Specialization:-OPERATION MANAGEMENT
Course Code- 206 Course Name - Supply Chain Management

Notes

Artificial Intelligence

The rise of artificial intelligence has been a long, gradual slog; long ago, AI entered the zeitgeist, but until recently much of the public was unfamiliar with the technology beyond Hollywood dramatizations or abstract doomsday scenarios.

Now, however, more people are aware that AI does not necessarily mean the robots of Skynet. Whether its customer service chatbots or customer relationship management tools that use machine learning algorithms, it's not uncommon to interact with AI multiple times a day.

AI at its core, is simply a program that is able to learn over time as it processes massive amounts of data. There are two key components here; one, obviously, is the processing of massive amounts of data that human beings are incapable of sifting through in a lifetime. This has long been humanity's obsession with computers, as well as building ever more sophisticated ones. The novel component of AI, however, is that these programs actually learn as they are fed more data. That means the more you use AI for a specific purpose, the better it gets at predicting outcomes.

The business applications are apparent and vast. Sifting through troves of business intelligence and augmenting human insight with data contextualized in real-time offers businesses in every industry powerful uses for AI. Whether it's a manufacturing plant monitoring its machines for signs of lower productivity or potential failures, or a financial firm that's predicting outcomes on the stock market, AI is an immensely powerful tool that cannot be ignored moving forward.

Internet of Things

The Internet of Things (IoT) goes hand-in-hand with AI. After all, to contextualize vast troves of data, you need to capture vast troves of data. IoT is often referred to as the process by which "dumb" machines are made "smart," or by which new products are produced with smart capabilities. In plain English, IoT means everything is networked and communicative. Not only can IoT enabled devices process what is

happening to them (e.g. a machine that recognizes its overheating) but can also transmit that data to a central location.

Imagine an entire factory floor, for example, of networked machinery feeding data back to a central database in real-time. That information can prove critical to avoiding reductions in productivity or dispatching predictive maintenance to keep machines running longer and more efficiently.

But what do you do with all that data? No human could ever sit down and make sense of it in one lifetime, and it would cost a fortune to employ an army of people to sift through it. And even if you did pay them that fortune, they'd have great difficulty communicating the fragmented bits of information they each uncovered. Enter AI to work in tandem with the data collecting powerhouse that is the IoT.

Blockchain

Proponents of blockchain say within the next 10 to 20 years, we could be looking at the replacement of conventional financial institutions and other forms of "middlemen" that currently track transactions. Blockchain, they argue will empower peer-to-peer transactions in a way that has never been possible before, reducing costs and expediting business processes.

Serge Beck, the CEO and founder of Optherium, a global research and development company building transformative blockchain solutions to reform defective functions within financial and security infrastructure, said the priority for his company right now is better securing business data, a major priority as cyber attacks continue to increase across the globe.

"Right now, the biggest issue is data breaches," Beck said. "All companies dealing with centralized data storage, any kind of data storage, they'll adopt blockchain tech first to get away from liability of storing data in one location."

While Beck said it could be a decade or more before we see anything we can consider "mass adoption" of blockchain tech, the process is already underway and companies that are on the cutting edge have begun implementation.

"In 2018 more and more companies will start implementing blockchain in their phase one," Beck said. "It has already started and it will continue going."

These emerging technologies are here. It will transform small business, large corporations and everything in between. Jump on the bandwagon today.

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External factors driving changes and shaping our economy and political answer Global Technology organizational consideration the power consumer the governmental policy and regulation The impact of this factor Where is from sector but they are all important we also entrance form organisations particularly in public and nonprofit sector
globalisation
The most cited change factor and it has place the post World War 2 as the dominant driving force in world record concept of the Global Marketplace for the Global Warming taken on new meaning for all Enterprises(profit and nonprofit small medium and large product of services) and for individual consumer during the last
Technology has had a major impact on supply chain as a facilitator of change of companies have transformed their process however it is also a major force in changing the background of the Marketplace individual organisations are connected 24/7 and not access to information on the same base search engines Google had made it possible gather Information which we have become what is described as the click here Have to pay for information to be post versus the media on their schedule full information as we needed stories of data and information are Virtually at our fingertips social network suggest Facebook and Twitter are playing and ever increasing role in business organisation and will include supply chain because of their impact on customer demand and the speed of information transfer money companies the opportunity to get our mind to uncover demand letter information for improved forecasting three organisational consolidation and power shift after World War 2 product manufacturing become the driving force in the supply chain design produce promoter and distributed there frequently the organisation in the supply chain in terms of sales volume and Chloe by our location and other factors data exhausted their influence throughout the supply chain to their specific economic advantage especially in the distribution of their products during the 1980 and especially the 99 a significant change in the relative economic power in the growing number of supply chain as mass weekend because it natural suggest Verma Kmart home decor and McDonald's became Market leader and engine for changes for example was number 1 on the front by the

middle of the first decade of the 25th century it has Surfers General Motors with more than 500 500 million dollars and annual states and was the number one employee in many states for the empowered consumer understanding consumer behaviour has become of focus of marketing analysis and strategic development for many years research analysis exam in consumer in total or in major grouping for sequence to understand their needs and to respond to them to their appropriate product and services analysis have implicated for Logistic and supply chain management but they have been viewed in the past of Logistic and having somewhat in direct impact towards the impact of the consumer in such more direction for supply because the consumer is place increased demand @ a level for then expanded variety of production services today consumers are more and lighter than educated and their import more than ever by the information that they have to their disposal from the internet and other sources their access to supply sources is expanded dramatically beyond their immediate local by virtual and cat cat lock the internet and other materials they have the opportunity to compare price 40 and services consequently the demand Cooperative price high quality trailer for customise product convenience flexibility and responsiveness the train to have lower tolerance level of poor quality in product and services.

Government policy and regulation the external change factor is the various level of government in bracket Federal state and local bracket close that established the administrator policies Regulation and Taxes that impact individual businesses and their supply chain the regulation of several important sectors of economy that occurred in the 1980 and 1990 is a good example this deregulation sector include transportation communication and Financial Institutions which are constant of the infrastructure for most organisations

Introduction to Supply Chain Management

Supply chain management (SCM) is the management of the flow of goods. It includes the

movement and storage of raw materials, work-in-process inventory, and finished goods from

point of origin to point of consumption. Here the term raw material or feedstock is the basic

material from which goods, finished products or intermediate materials that are also feedstocks

are manufactured or made. The term raw material is frequently used with an extended meaning.

As feedstock, the term connotes it is a bottleneck asset critical to the production of other

products. For example, crude oil is a feedstock raw material providing finished products in the

fuels, plastics and industrial chemicals and pharmaceuticals industries.Interconnected or

interlinked networks, channels and node businesses are involved in the provision of products and

services required by end customers in a supply chain. Supply chain management has been

defined as the "design, planning, execution, control, and monitoring of supply chain activities

with the objective of creating net value, building a competitive infrastructure, leveraging

worldwide logistics, synchronizing supply with demand and measuring performance globally." A

supply chain is a system of organizations, people, activities, information, and resources involved

in moving a product or service from supplier to customer. Supply chain activities transform

natural resources, raw materials, and components into a finished product that is delivered to the

end customer. In sophisticated supply chain systems, used products may re-enter the supply

chain at any point where residual value is recyclable. Supply chains link value chains.SCM

draws heavily from the areas of operations management, logistics, procurement, and information

technology, and strives for an integrated approach,where the terms are explained as

Operations management is an area of management concerned with overseeing, designing,

and controlling the process of production and redesigning business operations in the

production of goods or services. It involves the responsibility of ensuring that business

operations are efficient in terms of using as few resources as needed, and effective in

terms of meeting customer requirements. It is concerned with managing the process that

converts inputs (in the forms of materials, labor, and energy) into outputs (in the form of

goods and/or services).

Logistics is the management of the flow of resources between the point of origin and the

point of consumption in order to meet some requirements, for example, of customers or

corporations. The resources managed in logistics can include physical items, such as

food, materials, equipment, liquids, and staff, as well as abstract items, such as time,

information, particles, and energy. The logistics of physical items usually involves the

integration of information flow, material handling, production, packaging, inventory,

transportation, warehousing, and often security. The complexity of logistics can be

modeled, analyzed, visualized, and optimized by dedicated simulation software. The

minimization of the use of resources is a common motivation in logistics for import and

export.

Procurement is the acquisition of goods, services or works from an outside external

source. It is favourable that the goods, services or works are appropriate and that they are

procured at the best possible cost to meet the needs of the purchaser in terms of quality

and quantity, time, and location. Corporations and public bodies often define processes

intended to promote fair and open competition for their business while minimizing

exposure to fraud and collusion.

Information technology (IT) is the application of computers and telecommunications

equipment to store, retrieve, transmit and manipulate data, often in the context of a

business or other enterprise. The term is commonly used as a synonym for computers and

computer networks, but it also encompasses other information distribution technologies

such as television and telephones. Several industries are associated with information

technology, such as computer hardware, software, electronics, semiconductors, internet,

telecom equipment, e-commerce and computer services.

Origin of the term and definitions:

The term "supply chain management" entered the public domain when Keith Oliver, a consultant

at Booz Allen Hamilton (now Booz & Company), used it in an interview for the Financial Times

in 1982. The term was slow to take hold. It gained currency in the mid-1990s, when a flurry of

articles and books came out on the subject. In the late 1990s it rose to prominence as a

management buzzword, and operations managers began to use it in their titles with increasing

regularity.

Commonly accepted definitions of supply chain management include:

The management of upstream and downstream value-added flows of materials, final

goods, and related information among suppliers, company, resellers, and final consumers.

The systematic, strategic coordination of traditional business functions and tactics across

all business functions within a particular company and across businesses within the

supply chain, for the purposes of improving the long-term performance of the individual

companies and the supply chain as a whole.

A customer-focused definition is given by Hines —Supply chain strategies require a total

systems view of the links in the chain that work together efficiently to create customer

satisfaction at the end point of delivery to the consumer. As a consequence, costs must be

lowered throughout the chain by driving out unnecessary expenses, movements, and

handling. The main focus is turned to efficiency and added value, or the end-user's

perception of value. Efficiency must be increased, and bottlenecks removed. The

measurement of performance focuses on total system efficiency and the equitable

monetary reward distribution to those within the supply chain. The supply chain system

must be responsive to customer requirements."

The integration of key business processes across the supply chain for the purpose of

creating value for customers and stakeholders.

