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**Title**

**REVIEW OF SUPPLY CHAIN MANAGEMENT FOR  
MODELING AND INTEGRATION IN INDIAN  
ELECTRONICS & TELECOMMUNICATION  
INDUSTRY**

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**Abstract:**

Supply Chain Management is a network of facilities that produce raw materials, transform them into intermediate goods and then final products, and deliver the products to customers through a distribution system. Supply chain modeling and integration is gaining importance from academics and practitioners as supply chain management is becoming an essential tool in today's competitive business environment. Supply Chain Management has become company's strategy to increase their competitiveness.

The paper presents statistical analysis of the literature survey indicating the usefulness of the findings to the industries contemplating implementation of SCM practices. The findings will provide important implications for the management in the industries to understand determinants that contribute to the SCM success. Companies can enhance their SCM performance by improving the current practices/strategies by focusing on the determinants that significantly influence SCM performance.

**Introduction to Supply Chain Management & Service Supply Chain:**

Supply Chain Management is management of material, money, men, and information within and across the supply chain to maximize customer satisfaction and to get an edge over competitors. The integration of key business processes from the end user through original suppliers that provides products, services and information that add value for customers, is Supply Chain Management as shown in Figure 3.

Supply Chain Management is an external integration of logistics systems of the firm with the logistics systems of its customers, vendors, and all third-party logistics service providers with the objective of ensuring superior value to all stakeholders

Supply Chain Management concepts are shown in Figure 1.

A Service Supply Chain is an interrelated network of multiple members linking the customers' customers to the suppliers' suppliers. Supply Chain Management (SCM) concerns with an effective approach to coordinate the various links in the entire supply chain by both improving the customer services and reducing the cost. A service Supply Chain involves the series of

activities from the analysis of customer need, service design to service delivery. A service Supply Chain is shown in Figure 2.

**Evolution of SCM:**

Table 1 explains the evolution of supply chain management

**Table 1: Evolution of supply chain management**

S.No.	Era	Description
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 20 <sup>th</sup> century, especially by the creation of the assembly line.
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 & 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, warehouse 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  Web 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.
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**Definitions of SCM:**

Table 2 explains the definitions of SCM

**Table 2: Definitions of SCM**

S. No.	Authors  Year	Definition of SCM
1	Jones and Riley  (1985)	An integrative approach in dealing with the planning and control of the materials flow from suppliers to end-users.
2	Ellram and Cooper  (1990)	A management philosophy that reflects a systemic view of Supply Chain (by viewing the chain as a single entity) based on partnership concept that involves the joint efforts of several companies directed to total goods flow management, from supplier to final customer.
3	Scott and Brook  (1991)	The Supply chain linking each element of the manufacturing and supply process from raw materials to the end user, encompassing several organizational boundaries.
4	Ellaram  (1991)	The integration of the processes, systems, and organizations that control the movement of goods from the supplier to a satisfied customer without waste.
5	Lee and Billington  (1992)	Networks of manufacturing and distribution sites that procure raw materials, transform them into intermediate and finished products, and distribute the finished products to customers.
6	Ellram  Cooper  (1993)	A network of firms interacting to deliver product or service to the end customer, linking flows from raw material supply to final delivery.

7	Berry (1994)	Supply chain management aims at building trust, exchanging information on market needs, developing new products, and reducing the supplier base to a particular OEM (original equipment manufacturer) so as to release management resources for developing meaningful, long term relationship.
8	Cox (1995)	The functions within and outside a company that enable value chain to make and provide products to the customer.
9	Lee and Corey (1995)	SCM consists of the integration activities taking place among a network of facilities that procure raw material, transform them into intermediate goods and then final products, & deliver products to customers through a distribution system.
10	Ganeshan and Harrison (1995)	A network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers.
11	Patricia (1996)	The physical network that begins with the supplier and ends with the customer.
12	Monczka and Morgan (1997)	Integrated SCM is about going from the external customer and then managing all the processes that are needed to provide the customer with value in a horizontal way.
13	Saunders (1997)	External Chain is the total chain of exchange from original source of raw material, through the various firms involved in extracting and processing raw materials, manufacturing, assembling, distributing and retailing to ultimate end customers.
14	Kopczak (1997)	The set of entities, including suppliers, logistics services providers, manufacturers, distributors and resellers, through which materials, products and information flow.
15	Lee and Ng (1997)	A network of entities that starts with the suppliers' supplier and ends with the customers' custom the production and delivery of goods and services.
16	Christopher	Network of organizations that are involved, through upstream and

