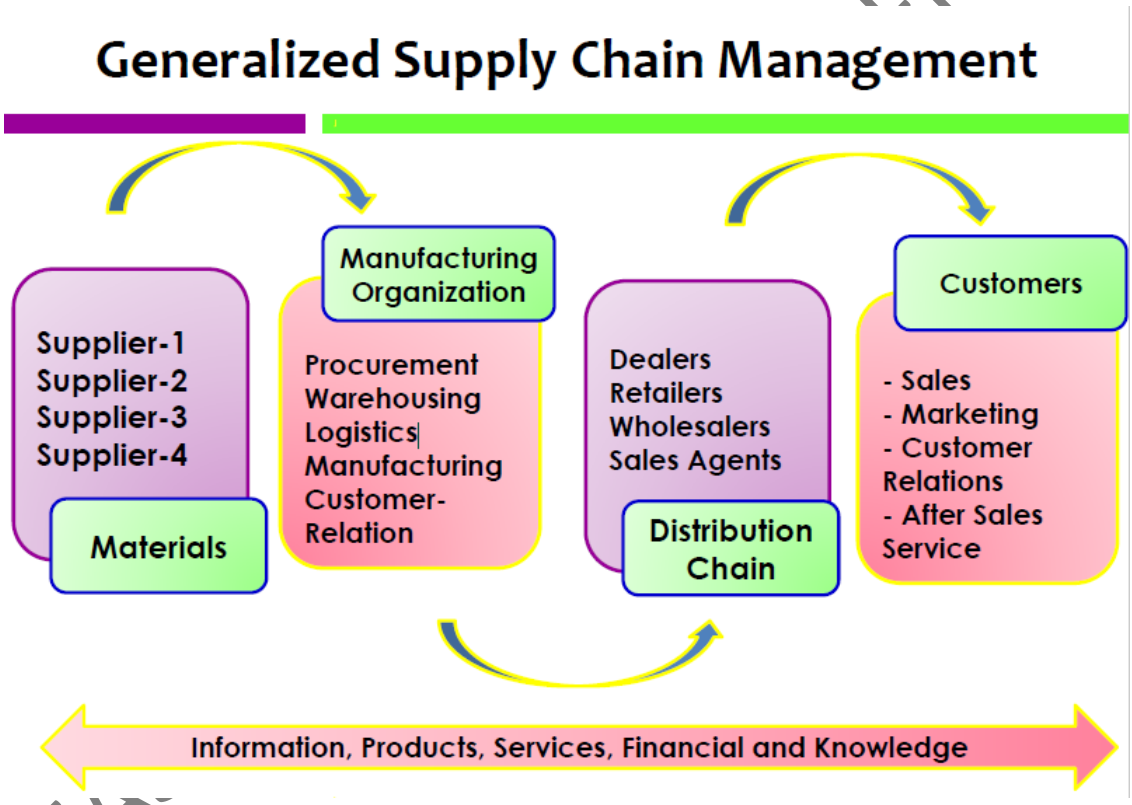
• With the goal of matching supply and demand

• In the most cost effective way

SUPPLY CHAIN STAGES

A typical supply chain may involve a variety of stages.

- ✓ Each stage in a supply chain is connected through the flow of products, information, and funds.
- ✓ These flows often occur in both directions and may be managed by one of the stages or an intermediary.



SUPPLY CHAIN MANAGEMENT FLOWS

SCM Can be divided into 3 main flows

- ✓ The Product Flow
- ✓ The information Flow

- ✓ The Finances Flow

THE PRODUCT FLOW

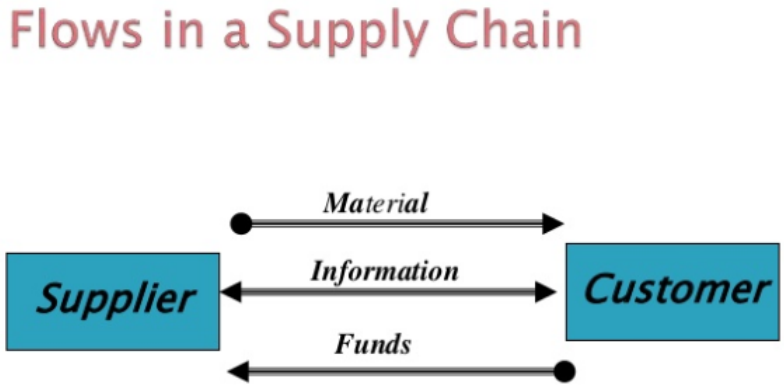
The product flow includes the movement of goods from a supplier to a customer, as well as any customer returns or service needs.

THE INFORMATION FLOW

The information flow involves transmitting orders and updating the status of delivery.

THE FINANCIAL FLOW

The financial flow consists of credit terms, payment schedules, and consignment and title ownership arrangements.



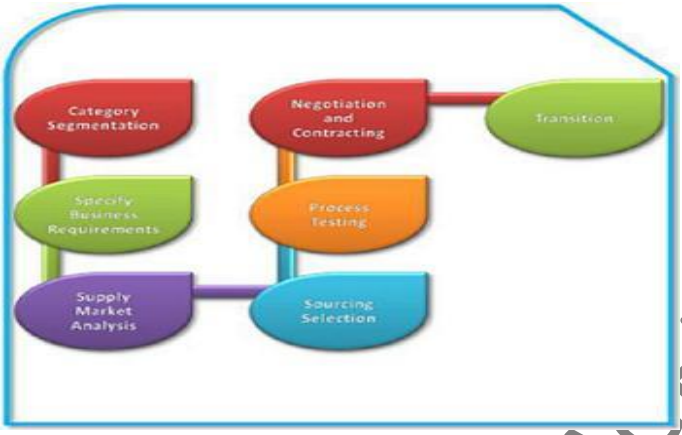
The flows resemble a chain reaction.

SCM - STRATEGIC SOURCING

Strategic sourcing can be defined as a collective and organized approach to supply chain management that defines the way information is gathered and used so that an organization can leverage its consolidated purchasing power to find the best possible values in the marketplace.

Several decades have witnessed a major transformation in the profession of supply chain, from the purchasing agent comprehension, where staying in repository was the criterion, to emerging into a supply chain management surrounding, where working with cross functional and cross

location teams is important, to achieve success.