According to the Council of Supply Chain Management Professionals (CSCMP), supply

chain management encompasses the planning and management of all activities involved

in sourcing, procurement, conversion, and logistics management. It also includes

coordination and collaboration with channel partners, which may be suppliers,

intermediaries, third-party service providers, or customers. Supply chain management

integrates supply and demand management within and across companies. More recently,

the loosely coupled, self-organizing network of businesses that cooperate to provide

product and service offerings has been called the Extended Enterprise.

A supply chain, as opposed to supply chain management, is a set of organizations directly linked

by one or more upstream and downstream flows of products, services, finances, or information

from a source to a customer. Supply chain management is the management of such a chain.

Supply chain management software includes tools or modules used to execute supply chain

transactions, manage supplier relationships, and control associated business processes. Supply

chain management software (SCMS) is a business term which refers to a whole range of

software tools or modules used in executing supply chain transactions, managing supplier

relationships and controlling associated business processes.While functionality in such systems

can often be broad – it commonly includes:

Customer requirement processing

Purchase order processing

Inventory management

Goods receipt and Warehouse management

Supplier Management/Sourcing

A requirement of many SCMS often includes forecasting. Such tools often attempt to balance the

disparity between supply and demand by improving business processes and using algorithms and

consumption analysis to better plan future needs.SCMS also often includes integration

technology that allows organizations to trade electronically with supply chain partners. In 2012,

the global supply chain management software market is estimated at $8.3 billion. The shift to

global supply chain networks shifted supply chain systems to cloud-based technology. This

encouraged technology that have all partners on the same software version, a single source of

truth for all software, and the implementation of software technology with pay for what you use

software.upply chain event management (SCEM) considers all possible events and factors that

can disrupt a supply chain. With SCEM, possible scenarios can be created and solutions

devised.In many cases the supply chain includes the collection of goods after consumer use for

recycling. Including third-party logistics or other gathering agencies as part of the RM repatriation

process is a way of illustrating the new endgame strategy.

Problems addressed

Supply chain management addresses the following problems:

Distribution network configuration: the number, location, and network missions of suppliers, production facilities, distribution centers, warehouses, cross-docks, and customers.

Distribution strategy: questions of operating control (e.g., centralized, decentralized, or shared); delivery scheme (e.g., direct shipment, pool point shipping, cross docking, direct store delivery, or closed loop shipping); mode of transportation (e.g., motor carrier, including truckload, less than truckload (LTL), parcel, railroad, intermodal transport, including trailer on flatcar (TOFC) and container on flatcar (COFC), ocean freight, airfreight); replenishment strategy (e.g., pull, push, or hybrid); and transportation control (e.g., owner operated, private carrier, common carrier, contract carrier, or third-party logistics (3PL)). A third-party logistics provider (abbreviated 3PL, or sometimes TPL) is a firm that provides service to its customers of outsourced (or "third party") logistics services for part, or all of their supply chain management functions. Third party logistics providers typically specialize in integrated operation, warehousing and transportation services that can be scaled and customized to customers' needs based on market conditions and the demands and delivery service requirements for their products and

materials. Often, these services go beyond logistics and included value-added services

related to the production or procurement of goods, i.e., services that integrate parts of the

supply chain. Then the provider is called third-party supply chain management provider

(3PSCM) or supply chain management service provider (SCMSP). Third Party Logistics

System is a process which targets a particular Function in the management. It may be like

warehousing, transportation, raw material provider, etc. According to the Council of

Supply Chain Management Professionals, 3PL is defined as "a firm that provides

multiple logistics services for use by customers. Preferably, these services are integrated,

or bundled together, by the provider. Among the services 3PLs provide are

transportation, warehousing, cross-docking, inventory management, packaging, and

freight forwarding. hird-party logistics providers include freight forwarders, courier

companies, as well as other companies integrating & offering subcontracted logistics and

transportation services. ertz and Alfredsson (2003) describe four categories of 3PL

providers: (a)Standard 3PL Provider: this is the most basic form of a 3PL provider. They

would perform activities such as, pick and pack, warehousing, and distribution (business)

– the most basic functions of logistics. For a majority of these firms, the 3PL function is

not their main activity.(b) Service Developer: this type of 3PL provider will offer their

customers advanced value-added services such as: tracking and tracing, cross-docking,

specific packaging, or providing a unique security system. A solid IT foundation and a

focus on economies of scale and scope will enable this type of 3PL provider to perform

these types of tasks.(c) The Customer Adapter: this type of 3PL provider comes in at the

request of the customer and essentially takes over complete control of the company's

logistics activities. The 3PL provider improves the logistics dramatically, but do not

develop a new service. The customer base for this type of 3PL provider is typically quite

small.(d) The Customer Developer: this is the highest level that a 3PL provider can attain

with respect to its processes and activities. This occurs when the 3PL provider integrates

itself with the customer and takes over their entire logistics function. These providers will

have few customers, but will perform extensive and detailed tasks for them.

Trade-offs in logistical activities: The above activities must be coordinated in order to

achieve the lowest total logistics cost. Trade-offs may increase the total cost if only one

of the activities is optimized. For example, full truckload (FTL) rates are more

economical on a cost-per-pallet basis than are LTL shipments. If, however, a full

truckload of a product is ordered to reduce transportation costs, there will be an increase

in inventory holding costs, which may increase total logistics costs. The planning of

logistical activities therefore takes a systems approach. These trade-offs are key to

developing the most efficient and effective logistics and SCM strategy.

Information: The integration of processes through the supply chain in order to share

valuable information, including demand signals, forecasts, inventory, transportation, and

potential collaboration.

Inventory management: Management of the quantity and location of inventory,

including raw materials, work in process (WIP), and finished goods.

Cash flow: Arranging the payment terms and methodologies for exchanging funds across

entities within the supply chain.

Supply chain execution means managing and coordinating the movement of materials,

information and funds across the supply chain. The flow is bi-directional. SCM applications

provide real-time analytical systems that manage the flow of products and information

throughout the supply chain network.

Functions of Supply Chain Management:

Supply chain management is a cross-functional approach that includes managing the movement

of raw materials into an organization, certain aspects of the internal processing of materials into

finished goods, and the movement of finished goods out of the organization and toward the end

consumer. As organizations strive to focus on core competencies and becoming more flexible,

they reduce their ownership of raw materials sources and distribution channels. These functions

are increasingly being outsourced to other firms that can perform the activities better or more

cost effectively. The effect is to increase the number of organizations involved in satisfying

customer demand, while reducing managerial control of daily logistics operations. Less control

and more supply chain partners led to the creation of the concept of supply chain management.

The purpose of supply chain management is to improve trust and collaboration among supply

chain partners, thus improving inventory visibility and the velocity of inventory movement.

Importance of Supply Chain Management:

Organizations increasingly find that they must rely on effective supply chains, or networks, to

compete in the global market and networked economy. In Peter Drucker's (1998) new

management paradigms, this concept of business relationships extends beyond traditional

enterprise boundaries and seeks to organize entire business processes throughout a value chain of

multiple companies.In recent decades, globalization, outsourcing, and information technology

have enabled many organizations, such as Dell and Hewlett Packard, to successfully operate

collaborative supply networks in which each specialized business partner focuses on only a few

key strategic activities (Scott, 1993). This inter-organisational supply network can be

acknowledged as a new form of organisation. However, with the complicated interactions among

the players, the network structure fits neither "market" nor "hierarchy" categories (Powell, 1990).

It is not clear what kind of performance impacts different supply network structures could have

on firms, and little is known about the coordination conditions and trade-offs that may exist

among the players. From a systems perspective, a complex network structure can be decomposed

into individual component firms (Zhang and Dilts, 2004). Traditionally, companies in a supply

network concentrate on the inputs and outputs of the processes, with little concern for the

internal management working of other individual players. Therefore, the choice of an internal

management control structure is known to impact local firm performance (Mintzberg, 1979).In

the 21st century, changes in the business environment have contributed to the development of

supply chain networks. First, as an outcome of globalization and the proliferation of

multinational companies, joint ventures, strategic alliances, and business partnerships, significant

success factors were identified, complementing the earlier "just-in-time", lean manufacturing,

and agile manufacturing practices.Second, technological changes, particularly the dramatic fall

in communication costs (a significant component of transaction costs), have led to changes in

coordination among the members of the supply chain network (Coase, 1998).Many researchers

have recognized supply network structures as a new organisational form, using terms such as

"Keiretsu", "Extended Enterprise", "Virtual Corporation", "Global Production Network", and

"Next Generation Manufacturing System". A keiretsu (system, series, grouping of enterprises,

order of succession) is a set of companies with interlocking business relationships and

shareholdings. It is a type of informal business group. The keiretsu maintained dominance over

the Japanese economy for the last half of the 20th century.The member companies own small

portions of the shares in each other's companies, centered on a core bank; this system helps

insulate each company from stock market fluctuations and takeover attempts, thus enabling longterm

planning in innovative projects. It is a key element of the automotive industry in Japan.In

general, such a structure can be defined as "a group of semi-independent organisations, each with

their capabilities, which collaborate in ever-changing constellations to serve one or more markets

in order to achieve some business goal specific to that collaboration‖.

The security management system for supply chains is described in ISO/IEC 28000 and ISO/IEC

28001 and related standards published jointly by the ISO and the IEC.Supply Chain Management

draws heavily from the areas of operations management, logistics, procurement, and information

technology, and strives for an integrated approach.

CHAPTER II

Historical Development of Supply Chain Management

Six major movements can be observed in the evolution of supply chain management studies are

1. Creation,

2. Integration

3. Globalization

4. Specialization phases one

5. Specialization phases two

6. SCM 2.0.

Creation era

The term "supply chain management" was first coined by Keith Oliver in 1982. Oliver defined in

1982 the Supply Chain concept as follows: ―Supply chain management (SCM) is the process of

planning, implementing, and controlling the operations of the supply chain with the purpose to

satisfy customer requirements as efficiently as possible. Supply chain management spans all

movement and storage of raw materials, work-in-process inventory, and finished goods from

point-of-origin to point-of-consumption‖. Since then, almost all Supply Chain Book authors have

developed their own definitions. Some of them are subtle variations and others add more detail,

but most of them remain close to Oliver's original definition. A 2003 article in a

Strategy+Business Issue named When Will Supply Chain Management Grow Up? by Tim

Laseter and Keith Oliver himself describes anecdotically the moment in which the term Supply

Chain Management was coined prior to the Financial Times interview: Oliver began to develop a

vision to tear down the functional silos inside an organization (manufacturing, marketing,

distribution, sales and finance). He and his team called it Integrated Inventory Management,

abbreviated I2M in the late 70's. They believed that the term was catchy and the I2M acronym

would be well received, but it all changed during a key steering committee meeting with Dutch

electronics giant Philips. At the meeting, he and his team found out that their catchy phrase was

not that catchy, and Oliver was challenged by one of the customer's managers: Mr. Van t'Hoff.