	(1998)	downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer
17	Tan (1998)	Supply chain management encompasses materials/supply management from the supply of basic raw materials to final product (and possible recycling and re-use). Supply chain management focuses on how firms utilize their suppliers' processes, technology and capability to enhance competitive advantage. It is a management philosophy that extends traditional intra-enterprise activities by bringing trading partners together with the common goal of optimization and efficiency.
18	Lambert (1998)	Integration of key business processes from end user through original suppliers that provide products, services and information that add value for customers and other stakeholders.
19	Houlihan (1999)	The integration of various functional areas within an organization to enhance the flow of goods from immediate strategic suppliers through manufacturing and distribution chain to the end user
20	Simchi-Levi. (2000)	A set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, distribution and sales centers, implying the production and distribution of goods in adequate quantities, at the right place and the right time, in order to minimize overall system cost while satisfying the requested level of demand and customer service
21	Mentzer (2001)	To improve the long term performance of the companies and the supply chain as a whole systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain is essential.
22	Trent (2004)	The proactive management of bidirectional coordination and movement of goods, services, information and funds, from raw material to final user.
23	Lambert (2005)	Since SC is a network of companies, or independent business units, from original supplier to end customers, management of this network is a complex task having the goal to implement cross-functional business processes and integrate them with other key members of the chain.



24	Russell (2007)	Alliances with key partners and information technology that allows supply chain partners to share accurate information on a timely basis are the building blocks of efficient and responsive supply chain operations. Upon this foundation, the introduction of lean manufacturing and lean logistics processes, together with the integration of key business processes up and down the supply chain create SCM.
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**Features of Supply Chain Management:**

Superior Customer Value

Single Entity

Inventory Perspective

Strategic Orientation

Outsourcing vs. in sourcing

Supply Chain Relationships

Flexible Approach

**Supply chain management objectives:**

The main objective of SCM is to build up and enhance competitive advantage by cost reduction without compromising customer satisfaction. Leveraging the expertise, experience, skills and capabilities of the SCP who comprise this competitive network (Mentzer 2001)

Implement solutions or bridges enables supply chain performance to maintain competitive advantage (Fawcett 2007)

**Contributions of Supply Chain Management:**

Superior Customer Value and Competitive Advantage

Inter-functional Integration and Coordination in Supply Chain Management

Inter-firm Integration and Coordination in Supply Chain Management

**Linkages of Supply Chain Management:**

Supply Chain Management and Marketing

Supply Chain Management and Sales

Supply Chain Management and Research and Development

Supply Chain Management and Manufacturing Operations

Supply Chain Management and Information Technology

Supply Chain Management and Finance

Table 3 shows the principal component bodies of supply chain literature

**Table 3 Principal component bodies of supply chain literature**

Strategic management	Relationships/partnerships
Strategic Networks	Relationships Development
Control in the supply chain	Supplier Development
Time-Based Strategy	Strategic Supplier Selection
Strategic Sourcing	Vertical Disintegration
Vertical Disintegration	Partnership Sourcing
Make or Buy decisions	Supplier Involvement
Core Competencies focus	Supply/Distribution Base Integration
Supply Network Design	Supplier Assessment (ISO)
Strategic Alliances	Guest Engineering Concept