Strategic sourcing is organized because of the necessity of some methodology or process. It is collective because one of the most essential necessities for any successful strategic sourcing attempt is of receiving operational components, apart from the procurement, engaged in the decision-making and assessment process.

The process of strategic processing is a step by step approach. There are seven distinct steps engaged in the process of strategic processing.

UNDERSTANDING THE SPEND CATEGORY

The first three steps involved in the strategic sourcing are carried out by the sourcing team. In this first stage, the team needs to do a complete survey on the total expenditure. The team ensures that it acknowledges every aspect regarding the spend category itself.

The five major regions that are analyzed in the first stage are as follows −

- Complete previous expenditure records and volumes.
- Expenditures divided by items and sub items.
- Expenditures by division, department or user.
- Expenditures by the supplier.
- Future demand projections or budgets.

For example, if the classification is grooved packaging at a customer goods company, the team has to acknowledge the description of the classification, application patterns and the reason behind specification of particular types and grades specified.

Stakeholders at all functioning units and physical locations are to be determined. The logistics, for instance, needs an updated report regarding the transportation specifications and marketing requirements to acknowledge some quality or environmentally applicable features.

SUPPLIER MARKET ASSESSMENT

The second step includes frequent assessment of the supplier market for pursuing substitute suppliers to present incumbents. A thorough study of the supplier marketplace dynamics and current trends is done. The major element of the key products design is **should-cost**. Along with it, an analysis on the major suppliers‟ sub-tier marketplace and examination for any risks or new opportunities are also important.

Now, it is not recommended to analyze the should-cost for every item. There are many instances where conservative strategic sourcing techniques tend to work better. But in the instances where the application of strategic sourcing is not applicable, the should-cost analysis supplies a valuable tool that drives minimizing of cost and regular progress efforts of the supplier.

SUPPLIER SURVEY

The third step is developing a supplier analysis for both incumbent and potential substitute suppliers. This analysis assists in examining the skills and abilities of a supplier. In the meanwhile, data collected from incumbent suppliers is used for verifying spend information that suppliers have from their sales systems.

The survey team considers the above-mentioned areas for gathering information. The areas are as follows −

- Feasibility
- Capability

- Maturity
- Capacity

The analysis is done to examine the potential and skills of the market to satisfy the customer demands. This analysis helps in the examination done at the initial stage to find out if the proposed project is feasible and can be delivered by the identified supply base.

This analysis also supplies an initial caution of the customer demands to the market and enables suppliers to think about how they would react to and fulfill the demand. The motto is to motivate the appropriate suppliers with the right structural layout to respond to the demands.

BUILDING THE STRATEGY

The fourth step comprises constructing the sourcing strategy. The merger of the first three steps supports the necessary elements for the sourcing strategy. For every region or category, the strategy depends on answering the questions given below.

- How willing is the marketplace to oppose the supplier?
- How supportive are the clients of a firm for testing incumbent supplier relationships?
- What are the substitutes to the competitive assessment?

Generally, these substitutes are opted when a purchasing firm has little leverage over its supply base. They will depend on the belief that the suppliers will share the profits of a new strategy. Thus, the sourcing strategy is an accumulation of all the drivers thus far mentioned.

RFX REQUEST

Mostly, the competitive approach is applied in general cases. In this approach, a request for proposal or bid needs to be prepared (e.g., RFP, RFQ, eRFQ, ITT) for most spend classifications or groups.

This defines and clarifies all the needs for all prequalified suppliers. The request should comprise product or service specifications, delivery and service requirements, assessment criteria, pricing structure and financial terms and conditions.

In the fifth stage, an interaction plan needs to be executed to allure maximum supplier interest. It must be ensured that each and every supplier is aware that they are competing on a level playing field. After sending the RFP to all suppliers, it is to be confirmed that they are given enough time to respond. In order to motivate greater response, follow-up messages should also be sent.

SELECTION

This step is all about selecting and negotiating with suppliers. The sourcing team is advised to apply its assessment constraints to the responses generated by the suppliers.

If information across the limitation of RFP response is required, it can be simply asked for. If done correctly, the settlement process is conducted first with a larger set of suppliers and then shortlisted to a few finalists. If the sourcing team utilizes an electronic negotiation tool, large number of suppliers can sustain in the process for longer duration, giving more wide suppliers a better opportunity at winning the enterprise.

COMMUNICATION WITH NEW SUPPLIERS

After informing the winning supplier(s), they should be invited to take part in executing recommendations. The execution plans vary according to the scale of switches the supplier makes.

For obligatory purposes, a communication plan will be set up, including any modification in specifications and improvements in delivery, service or pricing models. These tend to be communicated to users as well.

The company gains immensely from this entire process of creating a communication plan, making some modifications according to the customer demand and further forwarding this to the customer. It‟s essential that this process should be acknowledged by both the company and the supplier.

For new suppliers, we need to construct a communication plan that copes with the alteration from old to new at every point in the process engaged by the spend category. The sections that have an impact of this change are the department, finance and customer service.

In addition, the risk antennae will be particularly sensitive during this period. It is essential to gauge closely the new supplier‟s performance during the first weeks of performance.

Another essential task is to grasp the intellectual capital of the sourcing team, which has been developed within the seven-step process, so that it can be used the next time that category is sourced.

SUPPLY CHAIN STRATEGY

Determines the nature of material procurement, transportation of materials, manufacture of product or creation of service, distribution of product –Consistency and support between supply chain strategy, competitive strategy, and other functional strategies is important.

RELATIONSHIP BETWEEN COMPETITIVE STRATEGY & SUPPLY CHAIN STRATEGIES:

Value Chain begins with new product development, which creates specification for the product - Marketing and Sales generate demand by publicizing the customer priorities that products and services will satisfy

- ✓ Marketing also brings customer input back to new product development
- ✓ Using new product specifications, operations transforms inputs to outputs to create product
- ✓ Distribution either takes the product to the customer or brings the customer to the product
- ✓ Service responds to customer requests during or after the sale
- ✓ Finance, accounting, information technology, and human resources support and facilitate the -functioning of the value chain
- ✓ To execute a company"s competitive strategy, all these functions play a role, and each must develop its own strategy Achieving Strategic Fit Strategic fit.