Oliver explained Mr. Van t'Hoff what he meant by I2M: ―We're talking about the management

of a chain of supply as though it were a single entity,‖ Mr. Oliver replied, ―not a group of

disparate functions.‖ ―Then why don't you call it that?‖ Mr. Van t'Hoff said. ―Call it what?‖ Mr.

Oliver asked. ―Total supply chain management.‖Scott Stephens, Former Chair of the Supply-

Chain Council (SCC) (1983–1997) and Former Chief Technology Officer of the SCC (1997–

2005) states in his blog that after knowing the story, he was not really sure if it was Keith Oliver

or Mr. Van t'Hoff who coined the term. But as Oliver developed the concept prior to the meeting

and used it first in public during the Financial Times interview, gives credit to Oliver's story to

be the Ring of Truth.However, the concept of a supply chain in management was of great

importance long before, in the early 20th century, especially with the creation of the assembly

line. The characteristics of this era of supply chain management include the need for large-scale

changes, re-engineering, downsizing driven by cost reduction programs, and widespread

attention to Japanese management practices.

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. This era has continued to develop

into the 21st century with the expansion of Internet-based collaborative systems. This era of

supply chain evolution is characterized by both increasing value added and cost reductions

through integration.A supply chain can be classified as a stage 1, 2 or 3 network. In a stage 1–

type supply chain, systems such as production, storage, distribution, and material control are not

linked and are independent of each other. In a stage 2 supply chain, these are integrated under

one plan and is ERP enabled. Enterprise resource planning (ERP) is business management

software—usually a suite of integrated applications—that a company can use to store and

manage data from every stage of business, including:

Product planning, cost and development

Manufacturing

Marketing and sales

Inventory management

Shipping and payment

ERP provides an integrated real-time view of core business processes, using common databases

maintained by a database management system. ERP systems track business resources—cash, raw

materials, production capacity—and the status of business commitments: orders, purchase

orders, and payroll. The applications that make up the system share data across the various

departments (manufacturing, purchasing, sales, accounting, etc.) that entered the data. ERP

facilitates information flow between all business functions, and manages connections to outside

stakeholders.Enterprise system software is a multi-billion dollar industry that produces

components that support a variety of business functions. IT investments have become the largest

category of capital expenditure in United States-based businesses over the past decade. Though

early ERP systems focused on large enterprises, smaller enterprises increasingly use ERP

systems.Organizations consider the ERP system a vital organizational tool because it integrates

varied organizational systems and facilitates error-free transactions and production. However,

ERP system development is different from traditional systems development. ERP systems run on

a variety of computer hardware and network configurations, typically using a database as an

information repository.

A stage 3 supply chain is one that achieves vertical integration with upstream suppliers and

downstream customers. Vertically integrated companies in a supply chain are united through a

common owner. Usually each member of the supply chain produces a different product or

(market-specific) service, and the products combine to satisfy a common need. It is contrasted

with horizontal integration. Vertical integration has also described management styles that bring

large portions of the supply chain not only under a common ownership, but also into one

corporation (as in the 1920s when the Ford River Rouge Complex began making much of its

own steel rather than buying it from suppliers).An example of this kind of supply chain is Tesco.

Globalization era

The third movement of supply chain management development, the globalization era, can be

characterized by the attention given to global systems of supplier relationships and the expansion

of supply chains over national boundaries and into other continents. Although the use of global

sources in organizations' supply chains can be traced back several decades (e.g., in the oil

industry), it was not until the late 1980s that a considerable number of organizations started to

integrate global sources into their core business. This era is characterized by the globalization of

supply chain management in organizations with the goal of increasing their competitive

advantage, adding value, and reducing costs through global sourcing.

Specialization era (phase I): outsourced manufacturing and distribution

In the 1990s, companies began to focus on "core competencies" and specialization. They

abandoned vertical integration, sold off non-core operations, and outsourced those functions to

other companies. This changed management requirements, by extending the supply chain beyond

the company walls and distributing management across specialized supply chain partnerships.

This transition also refocused the fundamental perspectives of each organization. Original

equipment manufacturers (OEMs) became brand owners that required visibility deep into their

supply base. They had to control the entire supply chain from above, instead of from within.

Contract manufacturers had to manage bills of material with different part-numbering schemes

from multiple OEMs and support customer requests for work-in-process visibility and vendormanaged

inventory (VMI).

The specialization model creates manufacturing and distribution networks composed of several

individual supply chains specific to producers, suppliers, and customers that work together to

design, manufacture, distribute, market, sell, and service a product. This set of partners may

change according to a given market, region, or channel, resulting in a proliferation of trading

partner environments, each with its own unique characteristics and demands.

Specialization era (phase II): 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.

Market forces sometimes demand rapid changes from suppliers, logistics providers, locations, or

customers in their role as components of supply chain networks. This variability has significant

effects on supply chain infrastructure, from the foundation layers of establishing and managing

electronic communication between trading partners, to more complex requirements such as the

configuration of processes and work flows that are essential to the management of the network

itself.

Supply chain specialization enables companies to improve their overall competencies in the same

way that outsourced manufacturing and distribution has done; it allows them to focus on their

core competencies and assemble networks of specific, best-in-class partners to contribute to the

overall value chain itself, thereby increasing overall performance and efficiency. The ability to

quickly obtain and deploy this domain-specific supply chain expertise without developing and

maintaining an entirely unique and complex competency in house is a leading reason why supply

chain specialization is gaining popularity.

Outsourced technology hosting for supply chain solutions debuted in the late 1990s and

has taken root primarily in transportation and collaboration categories. This has

progressed from the application service provider (ASP) model from roughly 1998

through 2003, to the on-demand model from approximately 2003 through 2006, to the

software as a service (SaaS) model currently in focus today.The internet hosting provides

computer-based services to customers over a network. Software offered using an ASP

model is also sometimes called on-demand software or software as a service (SaaS). The

most limited sense of this business is that of providing access to a particular application

program (such as customer relationship management) using a standard protocol such as

HTTP.The need for ASPs has evolved from the increasing costs of specialized software

that have far exceeded the price range of small to medium sized businesses. As well, the

growing complexities of software have led to huge costs in distributing the software to

end-users. Through ASPs, the complexities and costs of such software can be cut down.

In addition, the issues of upgrading have been eliminated from the end-firm by placing

the onus on the ASP to maintain up-to-date services, 24 x 7 technical support, physical

and electronic security and in-built support for business continuity and flexible

working.The importance of this marketplace is reflected by its size. As of early 2003,

estimates of the United States market range from 1.5 to 4 billion dollars. Clients for ASP

services include businesses, government organizations, non-profits, and membership

organizations. There are several forms of ASP business. These are:

A specialist or functional ASP delivers a single application, such as credit card payment

processing or timesheet services;

A vertical market ASP delivers a solution package for a specific customer type, such as a

dental practice;

An enterprise ASP delivers broad spectrum solutions;

A local ASP delivers small business services within a limited area.

Some analysts identify a volume ASP as a fifth type. This is basically a specialist ASP

that offers a low cost packaged solution via their own website. PayPal was an instance of

this type, and their volume was one way to lower the unit cost of each transaction.

In addition to these types, some large multi-line companies (such as HP and IBM), use

ASP concepts as a particular business model that supports some specific customers.

Supply chain management 2.0 (SCM 2.0)

Building on globalization and specialization, the term "SCM 2.0" has been coined to describe

both changes within supply chains themselves as well as the evolution of processes, methods,

and tools to manage them in this new "era". The growing popularity of collaborative platforms is

highlighted by the rise of TradeCard's supply chain collaboration platform, which connects

multiple buyers and suppliers with financial institutions, enabling them to conduct automated

supply-chain finance transactions. TradeCard, Inc. was an American software company. Its main

product, also called TradeCard, was a SaaS collaboration product that was designed to allow

companies to manage their extended supply chains including tracking movement of goods and

payments.TradeCard has improved visibility, cash flow and margins for over 10,000 retailers and

brands, factories and suppliers, and service providers (financial institutions, logistics service

providers, customs brokers and agents) operating in 78 countries. Clients include retailers and

brands such as Coach, Inc. Levi Strauss & Co., Columbia Sportswear, Guess (clothing), Rite

Aid, and Perry Ellis International.Deloitte cited TradeCard for its entrepreneurial and disruptive

cloud technology enterprise resource planning solution that provides new IT architectures

designed to address unmet needs of enterprises. TradeCard is headquartered in New York City,

with offices in San Francisco, Amsterdam, Hong Kong, Shenzhen, Shanghai, Taipei, Seoul,

Colombo and Ho Chi Minh City.On January 7, 2013, TradeCard and GT Nexus announced plans

to merge creating a global supply-chain management company that would employ about 1,000

people and serve about 20,000 businesses in industries including manufacturing, retail and

pharmaceuticals

Web 2.0 is a trend in the use of the World Wide Web that is meant to increase creativity,

information sharing, and collaboration among users. At its core, the common attribute of Web

2.0 is to help navigate the vast information available on the Web in order to find what is being

bought. It is the notion of a usable pathway. SCM 2.0 replicates this notion in supply chain

operations. It is the pathway to SCM results, a combination of processes, methodologies, tools,

and delivery options to guide companies to their results quickly as the complexity and speed of

the supply chain increase due to global competition; rapid price fluctuations; surging oil prices;

short product life cycles; expanded specialization; near-, far-, and off-shoring; and talent

scarcity.

SCM 2.0 leverages solutions designed to rapidly deliver results with the agility to quickly

manage future change for continuous flexibility, value, and success. This is delivered through

competency networks composed of best-of-breed supply chain expertise to understand which

elements, both operationally and organizationally, deliver results, as well as through intimate

understanding of how to manage these elements to achieve the desired results. The solutions are

delivered in a variety of options, such as no-touch via business process outsourcing, mid-touch

via managed services and software as a service (SaaS), or high-touch in the traditional software

deployment model.

CHAPTER III

Supply Chain Business Process Integration

Successful SCM requires a change from managing individual functions to integrating activities

into key supply chain processes. In an example scenario, a purchasing department places orders

as its requirements become known. The marketing department, responding to customer demand,

communicates with several distributors and retailers as it attempts to determine ways to satisfy

this demand. Information shared between supply chain partners can only be fully leveraged

through process integration.