Strategic Supplier Segmentation	Design for Manufacture
World Class Manufacturing	Mergers Acquisitions, Joint Ventures
Strategic Supplier Selection	Strategic Alliances
Global Strategy	Contract View, Trust, Commitment
Capability Development	Partnership Performances
Strategic Purchasing	Relationship Marketing

Logistics	Best practices
Integration of materials and information flows	JIT, MRP, MRP II
JIT, MRP, Waste Removal, VMI	Continuous Improvement
Physical Distribution	Tiered Supplier Partnerships
Cross Docking	Supplier Associations
Logistics Postponement	Leverage Learning Network
Capacity Planning	Quick Response, Time Compression
Forecast Information Management	Process Mapping, Waste Removal
Distribution Channel Management	Physically efficient Vs. Market Oriented Supply Chains
Planning and Control of Materials Flow	

Marketing	Organizational behavior
Relationship Marketing	Communication
Internet Supply Chains	Human Resources Management
Customer Service Management	Employees' Relationships
Efficient Consumer Response	Organizational Structure



	Efficient Replenishment	Power in relationships
	After Sales Service	Organizational Culture
		Organizational Learning
		Technology Transfer
		Knowledge Transfer

**Barriers, Bridges and Benefits to effective SCM:**

Fawcett (2007) reviewed recent scientific literature on the potential barriers to SCM. They classified the barriers into two categories namely inter-firm rivalry and managerial complexity. They noted the following barriers under inter-firm rivalry category, in order of significance; internal and external turf wars, poor SCM planning, lack of vision of SCM, lack of trust, executive commitment and poor SCM understanding.

Managerial complexity includes misaligned SC processes, structures and major differences in SCPs’ business culture. And in the managerial complexity category noted the following barriers in order of significance; IS/IT deficiencies, organizational structure/culture, lack SC measurement and lack of alliance guidelines. These problems are both at enterprise level and SC level and hence the need to tackle them at both fronts. The worst barrier IS/IT deficiencies mean loss in competitive advantage by the whole SC.

They reviewed solutions to the SCM barriers proposed in the scientific literature. They noted the following plausible solutions in order of importance; information transparency, CFT/CF collaboration, collaborative planning, IT architecture/internet, formal performance tracking, adopt strategies SCM vision, attention to human factors, supplier certification/reduction, target segmented customers and shared investment/benefits.

They reviewed key benefits of SCM proposed in literature and noted the following in the order of their importance; increased inventory turnover, increased revenues, SCM cost reduction, product availability, decreased order cycle time, responsiveness, economic value added, capital utilization, decreased time to market and reducing logistics costs.

**Need for Managing Supply Chain:**

Supply chain involves the cost to convey the information, produce components, store them, transport them, and transfer funds and so on. The total cost of supply chain tends to increase due to many parameters like huge capital cost required for running global businesses, mounting real estate costs and freight charges (Koh, 2006)

However the perfect planning in SCM regarding material arrival, production schedule and distribution not only reduces the inventory and inventory cost but also reduces the wasted time and energy (Verma 2006) Supply chain management drastically alters inventory investment across a range of industries, and helps to tackle economic fluctuations (Heng 2005)

Table 4 shows the Supply chain content matrix

**Table 4 Supply chain content matrix**

	Level of Analysis	Element of the exchange considered			
		Assets	Information	Knowledge	Relationships
Dyadic	Suppl. Manuf.	Transaction cost (Specificity of assets)	Information Technology Support	Collaborative design	Outsourcing/subcontracting
		Transportation routes rationalization	Tools for analysis of information flow	Guest engineer	Trust/Power/Commitment
		Exchange of technology	Interplant planning and logistical integration (EDI)	HR development	Supplier development
		Redesign HR organizational incentives			Transaction cost approach
Chain	Manuf. Distr.	Distribution channel redesign	Information Technology support	Product teams	Logistic partnership (with logistic services providers)
		Facilities location (Warehouses, etc.)	Interplant planning and logistical integration (EDI)		Trust/Power/Commitment
		Transportation routes rationalization	Communication processes		Outsourcing/subcontracting
Chain	Suppl.	Quick Response,	Industrial dynamic	Supply chain	Scenarios good for supply