UNIT II: SUPPLY CHAIN SYNERGIES

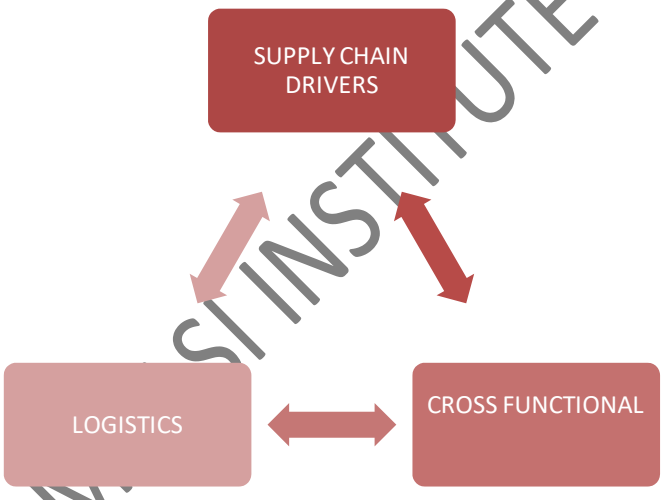
Collaborate with supply chain partners Supply Chain Drivers and Design Drivers of supply chain performance: Framework for structuring Facilities, including warehouse, Inventory, Transportation, Information, Sourcing, and Pricing – Yield management /Revenue management.

SUPPLY CHAIN DRIVERS

The supply chain drivers are grouped under two main drivers:

1. Logistics drivers
2. cross functional drivers

The following are the important drivers of the supply chain



LOGISTICS DRIVERS:

1. **Facilities**- warehouse or storage locations or factory location.

2. **Inventory**- stock of rawmaterials or finished goods
3. **Transportation**- moving of goods from one place to another.

***CROSS FUNCTIONAL DRIVERS*:**

4. **Pricing**- cost of goods
5. **Information** - Information is nothing but the customer needs and wants
6. **Sourcing** - procuring raw materials for production activities.

Drivers	Role in SC	Role in Competitive Strategy	Components of the driver's decision
Facilities	Flexible. Dedicated or Combined Product focus	Economies of scale Higher numbers or smaller facilities	Location Capacity Facility-related Metrics
Inventory	How much/many? Cost	Is it the cost? (JIT) Or Quantity?	Cycle, Safety and Seasonal inventory Availability of the product Inventory-related metric
Transportation	Faster mode is good but will incur higher cost	Faster mode = greater responsibility	Design of transportation network Choice of transportation mode Transportation-related metric

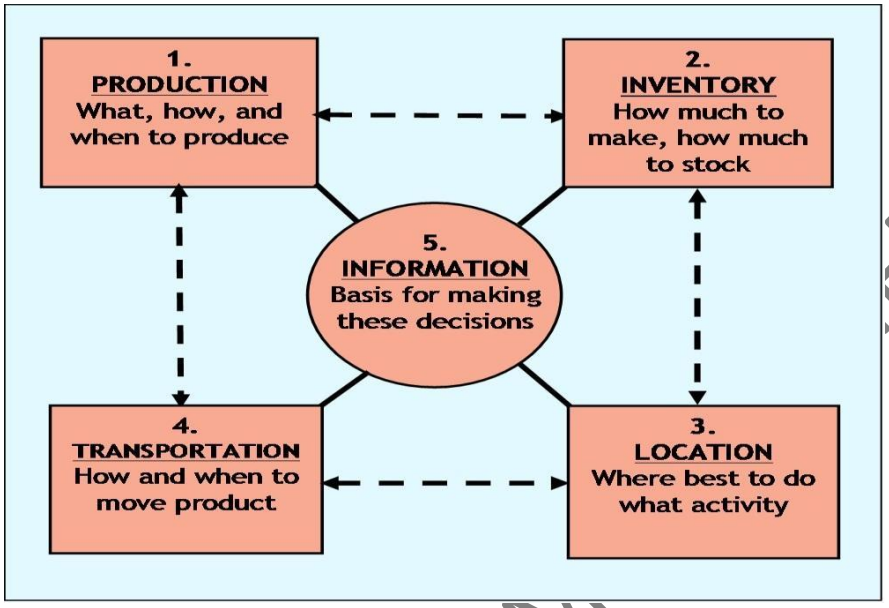
Information	allows coordination of all Stages	Enable efficient flow of information	Push vs pull Coordination and information sharing Sales and operations planning Enabling technologies Information-related metrics
Sourcing	crucial for efficient supply chain	Fully vertically	In-house or outsource

		"Virtual integration"	Supplier selection Procurement Sourcing-related metrics
Pricing	Amount to be charged	Optimal pricing strategies	Pricing and economies of scale Everyday low vs high low pricing Fixed vs menu pricing Pricing-related metrics

Supply Chain Drivers	Responsiveness	Efficiency
1. Production	- Excess capacity - Flexible manufacturing - Many smaller plants	- Little excess capacity - Narrow focus - Few central plants
2. Inventory	- High inventory levels - Wide range of items	- Low inventory levels - Fewer items
3. Location	- Many locations close to customers	- Few central locations serve wide areas
4. Transportation	- Frequent shipments - Fast & Flexible modes	- Few large shipments - Slower and cheaper modes
5. Information	- Collect & share timely and accurate data	- Cost of information drops while other costs rise

The five drivers provide a useful framework for thinking about supply chain capabilities. Decisions made about how each driver operates will determine the blend of responsiveness and

efficiency a supply chain is capable of achieving. The five drivers are illustrated in the diagram below:



FRAMEWORK FOR STRUCTURING FACILITIES

WAREHOUSING

Warehousing plays a vital role in the supply chain process. In today"s industry, the demands and expectations of the customers are undergoing a tremendous change. We want everything at our door step – that too with efficient price. The management of warehousing functions demands a distinct merging of engineering, IT, human resources and supply chain skills.

INVENTORY

- Inventory exists because of a mismatch between supply and demand
- Source of cost and influence on responsiveness
- Impact onMaterial flow time: time elapsed between when material enters the supply chain to when it exits the supply chain
- If responsiveness is a strategic competitive priority, a firm can locate larger amounts of inventory closer to customers

- If cost is more important, inventory can be reduced to make the firm more efficient
- Trade-off

Cycle inventory

o Average amount of inventory used to satisfy demand between shipments

- Depends on lot size

Safety inventory

- Inventory held in case demand exceeds expectations
- Costs of carrying too much inventory versus cost of losing sales

Seasonal inventory

- Inventory built up to counter predictable variability in demand
- Cost of carrying additional inventory versus cost of flexible production

Overall trade-off: Responsiveness versus efficiency

- More inventory: greater responsiveness but greater cost
- Less inventory: lower cost but lower responsiveness

TRANSPORTATION

•Moves the product between stages in the supply chain.