Supply chain business process integration involves collaborative work between buyers and

suppliers, joint product development, common systems, and shared information. According to

Lambert and Cooper (2000), operating an integrated supply chain requires a continuous

information flow. However, in many companies, management has concluded that optimizing

product flows cannot be accomplished without implementing a process approach. The key

supply chain processes stated by Lambert (2004) are:

Customer relationship management: Customer relationship management (CRM) is a

model for managing a company's interactions with current and future customers. It

involves using technology to organize, automate, and synchronize sales, marketing,

customer service, and technical support.

Customer service management

Demand management style: Demand management is a planning methodology used to

manage and forecast the demand of products and services.

Order fulfillment: Order fulfillment (in British English order fulfilment) is in the most

general sense the complete process from point of sales inquiry to delivery of a product to

the customer. Sometimes Order fulfillment is used to describe the more narrow act of

distribution or the logistics function, however, in the broader sense it refers to the way

firms respond to customer orders

Manufacturing flow management

Supplier relationship management: Supplier relationship management (SRM) is the

discipline of strategically planning for, and managing, all interactions with third party

organizations that supply goods and/or services to an organization in order to maximize

the value of those interactions. In practice, SRM entails creating closer, more

collaborative relationships with key suppliers in order to uncover and realize new value

and reduce risk.

Product development and commercialization: Commercialization is the process or cycle

of introducing a new product or production method into the market. The actual launch of

a new product is the final stage of new product development and the one where the most

money will have to be spent for advertising, sales promotion, and other marketing efforts.

Returns management

Much has been written about demand management. Best-in-class companies have similar

characteristics, which include the following:

Internal and external collaboration

Initiatives to reduce lead time

Tighter feedback from customer and market demand

Customer-level forecasting

One could suggest other critical supply business processes that combine these processes stated

by Lambert, such as:

a. Customer service management

b. Procurement

c. Product development and commercialization

d. Manufacturing flow management/support

e. Physical distribution

f. Outsourcing/partnerships

g. Performance measurement

h. Warehousing management

a) Customer service management process

Customer relationship management concerns the relationship between an organization and its

customers. Customer service is the source of customer information. It also provides the customer

with real-time information on scheduling and product availability through interfaces with the

company's production and distribution operations. Successful organizations use the following

steps to build customer relationships:

determine mutually satisfying goals for organization and customers

establish and maintain customer rapport

induce positive feelings in the organization and the customers

b) Procurement process

Strategic plans are drawn up with suppliers to support the manufacturing flow management

process and the development of new products. In firms whose operations extend globally,

sourcing may be managed on a global basis. The desired outcome is a relationship where both

parties benefit and a reduction in the time required for the product's design and development.

The purchasing function may also develop rapid communication systems, such as electronic data

interchange (EDI) and Internet linkage, to convey possible requirements more rapidly. Electronic

data interchange (EDI) is a document standard which when implemented acts as a common

interface between two or more computer applications in terms of understanding the document

transmitted. It is commonly used by big companies for e-commerce purposes, such as sending

orders to warehouses or tracking their order. It is more than mere e-mail; for instance,

organizations might replace bills of lading and even cheques with appropriate EDI messages. It

also refers specifically to a family of standards.

Activities related to obtaining products and materials from outside suppliers involve resource

planning, supply sourcing, negotiation, order placement, inbound transportation, storage,

handling, and quality assurance many of which include the responsibility to coordinate with

suppliers on matters of scheduling, supply continuity, hedging, and research into new sources or

programs.Here Quality assurance (QA) is a way of preventing mistakes or defects in

manufactured products and avoiding problems when delivering services to customers.

QA refers to administrative and procedural activities implemented in a quality system so that

requirements and goals for a product, service or activity will be fulfilled. It is the systematic

measurement, comparison with a standard, monitoring of processes and an associated feedback

loop that confers error prevention. This can be contrasted with quality control, which is focused

on process outputs.

Two principles included in QA are: "Fit for purpose", the product should be suitable for the

intended purpose; and "Right first time", mistakes should be eliminated. QA includes

management of the quality of raw materials, assemblies, products and components, services

related to production, and management, production and inspection processes.

Suitable quality is determined by product users, clients or customers, not by society in general. It

is not related to cost, and adjectives or descriptors such as "high" and "poor" are not applicable.

For example, a low priced product may be viewed as having high quality because it is

disposable, where another may be viewed as having poor quality because it is not disposable

c) Product development and commercialization

Here, customers and suppliers must be integrated into the product development process in order

to reduce the time to market. As product life cycles shorten, the appropriate products must be

developed and successfully launched with ever-shorter time schedules in order for firms to

remain competitive. According to Lambert and Cooper (2000), managers of the product

development and commercialization process must:

1. coordinate with customer relationship management to identify customer-articulated

needs;

2. select materials and suppliers in conjunction with procurement; and

3. develop production technology in manufacturing flow to manufacture and integrate into

the best supply chain flow for the given combination of product and markets.

d) Manufacturing flow management process

The manufacturing process produces and supplies products to the distribution channels based on

past forecasts. Manufacturing processes must be flexible in order to respond to market changes

and must accommodate mass customization. Orders are processes operating on a just-in-time

(JIT) basis in minimum lot sizes. Changes in the manufacturing flow process lead to shorter

cycle times, meaning improved responsiveness and efficiency in meeting customer demand. This

process manages activities related to planning, scheduling, and supporting manufacturing

operations, such as work-in-process storage, handling, transportation, and time phasing of

components, inventory at manufacturing sites, and maximum flexibility in the coordination of

geographical and final assemblies postponement of physical distribution operations.

e) Physical distribution

This concerns the movement of a finished product or service to customers. In physical

distribution, the customer is the final destination of a marketing channel, and the availability of

the product or service is a vital part of each channel participant's marketing effort. It is also

through the physical distribution process that the time and space of customer service become an

integral part of marketing. Thus it links a marketing channel with its customers (i.e., it links

manufacturers, wholesalers, and retailers).

f) Outsourcing/partnerships

This includes not just the outsourcing of the procurement of materials and components, but also

the outsourcing of services that traditionally have been provided in house. The logic of this trend

is that the company will increasingly focus on those activities in the value chain in which it has a

distinctive advantage and outsource everything else.This movement has been particularly evident

in logistics, where the provision of transport, warehousing, and inventory control is increasingly

subcontracted to specialists or logistics partners. Also, managing and controlling this network of

partners and suppliers requires a blend of central and local involvement: strategic decisions are

taken centrally, while the monitoring and control of supplier performance and day-to-day liaison

with logistics partners are best managed locally.

g) Performance measurement

Experts found a strong relationship from the largest arcs of supplier and customer integration to

market share and profitability. Taking advantage of supplier capabilities and emphasizing a longterm

supply chain perspective in customer relationships can both be correlated with a firm's

performance. As logistics competency becomes a critical factor in creating and maintaining

competitive advantage, measuring logistics performance becomes increasingly important,

because the difference between profitable and unprofitable operations becomes narrower. A.T.

Kearney Consultants (1985) noted that firms engaging in comprehensive performance

measurement realized improvements in overall productivity. According to experts, internal

measures are generally collected and analyzed by the firm, including cost, customer service,

productivity, asset measurement, and quality. External performance is measured through

customer perception measures and "best practice" benchmarking. A best practice is a method or

technique that has consistently shown results superior to those achieved with other means, and

that is used as a benchmark. In addition, a "best" practice can evolve to become better as

improvements are discovered. Best practice is considered by some as a business buzzword, used

to describe the process of developing and following a standard way of doing things that multiple

organizations can use.Best practices are used to maintain quality as an alternative to mandatory

legislated standards and can be based on self-assessment or benchmarking. Best practice is a

feature of accredited management standards such as ISO 9000 and ISO 14001.Some consulting

firms specialize in the area of Best Practice and offer pre-made 'templates' to standardize

business process documentation. Sometimes a "best practice" is not applicable or is inappropriate

for a particular organization's needs. A key strategic talent required when applying best practice

to organizations is the ability to balance the unique qualities of an organization with the practices

that it has in common with others.Good operating practice is a strategic management term. More

specific uses of the term include good agricultural practices, good manufacturing practice, good

laboratory practice, good clinical practice and good distribution practice.

h) Warehousing management

A warehouse management system (WMS) is a key part of the supply chain and primarily aims to

control the movement and storage of materials within a warehouse and process the associated

transactions, including shipping, receiving, putaway and picking. The systems also direct and

optimize stock putaway based on real-time information about the status of bin utilization. A

WMS monitors the progress of products through the warehouse. It involves the physical

warehouse infrastructure, tracking systems, and communication between product stations.More

precisely, warehouse management involves the receipt, storage and movement of goods,

(normally finished goods), to intermediate storage locations or to a final customer. In the multiechelon

model for distribution, there may be multiple levels of warehouses. This includes a

central warehouse, a regional warehouses (serviced by the central warehouse) and potentially

retail warehouses (serviced by the regional warehouses).Warehouse management systems often

utilize automatic identification and data capture technology, such as barcode scanners, mobile

computers, wireless LANs and potentially radio-frequency identification (RFID) to efficiently

monitor the flow of products. Once data has been collected, there is either a batch

synchronization with, or a real-time wireless transmission to a central database. The database can

then provide useful reports about the status of goods in the warehouse.Warehouse design and

process design within the warehouse (e.g. wave picking) is also part of warehouse management.

Warehouse management is an aspect of logistics and supply chain management. The objective of

a warehouse management system is to provide a set of computerized procedures for management

of warehouse inventory with the goal of minimizing cost and fulfillment times.This includes:

A standard receiving process to properly handle a shipment when it arrives. This process

can be individualized to each warehouse or product type

The receipt of stock and returns into a warehouse facility. An efficient warehouse

management system helps companies cut expenses by minimizing the amount of

unnecessary parts and products in storage. It also helps companies keep lost sales to a

minimum by having enough stock on hand to meet demand.

Modeling and managing the logical representation of the physical storage facilities (e.g.

racking, etc.). For example, if certain products are often sold together or are more popular

than others, those products can be grouped together or placed near the delivery area to

speed up the process of picking, packing and shipping to customers.

Enabling a seamless link to order processing and logistics management in order to pick,

pack, and ship product out of the facility.

Tracking where products are stocked, which suppliers they come from, and the length of

time they are stored. By analysing such data, companies can control inventory levels and

maximize the use of warehouse space. Furthermore, firms are more prepared for the

demands and supplies of the market, especially during special circumstances such as a

peak season on a particular month. Through the reports generated by the inventory

management software, firms are also able to gather important data that may be put in a

model for it to be analyzed.

Alone warehouse management cannot automate the process. It also involves the combination of

business process to be followed along with system to achieve 100% productivity and accuracy .