	Manuf. Distr	ECR, etc. Industrial dynamic approach	approach Information Technology support	councils	chain management Opportunism/Trust/Power/commitment
		Reverse supply chain management	Structured systems analysis and design method		Positioning in the chain
		Total cost of ownership	Modeling the information flow		Influence of product technology on supply chain relationships
		Value system analysis	Communication processes		
Network	Up stream	Supply network sourcing	Information Technology support	Suppliers meetings	Partnership sourcing
		Transportation routes rationalization	Supply network communication processes		Lean supply
		Supply network structure	Interplant planning and logistical integration (EDI)		Network sourcing
		Redesign HR organizational incentives			Supply base integration Trust/Power/Commitment
	Down stream	Transportation routes rationalization	Information Technology support		Logistic partnership (with logistic services providers)
		Distribution channel redesign	Supply network communication processes		Trust/Power/Commitment/ Opportunism
		Facilities location (Warehouses, etc.)	Interplant planning and logistical integration (EDI)		Outsourcing/subcontracting
		Design for supply chain management			
	Whole	Business network redesign approach	Information Technology support		Value system analysis
		Value system analysis	Business network redesign approach		Supply network partnership
		Design for supply chain management	Supply network communication processes		Trust/Power/Commitment/ Opportunism
		Industrial dynamic Approach			



### **Conclusions:**

Organizations have multiple objectives like enhanced competitiveness, better customer service and increased profitability etc. To seek these objectives organizations employ various defensive as well as offensive business performance improvement approaches. Approach we have discussed (SCM) covers all functional areas of organization. It is the network of customers, suppliers, manufacturers, and distributors concentrating the flows of material, information, and finance through physical and human resources.

This step-by-step assessment of business operations would certainly assist organizations to completely understand the concept of supply chain management.

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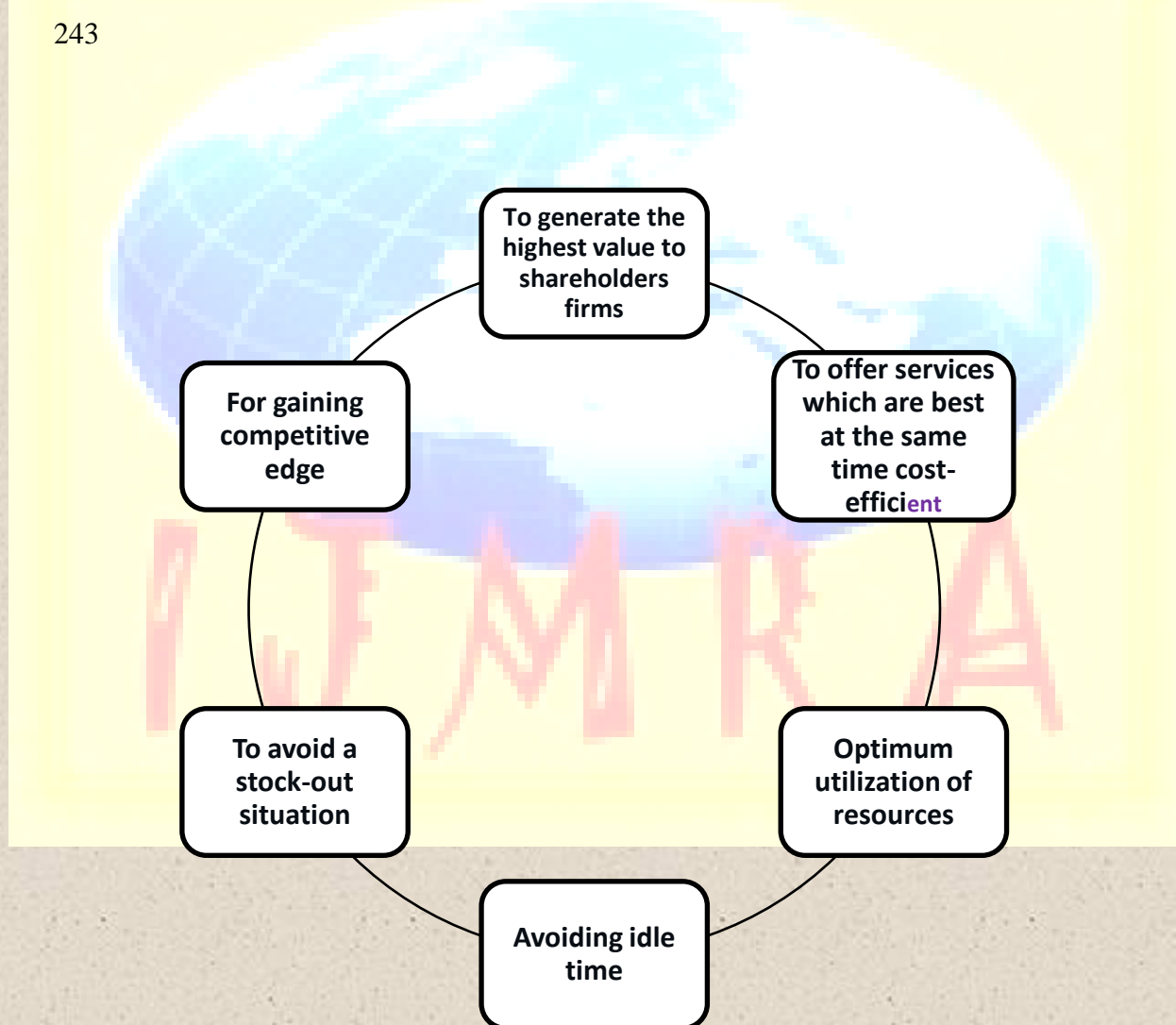