•Impact on responsiveness and efficiency.

•Faster transportation allows greater responsiveness but lower efficiency.

•Also affects inventory and facilities.

•If responsiveness is a strategic competitive priority, then faster transportation modes can provide greater responsiveness to customers who are willing to pay for it.

•Can also use slower transportation modes for customers whose priority is price (cost)

•Can also consider both inventory and transportation to find the right balance.

Mode of transportation:

- Air, truck, rail, ship, pipeline, electronic transportation.
- Vary in cost, speed, size of shipment, flexibility.

Route and network selection

- Route: path along which a product is shipped.
- Network: collection of locations and routes.

In-house or outsource

- Overall trade-off: Responsiveness versus efficiency.

INFORMATION

•The connection between the various stages in the supply chain – allows coordination between stages.

•Crucial to daily operation of each stage in a supply chain – e.g., production scheduling, inventory levels.

•Allows supply chain to become more efficient and more responsive at the same time (reduces the need for a trade-off).

•Push (MRP) versus pull (demand information transmitted quickly throughout the supply chain)

•Coordination and information sharing.

•Forecasting and aggregate planning.

ENABLING TECHNOLOGIES

- o EDI.
- o Internet.
- o ERP systems.
- o Supply Chain Management software.

Overall trade-off: Responsiveness versus efficiencySourcing

- Set of business processes required to purchase goods and services in a supply chain.
- Supplier selection, single vs. multiple suppliers, contract negotiation.
- Sourcing decisions are crucial because they affect the level of efficiency and responsiveness in a supply chain.
- In-house vs. outsource decisions- improving efficiency and responsiveness.
- In-house versus outsource decisions.
- Supplier evaluation and selection.
- Procurement process.
- Overall trade-off: Increase the supply chain profits.

YIELD MANAGEMENT /REVENUE MANAGEMENT

Revenue management is an approach that seeks to price at different levels depending upon a number of factors, based on the premise that different customers are willing to pay different prices for the same product or service. In the airline and hospitality industries there are high fixed costs, finite capacity, a high degree of perishability and multiple market segments. Instead of charging a single price to every potential customer, multiple pricing may apply depending upon the target segment, the timing of the purchase and the amount of available capacity.

THE ROLE OF REVENUE MANAGEMENT IN SUPPLY CHAIN MANAGEMENT

Revenue management is the use of pricing to increase the profit generated from a
Limited supply of supply chain assets.

– SCs are about matching demand and capacity.

– Prices affect demands.

Yield management similar to RM but deals more with quantities rather than prices.

Supply assets exist in two forms

– ***Capacity***: expiring

– ***Inventory***: often preserved

Revenue management may also be defined as offering different prices based oncustomer segment, time of use and product or capacity availability to increasesupply chain profits. Most common example is probably in airline ticket pricing

– Pricing according to customer segmentation at any time

– Pricing according to reading days for any customer segment.

Demand management Demand forecasting, Aggregate Planning and Managing Supply, Demand and InventoryAggregate Planning in a Supply Chain: role, aggregate planningproblems, strategies, role of IT, Implementation Responding to predictable variability in supply chain –

Types of supply chains-creating responsive supply chainslean and agile supply chain their characteristics.

DEMAND MANAGEMENT DEMAND FORECASTING

Demand Forecasting facilitates critical business activities like budgeting, financial planning, sales and marketing plans, raw material planning, production planning, risk assessment and formulating mitigation plans. Outlined below are the impacts of Demand Forecasting on Supply Chain Management:

Improved supplier relations and purchasing terms: Demand Forecasting drives the raw material planning process which facilities the Purchasing Managers to release timely purchase plan to suppliers. Visibility and transparency of raw material demand improve supplier relations and empowers Purchasing Managers to negotiate favorable terms for their companies.

Better capacity utilization and allocation of resources: Based on the current inventory levels, raw material availability and expected customer orders, production can be scheduled effectively. This leads to improved capacity utilization and judicious allocation of manufacturing resources.

Optimization of inventory levels: A proper Demand Forecast provides vital information for driving the desired raw material, WIP and finished goods inventory levels. This reduces the Bullwhip effect across the Supply Chain, leading to optimization of inventory levels and reduction in stock-out or over-stocking situations.

Improved distribution planning and logistics: Apart from small businesses, this is particularly evident in businesses dealing with multiple SKUs and wide distribution networks. Distribution and Logistics Managers are enabled to balance inventory across the network and negotiate favorable terms with Transporters.

Increase in customer service levels: With optimized inventory levels and improved Distribution Planning and Logistics, customer service metrics like on-time delivery (OTD), on-time in-full (OTIF), case-fill/fill-rate, etc. are improved due to right sizing and right positioning of inventory.

Better product lifecycle management: Medium to long range Demand Forecasts provide better

visibility of new product launches and old product discontinuations. This drives synchronized raw material, manufacturing and inventory planning to support new product launches and most importantly, reducing the risk of obsolescence of discontinued products.

Facilitates performance management: Management can set KPIs and targets for various functions like Sales, Finance, Purchase, Manufacturing, Logistics, etc. based on the medium to long range plans derived from the Demand Forecasting process. Organizational efficiency, effectiveness, and improvement initiatives can be designed for key areas of the company.

3 MAIN ROLES OF FORECASTING IN SUPPLY CHAIN MANAGEMENT

Forecasting plays three major roles in effective supply chain management:

Pivotal in strategic planning of Business: Forecasting is the underlying hypothesis for strategic business activities like expansion planning, budgeting, financial planning, risk assessment, and mitigation. Critical business assumptions like turnover, profit margins, cash flow, capital expenditure, etc. are also dependent on Forecasting.

Initiating all push–processes of Supply Chain: Forecasting is the starting point for all push-processes of Supply Chain like raw material planning, purchasing, inbound logistics, and manufacturing. Better forecasts help optimize the inventory levels and capacity utilization.

Driving all pull–processes of Supply Chain: Forecasting drives all pull-process of Supply Chain like order management, packaging, distribution, and outbound logistics. Better forecast improves the distribution and logistics and increases customer service levels.