CHAPTER IV

Resource-Based View Theory

Currently there's a gap in the literature on supply chain management studies present: there is no

theoretical support for explaining the existence or the boundaries of supply chain management. A

few authors, such as Halldorsson et al. (2003), Ketchen and Hult (2006), and Lavassani et al.

(2009), have tried to provide theoretical foundations for different areas related to supply chain by

employing organizational theories. These theories include:

Resource-based view (RBV): The resource-based view (RBV) as a basis for the

competitive advantage of a firm lies primarily in the application of a bundle of valuable

tangible or intangible resources at the firm's disposal (Mwailu & Mercer, 1983 p142,

Wernerfelt, 1984, p172; Rumelt, 1984, p557-558; Penrose, 1959). To transform a shortrun

competitive advantage into a sustained competitive advantage requires that these

resources are heterogeneous in nature and not perfectly mobile (: p105-106; Peteraf,

1993, p180). Effectively, this translates into valuable resources that are neither perfectly

imitable nor substitutable without great effort (Barney, 1991;: p117). If these conditions

hold, the bundle of resources can sustain the firm's above average returns. The VRIO and

VRIN (see below) model also constitutes a part of RBV. There is strong evidence that

supports the RBV (Crook et al., 2008).

The key points of the theory are:

1. Identify the firm's potential key resources.

2. Evaluate whether these resources fulfill the following criteria (referred to as

VRIN):

Valuable – A resource must enable a firm to employ a value-creating

strategy, by either outperforming its competitors or reduce its own

weaknesses (: p99;: p36). Relevant in this perspective is that the transaction

costs associated with the investment in the resource cannot be higher than the

discounted future rents that flow out of the value-creating strategy (Mahoney

and Pandian, 1992, p370; Conner, 1992, p131).

Rare – To be of value, a resource must be rare by definition. In a perfectly

competitive strategic factor market for a resource, the price of the resource

will be a reflection of the expected discounted future above-average returns .

In-imitable – If a valuable resource is controlled by only one firm it could be

a source of a competitive advantage (: p107). This advantage could be

sustainable if competitors are not able to duplicate this strategic asset perfectly (Peteraf, 1993, p183; Barney, 1986b, p658). The term isolating mechanism was introduced by Rumelt (1984, p567) to explain why firms might not be able to imitate a resource to the degree that they are able to compete with the firm having the valuable resource (Peteraf, 1993, p182-183; Mahoney and Pandian, 1992, p371). An important underlying factor of inimitability is causal ambiguity, which occurs if the source from which a firm's competitive advantage stems is unknown (Peteraf, 1993, p182; Lippman and Rumelt, 1982, p420). If the resource in question is knowledgebased or socially complex, causal ambiguity is more likely to occur as these types of resources are more likely to be idiosyncratic to the firm in which it resides (Peteraf, 1993, p183; Mahoney and Pandian, 1992, p365;: p110). Conner and Prahalad go so far as to say knowledge-based resources are —…the essence of the resource-based perspective‖

Non-substitutable – Even if a resource is rare, potentially value-creating and imperfectly imitable, an equally important aspect is lack of substitutability (Dierickx and Cool, 1989, p1509;: p111). If competitors are able to counter the firm's value-creating strategy with a substitute, prices are driven down to the point that the price equals the discounted future rents (Barney, 1986a, p1233; Sheikh, 1991, p137), resulting in zero economic profits.

3. Care for and protect resources that possess these evaluations, because doing so can improve organizational performance (Crook, Ketchen, Combs, and Todd, 2008).

The VRIN characteristics mentioned are individually necessary, but not sufficient

conditions for a sustained competitive advantage. Within the framework of the resourcebased

view, the chain is as strong as its weakest link and therefore requires the resource

to display each of the four characteristics to be a possible source of a sustainable

competitive advantage

History of the resource-based view

Some aspects of theories are thought of long before they are formally adopted and brought

together into the strict framework of an academic theory. The same could be said with regard to

the resource-based view.While this influential body of research within the field of Strategic

Management was named by Birger Wernerfelt in his article A Resource-Based View of the Firm

(1984), the origins of the resource-based view can be traced back to earlier research.

Retrospectively, elements can be found in works by Coase (1937), Selznick (1957), Penrose

(1959), Stigler (1961), Chandler (1962, 1977), and Williamson (1975), where emphasis is put on

the importance of resources and its implications for firm performance (Conner, 1991, p122;

Rumelt, 1984, p557; Mahoney and Pandian, 1992, p263; Rugman and Verbeke, 2002). This

paradigm shift from the narrow neoclassical focus to a broader rationale, and the coming closer

of different academic fields (industrial organization economics and organizational economics

being most prominent) was a particular important contribution (Conner, 1991, p133; Mahoney

and Pandian, 1992).

Two publications closely following Wernerfelt's initial article came from Barney (1986a,

1986b). Even though Wernerfelt was not referenced directly, the statements made by Barney

about strategic factor markets and the role of expectations can clearly be seen within the

resource-based framework as later developed by Barney (1991). Other concepts that were later

integrated into the resource-based framework have been articulated by Lippman and Rumelt

(uncertain imitability, 1982), Rumelt (isolating mechanisms, 1984) and Dierickx and Cool

(inimitability and its causes, 1989). Barney's framework proved a solid foundation upon which

others might build, and its theoretical underpinnings were strengthened by Conner (1991),

Mahoney and Pandian (1992), Conner and Prahalad (1996) and Makadok (2001), who positioned

the resource-based view with regard to various other research fields. More practical approaches

were provided for by Amit and Shoemaker (1993), while later criticism came from among others

from Priem and Butler (2001a, 2001b) and Hoopes, Madsen and Walker (2003).

The resource based view has been a common interest for management researchers and

numerous writings could be found for same. A resource-based view of a firm explains its ability

to deliver sustainable competitive advantage when resources are managed such that their

outcomes cannot be imitated by competitors, which ultimately creates a competitive barrier

(Mahoney and Pandian 1992 cited by Hooley and Greenley 2005, p. 96, Smith and Rupp 2002,

p. 48). RBV explains that a firm's sustainable competitive advantage is reached by virtue of

unique resources being rare, valuable, inimitable, non-tradable, and non-substitutable, as well as

firm-specific (Barney 1999 cited by Finney et al. 2004, p. 1722, Makadok 2001, p. 94). These

authors write about the fact that a firm may reach a sustainable competitive advantage through

unique resources which it holds, and these resources cannot be easily bought, transferred, or

copied, and simultaneously, they add value to a firm while being rare. It also highlights the fact

that not all resources of a firm may contribute to a firm's sustainable competitive advantage.

Varying performance between firms is a result of heterogeneity of assets (Lopez 2005, p. 662,

Helfat and Peteraf 2003, p. 1004) and RBV is focused on the factors that cause these differences

to prevail (Grant 1991, Mahoney and Pandian 1992, cited by Lopez 2005, p. 662).

Fundamental similarity in these writings is that unique value-creating resources will

generate a sustainable competitive advantage to the extent that no competitor has the ability to

use the same type of resources, either through acquisition or imitation. Major concern in RBV is

focused on the ability of the firm to maintain a combination of resources that cannot be

possessed or built up in a similar manner by competitors. Further such writings provide us with

the base to understand that the sustainability strength of competitive advantage depends on the

ability of competitors to use identical or similar resources that make the same implications on a

firm's performance. This ability of a firm to avoid imitation of their resources should be

analyzed in depth to understand the sustainability strength of a competitive advantage.

Barriers to imitation of resources: Resources are the inputs or the factors available to a

company which helps to perform its operations or carry out its activities (, Black and Boal 1994,

Grant 1995 cited by Ordaz et al.2003, p. 96). Also, these authors state that resources, if

considered as isolated factors, do not result in productivity; hence, coordination of resources is

important. The ways a firm can create a barrier to imitation are known as ―isolating

mechanisms‖, and are reflected in the aspects of corporate culture, managerial capabilities,

information asymmetries and property rights (Hooley and Greenlay 2005, p. 96, Winter 2003,p.

992). Further, they mention that except for legislative restrictions created through property

rights, the other three aspects are direct or indirect results of managerial practices.

King (2007, p. 156) mentions inter-firm causal ambiguity may results in sustainable

competitive advantage for some firms. Causal ambiguity is the continuum that describes the

degree to which decision makers understand the relationship between organizational inputs and

outputs (Ghinggold and Johnson 1998, p. 134, Lippman and Rumelt 1982 cited by King 2007, p.

156, Matthyssens and Vandenbempt 1998, p. 46). Their argument is that inability of competitors

to understand what causes the superior performance of another (inter-firm causal ambiguity),

helps to reach a sustainable competitive advantage for the one who is presently performing at a

superior level. Holley and Greenley (2005, p. 96) state that social context of certain resource

conditions act as an element to create isolating mechanisms and quote Wernerfelt (1986) that

tacitness (accumulated skill-based resources acquired through learning by doing) complexity

(large number of inter-related resources being used) and specificity (dedication of certain

resources to specific activities) and ultimately, these three characteristics will result in a

competitive barrier.

Referring back to the definitions stated previously regarding the competitive advantage

that mentions superior performance is correlated to resources of the firm (Christensen and Fahey

1984, Kay 1994, Porter 1980 cited by Chacarbaghi and Lynch 1999, p. 45) and consolidating

writings of King (2007, p. 156) stated above, we may derive the fact that inter-firm causal

ambiguity regarding resources will generate a competitive advantage at a sustainable level.

Further, it explains that the depth of understanding of competitors—regarding which resources

underlie the superior performance—will determine the sustainability strength of a competitive

advantage. Should a firm be unable to overcome the inter-firm causal ambiguity, this does not

necessarily result in imitating resources. As to Johnson (2006, p. 02) and Mahoney (2001, p.

658), even after recognizing competitors' valuable resources, a firm may not imitate due to the

social context of these resources or availability of more pursuing alternatives. Certain resources,

like company reputation, are path-dependent and are accumulated over time, and a competitor

may not be able to perfectly imitate such resources (Zander and Zander 2005, p. 1521, Santala

and Parvinen 2007, p. 172).

They argue on the basis that certain resources, even if imitated, may not bring the same

impact, since the maximum impact of the same is achieved over longer periods of time. Hence,

such imitation will not be successful. In consideration of the reputation of fact as a resource and

whether a late entrant may exploit any opportunity for a competitive advantage, Kim and Park

(2006, p. 45) mention three reasons why new entrants may be outperformed by earlier entrants.