Figure 1. Supply Chain Management



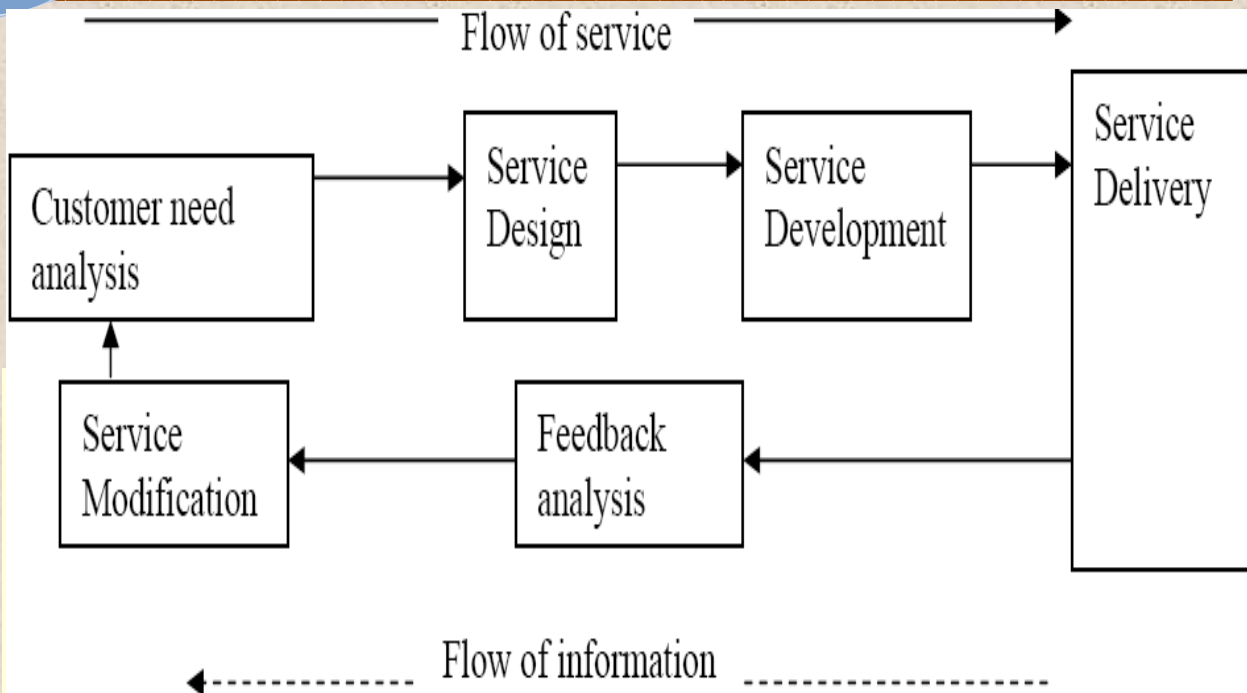