An organization can finalize its business plans on the recommendation of demand Forecast. Once

business plans are ready, an organization can do backward working from the final sales unit to raw materials required. Thus annual and quarterly plans are broken down into labor, raw material, working capital, etc. requirements over a medium range period 6 months to 18 months. This process of working out production requirements or a medium range is called aggregate planning.

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 ofcapacity, production, subcontracting, inventory,stock-outs, 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

Role of Aggregate Planning in a Supply Chain

• Specify operational parameters over the timehorizon

– Production rate – Subcontracting

– Workforce – Backlog

– Overtime – Inventory on hand

– Machine capacity level

• All supply chain stages should work together onan aggregate plan that will optimize supply chainperformance.

THE AGGREGATE PLANNING PROBLEM

• Given the demand forecast for each period in theplanning horizon, determine the production level,inventory level, and the capacity level for each periodthat maximizes the firm‟s (supply chain‟s) profit over theplanning horizon

• Specify the planning horizon (typically 3-18 months)

• Specify the duration of each period

• Specify key information required to develop anaggregate plan

Aggregate demand forecast Ft 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 orreducing machine capacity

($/machine)

• Labor/machine hours required per unit

• Inventory holding cost ($/unit/period)

• Stock-out or backlog cost ($/unit/period)

• Constraints – overtime, layoffs, capital available,stockouts, backlogs, from suppliers.

Identifying Aggregate Units ofProduction

• Aggregate unit should be identified in away that the resulting production schedulecan be accomplished in practice

• Focus on the bottlenecks when selectingthe aggregate unit and identifying capacityand production times

• Account for activities such as setups andmaintenance.

AGGREGATE PLANNING STRATEGIES

• Trade-off between capacity, inventory,backlog/lost sales

• Chase strategy – using capacity as thelever

• Time flexibility from workforce or capacitystrategy – using utilization as the lever

• Level strategy – using inventory as thelever

• Tailored or hybrid strategy – acombination of strategies

Chase Strategy

• Vary machine capacity or hire and lay offworkers as demand varies

• Often difficult to vary capacity and workforceon short notice

• Expensive if cost of varying capacity is high

• Negative effect on workforce morale

• Results in low levels of inventory

• Used when inventory holding costs are highand costs of changing capacity are low

Time Flexibility Strategy

- Use excess machine capacity
- Workforce stable, number of hours workedvaries
- Use overtime or a flexible work schedule

• Flexible workforce, avoids morale problems
• Low levels of inventory, lower utilization
• Used when inventory holding costs are highand capacity is relatively inexpensive

Level Strategy

• Stable machine capacity and workforcelevels, constant output rate
• Inventory levels fluctuate over time
• Inventories carried over from high to lowdemand periods
• Better for worker morale
• Large inventories and backlogs mayaccumulate
• Used when inventory holding and backlogcosts are relatively low

AGGREGATE PLANNING

FACTORS AFFECTING AGGREGATE PLANNING

Aggregate planning is an operational activity critical to the organization as it looks to balance longterm strategic planning with short term production success. Following Factors are critical before an aggregate planning process can actually start

•A complete information is required about available production facility and raw materials.
•A solid demand Forecast covering the mediumrange period
•Financial planning surrounding the production cost which includes raw material, labor, inventory planning, etc.
•Organization policy around labor management, quality management, etc &or aggregate planning to be a success, following inputs are required
•An aggregate demand forecast for the relevant period
•Evaluation of all the available means to manage capacity planning like subcontracting,

outsourcing, etc.

•Listing operational status of workforce number, skill set, etc., inventory level and production efficiency Aggregate planning will ensure that organization can plan or work Force level, inventory level and production rate in line with its strategic goal and objective.

AGILE SUPPLY CHAIN CONCEPT

Agility is a supply chain-wide capability that embraces organizational structures, value chain configurations, information systems, logistics processes and in particular mindset and culture. A key characteristic of an agile supply chain is flexibility, which should be interpreted from two side of supply chain. From the inside of supply chain, such flexibility means configurations and structures are not fixed. They may transform quickly as the needs arises. From outside, i.e. from market and consumer perspective, the supply chain must deliver timely products and services; and deliver them at the beginning of the usually short profit widows; often to be innovative and to be the market leader.

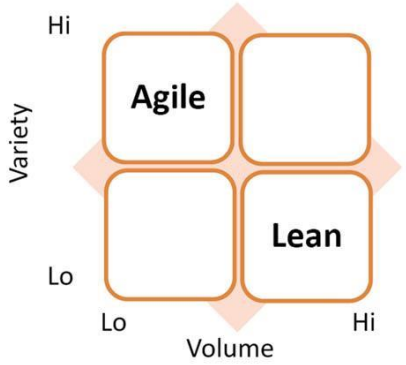
Thus „agile supply chain" is essentially a practical approach to managing supply networks and developing flexible capabilities to satisfy the fast changing customer demand. It is about moving and transforming a supply chain that is structured around the focal company and its product categories to the one that is centered on end-consumers and their requirement. As the Chairman of Li and Fung Group - the largest export trader in Hong Kong, says that one of the key features of his approach is to organise for customer, not on country units that may end up competing against each other.

LEAN SUPPLY CHAIN CONCEPT

Lean supply chains operate efficient manufacturing processes and have lower administrative costs. The benefits can be significant: reducing capital tied up in inventory, improved customer services, increased capacity and not wasting time in routine day-to-day operations, all leading to greater profitability.

Its detractors cite lack of flexibility and possible over-application as shortcomings. It also has the reputation of stifling innovation because it emphasises tightly defined process improvements. However, any initiative that involves eliminating waste to save money must work well for most

organizations.



"Lean" works best in high volume, low variety and predictable environments.

"Agility" is needed in less predictable environments where the demand for variety is high.

Comparison of lean supply with agile supply

Distinguishing Attributes	**Lean Supply**	**Agile Supply**
Typical products	Commodities	Fashion goods
Market place demand	Predictable	Volatile
Product variety	Low	High
Product life cycle	Long	Short
Customer drivers	Cost	Availability
Profit margin	Low	High
Dominant cost	Physical cost	Marketability cost
Stock-out penalties	Long-term contractual	Immediate and volatile
Purchasing policy	Buy materials	Assign capacity

Information enrichment	Highly desirable	Obligatory
Forecasting mechanism	Algorithmic	consultative

UNIT IV: CUSTOMER VALUE AND SUPPLY CHAIN MANAGEMENT

Dimensions of customer value-value added services –customer value measures Push-pull boundary –mass customization and supply chain management outsource - Third and Fourth - Party Logistics providers –managing risk in supply chains Creating a sustainable supply chain

DIMENSIONS OF CUSTOMER VALUE-VALUE ADDED SERVICES

Customer Value Defines the SCM

- SCM strategy determined by:
- type of products or services it offers
- value of various elements of this offering to the customer.