First, early entrants have a technological know-how which helps them to perform at a superior

level. Secondly, early entrants have developed capabilities with time that enhance their strength

to out-perform late entrants. Thirdly, switching costs incurred to customers, if they decide to

migrate, will help early entrants to dominate the market, evading the late entrants' opportunity to

capture market share. Customer awareness and loyalty is another rational benefit early entrants

enjoy (Lieberman and Montgomery 1988, Porter 1985, Hill 1997, Yoffie 1990 cited by Ma 2004,

p. 914, Agarwal et al. 2003, p. 117).

However, first mover advantage is active in evolutionary technological transitions, which

are technological innovations based on previous developments (Kim and Park 2006, p, 45,

Cottam et al. 2001, p. 142). The same authors further argue that revolutionary technological

changes (changes that significantly disturb the existing technology) will eliminate the advantage

of early entrants. Such writings elaborate that though early entrants enjoy certain resources by

virtue of the forgone time periods in the markets, rapidly changing technological environments

may make those resources obsolete and curtail the firm's dominance. Late entrants may comply

with the technological innovativeness and increased pressure of competition, seeking a

competitive advantage by making the existing competencies and resources of early entrants

invalid or outdated. In other words, innovative technological implications will significantly

change the landscape of the industry and the market, making early movers' advantage minimal.

However, in a market where technology does not play a dynamic role, early mover advantage

may prevail.

The above-developed framework for the RBV reflects a unique feature, namely, that

sustainable competitive advantage is achieved in an environment where competition does not

exist. According to the characteristics of the RBV, rival firms may not perform at a level that

could be identified as considerable competition for the incumbents of the market, since they do

not possess the required resources to perform at a level that creates a threat and competition.

Through barriers to imitation, incumbents ensure that rival firms do not reach a level at which

they may perform in a similar manner to the former. In other words, the sustainability of the

winning edge is determined by the strength of not letting other firms compete at the same level.

The moment competition becomes active, competitive advantage becomes ineffective, since two

or more firms begin to perform at a superior level, evading the possibility of single-firm

dominance; hence, no firm will enjoy a competitive advantage. Ma (2003, p. 76) agrees stating

that, by definition, the sustainable competitive advantage discussed in the RBV is anticompetitive.

Further such sustainable competitive advantage could exist in the world of no

competitive imitation (, Peteraf 1993 cited by Ma 2003, p. 77, Ethiraj et al., 2005, p. 27).

Based on the empirical writings stated above, RBV provides the understanding that

certain unique existing resources will result in superior performance and ultimately build a

competitive advantage. Sustainability of such an advantage will be determined by the ability of

competitors to imitate such resources. However, the existing resources of a firm may not be

adequate to facilitate the future market requirement, due to volatility of the contemporary

markets. There is a vital need to modify and develop resources in order to encounter the future

market competition. An organization should exploit existing business opportunities using the

present resources while generating and developing a new set of resources to sustain its

competitiveness in the future market environments; hence, an organization should be engaged in

resource management and resource development (Chaharbaghi and Lynch 1999, p. 45, Song et

al., 2002, p. 86). Their writings explain that in order to sustain the competitive advantage, it is

crucial to develop resources that will strengthen the firm's ability to continue the superior

performance. Any industry or market reflects high uncertainty and, in order to survive and stay

ahead of competition, new resources become highly necessary. Morgan (2000 cited by Finney et

al. 2005, p. 1722) agrees, stating that the need to update resources is a major management task

since all business environments reflect highly unpredictable market and environmental

conditions. The existing winning edge needed to be developed since various market dynamics

may make existing value-creating resources obsolete.

Criticism/Limitations

In 2001, one of the most interesting academic debates in strategic management was

published in Vol.26 (1) of the Academy of Management Review. Priem and Butler (2001a)

started off by their critique of Barney's (1991) original article. Barney (2001) then responded and

defended his research, followed by another critical comment by Priem and Butler (2001b).

Priem and Butler (2001) raised many key points of criticism: The RBV may be

tautological, or self-verifying. Barney has defined a competitive advantage as a value-creating

strategy that is based on resources that are, among other characteristics, valuable (1991, p106).

This reasoning is circular and therefore operationally invalid (Priem and Butler, 2001a, p31). For

more info on the tautology, see also Collis, 1994. According to Priem and Butler (2001a),

Barney's perspective does not constitute a theory of the firm. The conditions of lawlike

generalizations (Rudner, 1966) of empirical content, nomic necessity and generalized

conditionals are not met.Different resource configurations can generate the same value for firms

and thus would not be competitive advantage

The role of product markets is underdeveloped in the argument

Limited focus on capabilities

Retrospective causality issues: any current success could be attributed to a

number of reasons (e.g. unique resources), but the causality is not always clear.

The theory has limited prescriptive implications

However, Barney (2001) provided counter-arguments to these points of criticism. For

example, he said that any theory could be rephrased to appear tautological. He also stated that his

theory applies to static (equilibrium) environments, but not to dynamic environments. As today's

business realities are clearly not static but dynamic and characterized by high velocity and rapid

change, Barney (2001) thus admitted that his 1991 VRIN theory has little potential for

applicability to the real world. It does, however, provide a good way for senior managers to

better understand their resource base. Barney (2001) also suggested re-defining the criterion of

"value" and pointed to different ways of describing "competitive advantage" as strategic

advantage, above-average industry profits and economic rents. The tone of his paper appears

defensive at times, showing that Priem and Butler (2001a) have actually raised some important

issues.

Priem and Butler (2001a;2001b), however could be criticized for slightly missing the point.

This is because they focus on the status of the RBV as a theory, the tautology allegation and

sustainable competitive advantage. In business reality, senior managers are often not interested

whether or not the RBV constitutes a real theory or not. Instead, they require guidance for

achieving competitite survival. As Ludwig and Pemberton (2011) have shown, any firm

operating in today's dynamic external business environments needs to focus on competitive

survival and their capabilities.

Furthermore, it is not difficult to retrospectively criticise a theory. Priem and Butler

(2001a) were arguably ten years too late in their critique of Barney's (1991) framework. In the

process, they engaged in and instigated a rather superfluous debate instead of focussing on really

important issues facing senior managers.

Further criticisms of the RBV are:

There is insufficient focus on depreciating resource value, i.e. the negative effect of

external change on the resource/asset base of the SBU. As described earlier, perhaps the entire

focus of the RBV on achievement of sustainable competitive advantage should be re-considered.

Competitive survival is more important.It is perhaps difficult (if not impossible) to find a

resource which satisfies all of the Barney's VRIN criteria.There is the assumption that a firm can

be profitable in a highly competitive market as long as it can exploit advantageous resources, but

this may not necessarily be the case. It ignores external factors concerning the industry as a

whole; a firm should also consider Porter's Industry Structure Analysis (Porter's Five

Forces).Long-term implications that flow from its premises: A prominent source of sustainable

competitive advantages is causal ambiguity (Lippman & Rumelt, 1982, p420). While this is

undeniably true, this leaves an awkward possibility: the firm is not able to manage a resource it

does not know exists, even if a changing environment requires this (Lippman & Rumelt, 1982,

p420). Through such an external change, the initial sustainable competitive advantage could be

nullified or even transformed into a weakness (Priem and Butler, 2001a, p33; Peteraf, 1993,

p187; Rumelt, 1984, p566).

Premise of efficient markets: Much research hinges on the premise that markets in

general or factor markets are efficient, and that firms are capable of precisely pricing in the exact

future value of any value-creating strategy that could flow from the resource (Barney, 1986a,

p1232). Dierickx and Cool argue that purchasable assets cannot be sources of sustained

competitive advantage, just because they can be purchased. Either the price of the resource will

increase to the point that it equals the future above-average return, or other competitors will

purchase the resource as well and use it in a value-increasing strategy that diminishes rents to

zero (Peteraf, 1993, p185; Conner, 1991, p137).

The concept of rarity is obsolete: Although prominently present in Wernerfelt's original

articulation of the resource-based view (1984) and Barney's subsequent framework (1991), the

concept that resources need to be rare to be able to function as a possible source of a sustained

competitive advantage is unnecessary (Hoopes, Madsen and Walker, 2003, p890). Because of the

implications of the other concepts (e.g. valuable, inimitable and nonsubstitutability) any resource

that follows from the previous characteristics is inherently rare.

Sustainable: The lack of an exact definition of sustainability makes its premise difficult to

test empirically. Barney's statement (: p102-103) that the competitive advantage is sustained if

current and future rivals have ceased their imitative efforts is versatile from the point of view of

developing a theoretical framework, but is a disadvantage from a more practical point of view, as

there is no explicit end-goal.

The relational view is an extension of the resource-based view for considering networks and

dyads of firms as the unit of analysis to explain relational rents, i.e., superior individual firm

performance generated within that network/dyad.

CHAPTER V

Theories of Supply Chain Management

Knowledge-based view (KBV): The knowledge-based theory of the firm considers

knowledge as the most strategically significant resource of a firm. Its proponents argue

that because knowledge-based resources are usually difficult to imitate and socially

complex, heterogeneous knowledge bases and capabilities among firms are the major

determinants of sustained competitive advantage and superior corporate performance.This

knowledge is embedded and carried through multiple entities including organizational

culture and identity, policies, routines, documents, systems, and employees. Originating

from the strategic management literature, this perspective builds upon and extends the

resource-based view of the firm (RBV) initially promoted by Penrose (1959) and later

expanded by others (Wernerfelt 1984, Barney 1991, Conner 1991).Although the resourcebased

view of the firm recognizes the important role of knowledge in firms that achieve a

competitive advantage, proponents of the knowledge-based view argue that the resourcebased

perspective does not go far enough. Specifically, the RBV treats knowledge as a

generic resource, rather than having special characteristics. It therefore does not

distinguish between different types of knowledge-based capabilities. Information

technologies can play an important role in the knowledge-based view of the firm in that

information systems can be used to synthesize, enhance, and expedite large-scale intraand

inter-firm knowledge management (Alavi and Leidner 2001).Whether or not the

Knowledge-based theory of the firm actually constitutes a theory has been the subject of

considerable debate. See for example, Foss (1996) and Phelan & Lewin (2000). According

to one notable proponent of the Knowledge-Based View of the firm (KBV), ―The

emerging knowledge-based view of the firm is not a theory of the firm in any formal

sense‖.

Strategic choice theory (SCT): In organizational theory, a topic in sociology,

Strategic Choice Theory describes the role that leaders or leading groups play in

influencing an organization through making choices in a dynamic political process.

Previous to this theory, a common view was that organizations were thought to be

designed along operational requirements based on the external environment. Strategic

choice theory provided an alternative that emphasized the agency of individuals and

groups within organizations to make choices, sometimes serving their own ends, that

dynamically influenced the development of those organizations. These strategic choices

formed part of an organizational learning process that adapted to the external

environment as well as the internal political situation.