Figure 2. Service Supply Chain

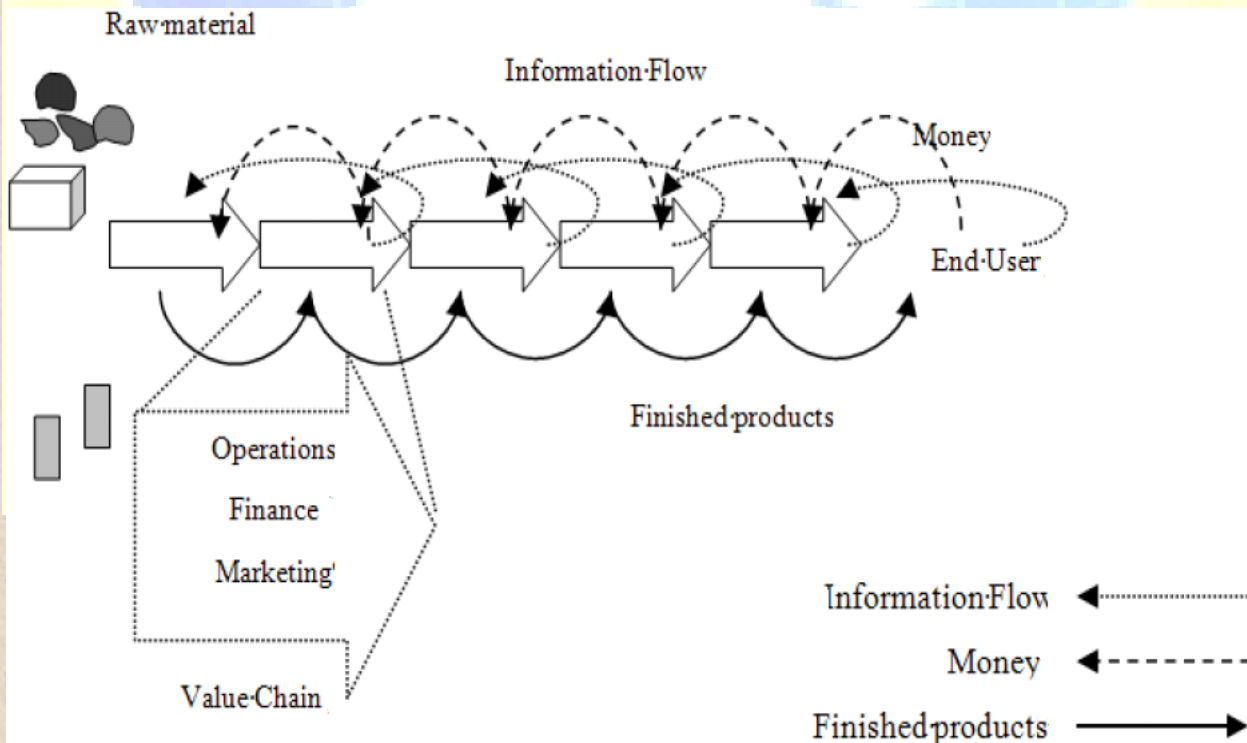


Figure 3. Supply Chain Management