Examples:

- If customers value one-stop shopping => carry a large number of products and options
- Personal customization of products => flexible supply chain
- Supply chain needs to be considered in any product and sales strategy
- SCM strategy could provide competitive advantages leading to increased customer value

THE DIMENSIONS OF CUSTOMER VALUE

- Conformance to requirements.
- Product selection.
- Price and brand.
- Value-added services.

SCM - INTEGRATION

Supply chain integration can be defined as a close calibration and collaboration within a supply chain, mostly with the application of shared management information systems. A supply chain is

made from all parties that participate in the completion of a purchase, like the resources, raw materials, manufacturing of the product, shipping of completed products and facilitating services. There are different levels of supply chain integration. The initial step in integration shall include choosing precise merchants to supply certain inputs and ensuring compliance for them for supplying certain amount of inputs within the year at a set cost.

This assures that the company has the appropriate materials required to produce the expected output of computers during the year. In the meanwhile, this computer company may sign a bond with a large supplier of circuit boards; the bond expects it to deliver a precise quantity at precise times within a year and fix a price that will be effective during the bond year.

If we move to a higher level, the next step would be to integrate the companies more closely. The circuit board supplier may construct a plant close to the assembly plant and may also share production software. Hence, the circuit board company would be able to see how many boards are required in the upcoming month and can construct them in time, as the company requires them in order to meet its sales demand.

Further higher level is referred as vertical integration. This level starts when the supply chain of a company is actually owned by the company itself. Here, a computer company may buy the circuit board company just to ensure a devoted supply of elements.

PUSH SYSTEM

In a push-based supply chain, the goods are pushed with the help of a medium, from the source point, e.g., the production site, to the retailer, e.g., the destination site. The production level is set in accordance with the previous ordering patterns by the manufacturer.

A push-based supply chain is time consuming when it has to respond to fluctuations in demand, which can result in overstocking or bottlenecks and delays, unacceptable service levels and product obsolescence.

This system is based on the deliberation of customer‟s demand. It tries to push as many products

into the market as possible. As a result, the production is time consuming because the producer and the retailer struggle to react to the changes in the market. Forecast or prediction plays an important role in the push system.

Optimum level of products can be produced through long term prediction. This deliberative nature of the push system leads to high production cost, high inventory cost as well as high shipment cost due to the company‟s desire to halt products at every stage.

Thus, in the push view of supply chain integration, the manager of a firm may sometimes fail to satisfy or cope with the fluctuating demand pattern. This system leads to high inventory and high size of batches.

Here, the companies focus more on minimizing the cost of supply chain and neglect the responsiveness. This system models challenges along with demand management and transportation management.

PULL SYSTEM

The pull-based supply chain is based on demand-driven techniques; the procurement, production and distribution are demand-driven rather than predicting. This system doesn‟t always follow the make-to-order production. For example, Toyota Motors Manufacturing produces products yet do not religiously produce to order. They follow the supermarket model.

According to this model, limited inventory is kept and piled up as it is consumed. Talking about Toyota, Kanban cards are used to hint at the requirement of piling up inventory.

In this system, the demand is real and the company responds to the customer demands. It assists the company in producing the exact amount of products demanded by the clients.

The major drawback in this system is that in case the demand exceeds than the amount of products manufactured, then the company fails to meet the customer demand, which in turn leads

to loss of opportunity cost.

Basically in the pull system, the total time allotted for manufacturing of products is not sufficient. The production unit and distribution unit of the company rely on the demand. From this point of view, we can say that the company has a reactive supply chain.

Thus, it has less inventories as well as variability. It minimizes the lead time in the complete process. The biggest drawback in pull based supply chain integration is that it can"t minimize the price by ranking up the production and operations.

DIFFERENCES IN PUSH AND PULL SYSTEM

The major differences between push and pull view in supply chain are as follows −

- In the push system, the implementation begins in anticipation of customer order whereas in the pull system, the implementation starts as a result of customer"s order.
- In the push system, there is an uncertainty in demand whereas in pull system, the demand remains certain.
- The push system is a speculative process whereas the pull system is a reactive process.
- The level of complexity is high in the push system whereas it is low in the pull system.
- The push based system concentrates on resources allocation whereas the pull system stresses on responsiveness.
- The push system has a long lead time whereas the pull system has a short lead time.
- The push system assists in supply chain planning whereas the pull system facilitates in order completion.

To conclude, the push based supply chain integrations works with an objective of minimizing the

cost whereas the pull based supply chain integration works with an objective to maximize the services it provides.

PUSH &PULL SYSTEM

Mostly we find a supply chain as merger of both push and pull systems, where the medium

between the stages of the push-based and the pull-based systems is referred as the push–pull boundary.

The terms push and pull were framed in logistics and supply chain management, but these terms are broadly used in the field of marketing as well as in the hotel distribution business.

To present an example, Wal-Mart implements the push vs. pull strategy. A push and pull system in business represents the shipment of a product or information between two subjects. Generally, the consumers use pull system in the markets for the goods or information they demand for their requirements whereas the merchants or suppliers use the push system towards the consumers.
In supply chains, all the levels or stages function actively for the push and the pull system. The production in push system depends on the demand predicted and production in pull system depends on absolute or consumed demand.

The medium between these two levels is referred as the push–pull boundary or decoupling point. Generally, this strategy is recommended for products where uncertainty in demand is high. Further, economies of scale play a crucial role in minimizing production and/or delivery costs.
For example, the furniture industries use the push and pull strategy. Here the production unit uses the pull-based strategy because it is impossible to make production decisions on the basis on long term prediction. Meanwhile, the distribution unit needs to enjoy the benefits of economy of scale so that the shipment cost can be reduced; thus it uses a push-based strategy.

VALUE ADDED SERVICES:

Value Added refers to the increase in value of an item after any stage of processing. This value addition to the item can be due to labor, machine, creativity, technology etc. Hence, it is nothing but the enhancement of the value after each stage of the process.