Agency theory (AT): A supposition that explains the relationship between principals

and agents in business. Agency theory is concerned with resolving problems that can

exist in agency relationships; that is, between principals (such as shareholders) and agents

of the principals (for example, company executives). The two problems that agency

theory addresses are: 1.) the problems that arise when the desires or goals of the principal

and agent are in conflict, and the principal is unable to verify (because it difficult and/or

expensive to do so) what the agent is actually doing; and 2.) the problems that arise when

the principal and agent have different attitudes towards risk. Because of different risk

tolerances, the principal and agent may each be inclined to take different actions.

An agency, in general terms, is the relationship between two parties, where one is a

principal and the other is an agent who represents the principal in transactions with a third party. Agency relationships occur when the principals hire the agent to perform a service on the principals' behalf. Principals commonly delegate decision-making authority to the agents. Agency problems can arise because of inefficiencies and incomplete information. In finance, two important agency relationships are those between stockholders and managers, and stockholders and creditors.

Just-in-time (JIT): Just in time (JIT) is a production strategy that strives to improve a business' return on investment by reducing in-process inventory and associated carrying costs. To meet JIT objectives, the process relies on signals or Kanban between different points, which are involved in the process, which tell production when to make the next part. Kanban are usually 'tickets' but can be simple visual signals, such as the presence or absence of a part on a shelf. Implemented correctly, JIT focuses on continuous improvement and can improve a manufacturing organization's return on investment, quality, and efficiency. To achieve continuous improvement key areas of focus could be flow, employee involvement and quality.

JIT relies on other elements in the inventory chain as well. For instance, its effective application cannot be independent of other key components of a lean manufacturing system or it can "end up with the opposite of the desired result." In recent years

manufacturers have continued to try to hone forecasting methods such as applying a trailing 13-week average as a better predictor for JIT planning; however, some research demonstrates that basing JIT on the presumption of stability is inherently flawed. The philosophy of JIT is simple: the storage of unused inventory is a waste of resources. JIT inventory systems expose hidden cost of keeping inventory, and are therefore not a simple solution for a company to adopt it. The company must follow an array of new methods to manage the consequences of the change. The ideas in this way of working come from many different disciplines including statistics, industrial engineering, production management, and behavioral science. The JIT inventory philosophy defines how inventory is viewed and how it relates to management.Inventory is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting.

This does not mean to say JIT is implemented without an awareness that removing inventory exposes pre-existing manufacturing issues. This way of working encourages businesses to eliminate inventory that does not compensate for manufacturing process issues, and to constantly improve those processes to require less inventory. Secondly, allowing any stock habituates management to stock keeping. Management may be

tempted to keep stock to hide production problems. These problems include backups at

work centers, machine reliability, process variability, lack of flexibility of employees and

equipment, and inadequate capacity.In short, the Just-in-Time inventory system focus is

having ―the right material, at the right time, at the right place, and in the exact amount‖,

without the safety net of inventory. The JIT system has broad implications for

implementers.

Systems theory (ST): Systems theory is the interdisciplinary study of systems in

general, with the goal of elucidating principles that can be applied to all types of systems

at all nesting levels in all fields of research. The term does not yet have a wellestablished,

precise meaning, but systems theory can reasonably be considered a

specialization of systems thinking, a generalization of systems science, a systems

approach. The term originates from Bertalanffy's general system theory (GST) and is

used in later efforts in other fields, such as the action theory of Talcott Parsons and the

social systems theory of Niklas Luhmann.In this context the word systems is used to refer

specifically to self-regulating systems, i.e. that are self-correcting through feedback. Selfregulating

systems are found in nature, including the physiological systems of our body,

in local and global ecosystems, and in climate—and in human learning processes.

Customer relationship management (CRM): Customer relationship

management (CRM) is a model for managing a company's interactions with current and

future customers. It involves using technology to organize, automate, and synchronize

sales, marketing, customer service, and technical support.

Characteristics of CRM:The modern environment requires one business to interact with

another via the web. According to a Sweeney Group definition, CRM is ―all the tools,

technologies and procedures to manage, improve, or facilitate sales, support and related

interactions with customers, prospects, and business partners throughout the enterprise‖.

It assumes that CRM is involved in every B2B transaction.Despite the general notion that

CRM systems were created for the customer-centric businesses, they can also be applied

to B2B environments to streamline and improve customer management conditions. B2C

and B2B CRM systems are not created equally and different CRM software applies to

B2B and B2C conditions. B2B relationships usually have longer maturity times than B2C

relationships. For the best level of CRM operation in a B2B environment, the software

must be personalized and delivered at individual levels.

Well-designed CRM includes the following characteristics:

1. Relationship management is a customer-oriented feature with service response based on customer input, one-to-one solutions to customers' requirements, direct online communications with customer and customer service centers that help customers solve their questions.

2. Salesforce automation. This function can implement sales promotion analysis, automate tracking of a client's account history for repeated sales or future sales, and also coordinate sales, marketing, call centers, and retail outlets in order to realize the salesforce automation.

3. Use of technology. This feature is about following the technology trend and skills of value delovering using technology to make ―up-to-the-second‖ customer data available. It applies data warehouse technology in order to aggregate transaction information, to merge the information with CRM solutions, and to provide KPI (key performance indicators).

4. Opportunity management. This feature helps the company to manage unpredictable growth and demand and implement a good forecasting model to integrate sales history with sales projections.

Available-to-promise (ATP): Available-to-promise (ATP) is a business function that provides a response to customer order enquiries, based on resource availability. It

generates available quantities of the requested product, and delivery due dates. Therefore,

ATP supports order promising and fulfillment, aiming to manage demand and match it to

production plans.Available-to-promise functions are IT-enabled and usually integrated in

enterprise management software packages. However, ATP execution may need to be

adjusted for the way a certain company operates. A fundamental distinction between ATP

functions is based on the push-pull strategy. Push-based ATP is based on forecasts

regarding future demand - based on anticipation of demand, ATP quantities and

availability dates are computed. A prominent example is the traditional determination of

ATP based on the Master Production Schedule. The push-based approach is

fundamentally limited by dependence on forecasts, which may prove inaccurate. Gross

ATP represents the total available supply, Net ATP represents the supply remaining to

support new demands, after existing demands have been accounted for.Pull-based

models, on the other hand, dynamically allocate resources in response to actual customer

orders. This means that pull-based ATP is able to balance forecast-driven resource

replenishment with order-triggered resource utilization,but because resources are

allocated with each coming order, the process will yield myopic results. ATP functions

can be executed in real time, driven by each individual order, or in batch mode – meaning

that at a certain time interval, the system checks availability for orders piled up in that

period of time. The process is triggered by the need to check resource availability before

making a commitment to deliver an order. For example, ATP calculation using SAP

software depends on the level of "stock, planned receipts (production orders, purchase

orders, planned orders and so on), and planned requirements (sales orders, deliveries,

reservations, etc.)"

Types of CRM: Marketing: CRM systems for marketing track and measure

campaigns over multiple communication channels, such as email, search, social media,

telephone and direct mail. These systems track clicks, responses, leads and deals.

Customer service and support: CRM systems can be used to create, assign and manage

requests made by customers, such as call center software which helps direct customers to

agents. CRM software can also be used to identify and reward loyal customers over a

period of time.

Appointments:CRM systems can automatically suggest suitable appointment times to

customers via e-mail or the web. These can then be synchronized with the representative

or agent's calendar

Implementing CRM to the company:There are numerous steps company should follow

while implementing CRM system. The project manager is responsible for the success of

this process. Some conditions need to be checked by the company before the starting

implementation directly:

1. Make a strategic decision concerning CRM desired goal: to improve or to change the

business processes of the organization?

2. Choose an appropriate project manager: usually it is IT-department that is responsible

for CRM system implementation. However, it is reasonable to hire the manager with a

Customer Service/Sales and Marketing business focus as there are a bunch of

decisions that are related rather to the business processes rather than to the hardware,

software or network

3. Executive sponsorship: provide the top management support and systematic

introduction to the project manager

4. Project team commitment and training: make sure team members have enough time

and authority to complete project tasks and are committed to its success

5. Define KPI metrics

6. Use phased approach: work towards long-term enterprise with a series of smaller,

phased implementations

CRM software:Selecting a CRM program means finding the software that fits the

company’s needs. All the CRM software comes many features and tools, and despite the

fact that many of CRM product offer similar feature sets, there are some unique tools in

each one. Programs can be divided into categories by the following criteria: Features

mean how well it integrates with other applications (ex. Outlook, Gmail, iCall etc.) and

how accessible information is. It covers everything from calendar alerts and to-do lists to

mobile access and synchronization capabilities. Contact information ranking outlines the

program's ability to store specific information for each contact. Business world is a fastpaced

so managers are need to be able to access customer's information quickly. Sales

and marketing tools designed to help and maintain current clients and gain new ones.

Important that this tools help find campaigns with positive ROI and those that are not

performed. Ease of use is about app's design.Programs are checked on clean, quick

navigation and easy-to-locate of the most important items. Help and support is about

what support CRM software manufacturer provides for their product.

CHAPTER VI

Channel Coordination in Supply Chain Management

Channel coordination (or supply chain coordination) aims at improving supply chain

performance by aligning the plans and the objectives of individual enterprises. It usually focuses

on inventory management and ordering decisions in distributed inter-company settings. Channel

coordination models may involve multi-echelon inventory theory, multiple decision makers,

asymmetric information, as well as recent paradigms of manufacturing, such as mass

customization, short product life-cycles, outsourcing and delayed differentiation. The theoretical

foundations of the coordination are based chiefly on the contract theory. The problem of channel

coordination was first modeled and analyzed by Anantasubramania Kumar in 1992.

The decentralized decision making in supply chains leads to a dilemma situation which

results in a suboptimal overall performance called double marginalization. Recently, partners in

permanent supply chains tend to extend the coordination of their decisions in order to improve

the performance for all of the participants. Some practical realizations of this approach are

Collaborative Planning, Forecasting, and Replenishment (CPFR), Vendor Managed Inventory

(VMI) and Quick Response (QR).The theory of channel coordination aims at supporting the

performance optimization by developing arrangements for aligning the different objectives of the

partners. These are called coordination mechanisms or schemes, which control the flows of

information, materials (or service) and financial assets along the chains. In general, a contracting

scheme should consist of the following components:

local planning methods which consider the constraints and objectives of the individual

partners,

an infrastructure and protocol for information sharing, and

an incentive scheme for aligning the individual interests of the partners.