MASS CUSTOMIZATION AND SUPPLY CHAIN MANAGEMENT

Mass customization has many explanations, but each of them is that in marketing, manufacturing, call centers and management, it is the use of flexible computer-aided

manufacturing systems to produce custom output. Those systems combine the low unit costs of mass production processes with the flexibility of individual customization. Mass customization is a marketing and manufacturing technique that combines the flexibility and personalization of "custom-made" with the low unit costs associated with mass production. Mass customization is a business strategy that aims to fulfill individual customer needs at a cost level. That enables to target a relatively large part of the market of a similar standard product. Production of personalized or custom-adjusted goods or services to meet consumers diverse and changing needs nearly to the mass production prices. Mass customization is not mass production.

All executives today recognize the need to provide outstanding service to customers. Focusing on the customer, however, is both an imperative and a potential curse. In their desire to become customer driven, many companies have resorted to invent new programs and procedures to meet every customer"s request. But as customers and their needs grow increasingly diverse, such an approach has become a surefire way to add unnecessary cost and complexity to operations. Managers have discovered that mass customization if not properly operated, too, can produce unnecessary cost and complexity.

Mass customization is based on several significant aspects:

- ✓ Mass customization is based on product-based strategy,
- ✓ No more brands –consumer becomes its own brand by creating their own personal brand,
- ✓ Consumers require adjustment,
- ✓ Modulating means mass customization,
- ✓ Mass customization sells customized products or services.

THIRD AND FOURTH - PARTY LOGISTICS PROVIDERS

Third-party logistics provider (3PL) is an asset based company that offers logistics and supply

chain management services to its customers. It commonly owns and manages distribution centers and transport modes. A **fourth-party logistics provider (4PL)** integrates the resources of producers, retailers and third-party logistics providers in view to build a system-wide improvement in supply chain management. They are non-asset based meaning that they mainly

provide organizational expertise. However, about 75% of all the 3PLs are also offering 4PLs services. The main factors behind the increasing role of 3PLs and 4PLs are:

The international division of production associated with globalization helped set a global network of manufacturing activities, implying that producers and consumers tend to have an acute geographical separation requiring complex transportation services.

A increasing focus of manufacturers and retailers on their core business (known as core competencies) and sub-contracting activities such as logistics where they have less expertise. The goal is to promote the respective specializations in production and distribution.

Better utilization of transportation assets and resulting economies of scale. 3PLs can make better use of transportation assets by balancing the needs of multiple client shippers across transportation and distribution functions, locations, etc. (e.g. developing networks to maximize backhaul).

Productivity gains in supply chain management in terms of costs and reliability that can be derived from the managerial and information technology expertise provided by 3/4PL.

Offshoring and outsourcing resulted in longer and more complex supply chains in which several segments of the transport chain are taking place in environments unfamiliar to the outsourcing company.

3/4PLs are more prone to implement novel supply chain management practices requiring a higher expertise on material flows such as trans-loading, cross-docking and shipment tracking.

A general trend towards de-regulation permitting a higher level of interaction between transportation modes. These interactions rely on complex transport services.

GREEN SUPPLY CHAIN MANAGEMENT

Green Supply Chain Management is all about delivering products and services from suppliers, manufacturers to end customers through material flow, information flow and cash flow in the

context of environment. Traditional Supply Chain Management focuses on Total Quality, optimum Cost and best service which in some way contributed to environment. Today's Green Supply chain management mandates to incorporate the environmental idea in each and every stage of the product and service in a Supply Chain. Hence Supply chain managers have a great role in developing innovative environmental technologies to tackle the problems faced by the economy on environmental problems and communicate this to every stake holder in the chain.

BENEFITS OF GSCM

1. GSCM will help us to gain a competitive advantage and help us to attract new customers.
2. Increased use of resources, improved efficiency and reduced production cost.
3. It contributes greater towards improved financial performance.
4. Reduces risk by avoiding hazardous material that leads to environmental effect.
5. Improved quality of products and services gives higher customer delight and reputation.

UNIT V: SUPPLY CHAIN ANALYTICS

Use of computer software in supply chain problems -Electronic commerce –emerging mega trends supply chain of the future –seeking structural flexibility –The multi-channel revolution 2020 vision

SUPPLY CHAIN MANAGEMENT - ROLE OF IT

Companies that opt to participate in supply chain management initiatives accept a specific role to enact. They have a mutual feeling that they, along with all other supply chain participants, will be better off because of this collaborative effort. The fundamental issue here is power. The last two decades have seen the shifting of power from manufacturers to retailers.

When we talk about information access for the supply chain, retailers have an essential designation. They emerge to the position of prominence with the help of technologies. The advancement of inter organizational information system for the supply chain has three distinct benefits. These are −

- **Cost reduction** − The advancement of technology has further led to ready availability of all the products with different offers and discounts. This leads to reduction of costs of products.
- **Productivity** − The growth of information technology has improved productivity because of inventions of new tools and software. That makes productivity much easier and less time consuming.
- **Improvement and product/market strategies** − Recent years have seen a huge growth in not only the technologies but the market itself. New strategies are made to allure customers and new ideas are being experimented for improving the product.

It would be appropriate to say that information technology is a vital organ of supply chain management. With the advancement of technologies, new products are being introduced within fraction of seconds increasing their demand in the market. Let us study the role of information technology in supply chain management briefly.

The software as well as the hardware part needs to be considered in the advancement and maintenance of supply chain information systems. The hardware part comprises computer's input/output devices like the screen, printer, mouse and storage media. The software part comprises the entire system and application program used for processing transactions management control, decision-making and strategic planning.

ELECTRONIC COMMERCE

Electronic commerce involves the broad range of tools and techniques used to conduct business in a paperless environment. Hence it comprises electronic data interchange, e-mail, electronic fund transfers, electronic publishing, image processing, electronic bulletin boards, shared databases and magnetic/optical data capture.

Electronic commerce helps enterprises to automate the process of transferring records, documents, data and information electronically between suppliers and customers, thus making the communication process a lot easier, cheaper and less time consuming.

ELECTRONIC DATA INTERCHANGE

Electronic Data Interchange (EDI) involves the swapping of business documents in a standard format from computer-to-computer. It presents the capability as well as the practice of exchanging information between two companies electronically rather than the traditional form of mail, courier, & fax.

The major advantages of EDI are as follows −

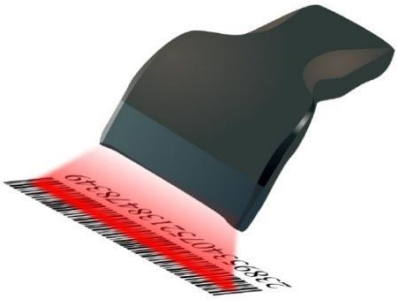
- Instant processing of information
- Improvised customer service
- Limited paper work
- High productivity
- Advanced tracing and expediting
- Cost efficiency
- Competitive benefit

- Advanced billing

The application of EDI supply chain partners can overcome the deformity and falsehood in supply and demand information by remodeling technologies to support real time sharing of actual demand and supply information.

BARCODE SCANNING

We can see the application of barcode scanners in the checkout counters of super market. This code states the name of product along with its manufacturer. Some other practical applications of barcode scanners are tracking the moving items like elements in PC assembly operations and automobiles in assembly plants.



DATA WAREHOUSE

Data warehouse can be defined as a store comprising all the databases. It is a centralized database that is prolonged independently from the production system database of a company.

Many companies maintain multiple databases. Instead of some particular business processes, it is established around informational subjects. The data present in data warehouses is time dependent and easily accessible. Historical data may also be accumulated in data warehouse.

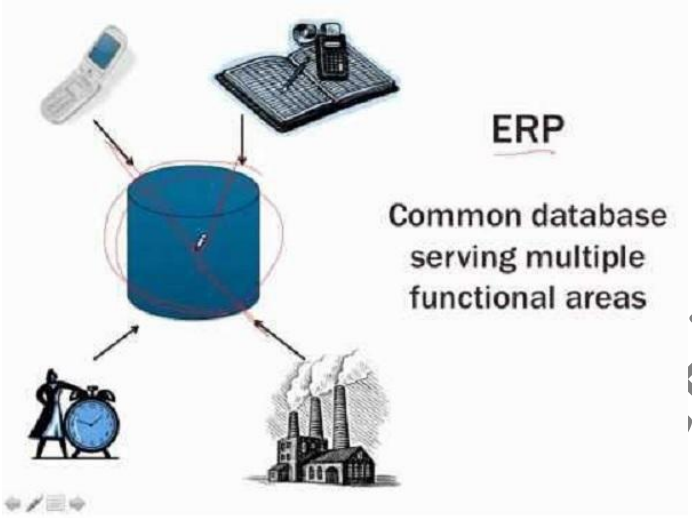
ENTERPRISE RESOURCE PLANNING(ERP) TOOLS

The ERP system has now become the base of many IT infrastructures. Some of the ERP tools are Baan, SAP, PeopleSoft. ERP system has now become the processing tool of many companies. They grab the data and minimize the manual activities and tasks related to processing financial, inventory and customer order information.

ERP system holds a high level of integration that is achieved through the proper application of a single data model, improving mutual understanding of what the shared data represents and

constructing a set of rules for accessing data.

With the advancement of technology, we can say that world is shrinking day by day. Similarly, customers' expectations are increasing. Also companies are being more prone to uncertain environment. In this running market, a company can only sustain if it accepts the fact that their conventional supply chain integration needs to be expanded beyond their peripheries.



The strategic and technological interventions in supply chain have a huge effect in predicting the buy and sell features of a company. A company should try to use the potential of the internet to the maximum level through clear vision, strong planning and technical insight. This is essential for better supply chain management and also for improved competitiveness.

We can see how Internet technology, World Wide Web, electronic commerce etc. has changed the way in which a company does business. These companies must acknowledge the power of technology to work together with their business partners.

We can in fact say that IT has launched a new breed of SCM application. The Internet and other networking links learn from the performance in the past and observe the historical trends in order to identify how much product should be made along with the best and cost effective methods for warehousing it or shipping it to retailer.

MEGA TRENDS OF SUPPLY CHAIN MANAGEMENT

DIGITAL SOCIETY:

The first trend is about the digital society. We, humans, share a lot of data for example on social media like Facebook, Instagram, and Twitter but also on Google, but also machines share a lot of data. Currently, we already have more machines on the internet than humans.

HUMAN BEHAVIOR:

The second trend is around human behavior. Over the last years, we have been working on algorithms, optimizers, and all kind of tools to improve decision making what we need to understand is, what humans do with all this information? How do they take decisions?

***SCARCITY*:**

The third trend is about scarcity. We are already running short on some basic materials. When you want to produce a mobile phone, we have to go deep into the sea to collect some of its basic materials.

DIGITAL MANUFACTURING:

A fourth trend is in digital manufacturing. 3d printers, additive manufacturing, in the coming year, in the U.S. only, 200,000 industrial 3d printers will be installed.

STRUCTURAL FLEXIBILITY IN SUPPLY CHAIN MANAGEMENT

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:

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

2. **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 colors.

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.

THE MULTI-CHANNEL REVOLUTION 2020 VISION

The 2020 Future Value Chain project identifies the trends that will have the greatest impact on the Consumer Goods industry in the coming 10 years. Twelve global root trends have been identified that address change in society, shopper behavior, environment and technology. These root trends are:

1. Increased Urbanization
2. Aging Population
3. Increasing Spread of Wealth
4. Increased Impact of Consumer Technology Adoption
5. Increase in Consumer Service Demands
6. Increased Importance of Health and Wellbeing
7. Growing Consumer Concern about Sustainability
8. Shifting of Economic Power
9. Scarcity of Natural Resources
10. Increase in Regulatory Pressure
11. Rapid Adoption of Supply Chain Technology Capabilities
12. Impact of Next-Generation Information Technologies

MULTI-CHANNEL REVOLUTION 2020 VISION

The 10 Trends

1. Service chains will become more important than product chains.
2. Companies will need to fully report corporate externalities.
3. Supply chains must be designed to serve the "base of the pyramid."
4. Knowledge work and workers will become global in nature.
5. SCM will have a standard certification process similar to that for CPAs.
6. Product clockspeeds will determine the number and nature of the supply chains.
7. Micro segmentation will be key to success.
8. Technology to support SCM will primarily be "on tap."
9. Leaders will leverage social media in a closed loop feedback process.
10. Artificial intelligence will be embedded in mainstream supply chain activities.