The appropriate planning methods are necessary for optimizing the behavior of the

production. The second component should support the information visibility and transparency

both within and among the partners and facilitates the realization of real-time enterprises.

Finally, the third component should guarantee that the partners act upon to the common goals of

the supply chain.The general method for studying coordination consists of two steps. At first,

one assumes a central decision maker with complete information who solves the problem. The

result is a first-best solution which provides bound on the obtainable system-wide performance

objective. In the second step one regards the decentralized problem and designs such a contract

protocol that approaches or even achieves the performance of the first-best.A contract is said to

coordinate the channel, if thereby the partners' optimal local decisions lead to optimal systemwide

performance. Channel coordination is achievable in several simple models, but it is more

difficult (or even impossible) in more realistic cases and in the practice. Therefore the aim is

often only the achievement of mutual benefit compared to the uncoordinated situation.Another

widely studied alternative direction for channel coordination is the application of some

negotiation protocols. Such approaches apply iterative solution methods, where the partners

exchange proposals and counter-proposals until an agreement is reached. For this reason, this

approach is commonly referred to as collaborative planning. The negotiation protocols can be

characterized according to the following criteria:

The initial proposal is most frequently generated by the buyer company which is called

upstream planning. By contrast, when the initiator is the supplier, it is referred to as downstream

planning. In several cases there already exists an initial plan (e.g., using rolling schedules or

frame plans). There are also some protocols where the initial plan is generated randomly.In order

to guarantee finite runtime, the maximal number of rounds should be determined. In addition, the

protocol should also specify the number of plans offered in each round. When the number of

rounds or plans is high, the practical application necessitates fast local planner systems in order

to quickly evaluate the proposals and generate counter-proposals. Generally, the negotiation

protocols cannot provide optimality, and they require some special conditions to assure

convergence.The counter-proposals usually define side-payments (compensations) between the

companies in order to inspire the partner deviating from its previously proposed plan.An also

commonly used instrument for aligning plans of different decision makers is the application of

some auction mechanisms. However, ―auctions are most applicable in pure market interactions at

the boundaries of a supply chain but not within a supply chain", therefore they are usually not

considered as channel coordination approaches.

Characteristics of coordination schemes:

There are several classifications of channel coordination contracts, but they are not complete,

and the considered classes are not disjoint. Instead of a complete classification, a set of aspects

are enumerated below which generalizes the existing taxonomies by allowing classification

along multiple viewpoints.

Problem characteristics

Horizon:Most of the related models consider either one-period horizon or two-period

horizon with forecast update. In the latter, the production can be based on the preliminary

forecast with normal production mode or on the updated forecast with emergency production,

which means shorter lead-time, but higher cost. Besides, the horizon can consist of multiple

periods and it can be even infinite. The practically most widespread approach is the rolling

horizon planning, i.e., updating and extending an existing plan in each period.

Number of products:Almost all contract-based models regard only one product. Some

models study the special cases of substitute or complementary products. However, considering

more products in the general case is necessary if technological or financial constraints—like

capacity or budget limits—exist.

Demand characteristic:On one hand, the demand can be stochastic (uncertain) or

deterministic. On the other hand, it can be considered static (constant over time) or dynamic

(e.g., having seasonality).

Risk treatment:In most of the models the players are regarded to be risk neutral. This

means that they intend to maximize their expected profit (or minimize their expected costs).

However, some studies regard risk averse players who want to find an acceptable trade-off

considering both the expected value and the variance of the profit.

Shortage treatment:The models differ in their attitude towards stockouts. Most authors

consider either backlogs, when the demand must be fulfilled later at the expense of providing

lower price or lost sales which also includes some theoretical costs (e.g., loss of goodwill, loss

of profit, etc.). Some models include a service level constraint, which limits the occurrence or

quantity of expected stockouts. Even the 100% service level can be achieved with additional or

emergency production (e.g., overtime, outsourcing) for higher costs.

Parameters and variables:This viewpoint shows the largest variations in the different

models. The main decision variables are quantity-related (production quantity, order quantity,

number of options, etc.), but sometimes prices are also decision variables. The parameters can

be either constant or stochastic. The most common parameters are related to costs: fixed

(ordering or setup) cost, production cost and inventory holding cost. These are optional; many

models disregard fixed or inventory holding costs. There exist numerous other parameters:

prices for the different contracts, salvage value, shortage penalty, lead-time, etc.

Basic model and solution technique:Most of the one-period models apply the newsvendor

model. On two-period horizon, this is extended with the possibility of two production modes.

On a multiple period horizon the base-stock, or in case of deterministic demand the EOQ

models are the most widespread. In such cases the optimal solution can be determined with

simple algebraic operations. These simple models usually completely disregard technological

constraints; however, in real industrial cases resource capacity, inventory or budget constraints

may be relevant. This necessitates more complex models, such as LP, MIP, stochastic program,

and thus more powerful mathematical programming techniques may be required.As for the

optimization criteria, the most usual objectives are the profit maximization or cost

minimization, but other alternatives are also conceivable, e.g., throughput time minimization.

Considering multiple criteria is not yet prevalent in the coordination literature.

Decentralization Characteristics:

Number and role of the players:The most often studied dilemmas involve the two players

and call them customer and supplier (or buyer-seller). There are also extensions of this

simple model: the multiple customers with correlated demand and the multiple suppliers

with different production parameters. Multi-echelon extensions are also conceivable,

however, sparse in the literature. When the coordination is within a supply chain (typically a

customer-supplier relation), it is called vertical, otherwise horizontal. An example for the

latter is when different suppliers of the same customer coordinate their

transportation.Sometimes the roles of the participants are also important. The most

frequently considered companies are manufacturers, retailers, distributors or logistic

companies.

Relation of the players:One of the most important characteristics of the coordination is the

power relations of the players. The power is influenced by several factors, such as possessed

process know-how, number of competitors, ratio in the value creation, access to the market

and financial resources.The players can behave in a cooperative or opportunistic way. In the

former case, they share a common goal and act like a team, while in the latter situation each

player is interested only in its own goals. These two behaviors are usually present in a

mixed form, since the opportunistic claims for profitability and growth are sustainable

usually only with a certain cooperative attitude.The relation can be temporary or permanent.

In the temporary case usually one- or two-period models are applied, or even an auction

mechanism. However, the coordination is even more important in permanent relations,

where the planning is usually done in a rolling horizon manner. When coordinating a

permanent supply relation, one has to consider the learning effect, i.e., players intend to

learn each other's private information and behavior.

Goal of the coordination:The simplest possible coordination is aimed only at aligning the

(material) flows within the supply chain in order to gain executable plans and avoid

shortages. In a more advanced form of coordination, the partners intend to improve supply

chain performance by approaching or even achieving the optimal plan according to some

criteria. Generally, a coordinated plan may incur losses for some of the players compared to

the uncoordinated situation, which necessitates some kind of side-payment in order to

provide a win-win situation. In addition, even some sort of fairness may be required, but it is

not only hard to guarantee, but even to define.Most of the coordination approaches requires

that the goal should be achieved in an equilibrium in order to exclude the possibility that an

opportunistic player deviates from the coordinated plan.

Information structure:Some papers study the symmetric information case, when all of the

players know exactly the same parameters. This approach is very convenient for cost and

profit sharing, since all players know the incurring system cost. The asymmetric case, when

there is an information gap between the players is more realistic, but poses new challenges.

The asymmetry typically concerns either the cost parameters, the capacities or the quantities

like the demand forecast. The demand and the forecast are often considered to be

qualitative, limited to only two possible values: high and low. In case of stochastic demand,

the uncertainty of the forecasts can also be private information.

Decision structure:The decision making roles of the players depend on the specified

decision variables. However, there is a more-or-less general classification in this aspect:

forced and voluntary compliance. Under forced compliance the supplier is responsible for

satisfying all orders of the customer, therefore it does not have the opportunity to decide

about the production quantity. Under voluntary compliance, the supplier decides about the

production quantity and it cannot be forced to fill an order. This latter is more complex

analytically, but more realistic as well. Even so, several papers assume that the supplier

decides about the price and then the customer decides the order quantity.

Game theoretic model:From the viewpoint of game theory the models can take cooperative

or non-cooperative approaches. The cooperative approach studies, how the players form

coalitions therefore these models are usually applied on the strategic level of network

design. Other typical form of cooperative games involves some bargaining framework—

e.g., the Nash bargaining model—for agreeing upon the parameters of the applied

contracts.On the other hand, on the operational level, the non-cooperative approach is used.

Usually the sequential Stackelberg game model is considered, where one of the players, the

leader moves first and then the follower reacts. Both cases—the supplier or the customer as

the Stackelberg leader—are widely studied in the literature. In case of information

asymmetry, a similar sequential model is used and it is called principal–agent setting. The

study of the long-term supply relationship can also be modeled as a repeated game.To sum

up, a collaboration generally consists of a cooperative, followed by a non-cooperative game.

However, most researches concentrate only on one of the phases.

Contract types

There are many variants of the contracts, some widespread forms are briefly described below.

Besides, there exist several combinations and customized approaches, too.

Two-part tariff:In this case the customer pays not only for the purchased goods, but in

addition a fixed amount called franchise fee per order. This is intended to compensate the

supplier for his fixed setup cost.

Sales rebate:This contract specifies two prices and a quantity threshold. If the order size is

below the threshold, the customer pays the higher price, and if it is above, she pays a lower

price for the units above the threshold.

Quantity discount:Under quantity discount contract, the customer pays a wholesale price

depending on the order quantity. This resembles to the sales rebate contract, but there is no

threshold defined. The mechanism for specifying the contract can be complex. The contract

has been applied in many situations, for example, in an international supply chain with

fluctuating exchange rates.

Capacity options:While advance capacity purchase is popular in the supply chain practice,

there are situations where a manufacturer prefers to delay its capacity purchase to have better

information about the uncertain demand.

Buyback/return:With these types of contracts the supplier offers that it will buy back the

remaining obsolete inventory at a discounted price. This supports the sharing of inventory risk

between the partners. A variation of this contract is the backup agreement, where the customer

gives a preliminary forecast and then makes an order less or equal to the forecasted quantity.

If the order is less, it must also pay a proportional penalty for the remaining obsolete

inventory. Buyback agreements are widespread in the newspaper, book, CD and fashion

industries.

Quantity flexibility:In this case the customer gives a preliminary forecast and then it can give

fixed order in an interval around the forecast. Such contracts are widespread in several

markets, e.g., among the suppliers of the European automotive industry.

Revenue sharing:With revenue sharing the customer pays not only for the purchased goods,

but also shares a given percentage of her revenue with the supplier. This contract is

successfully used in video cassette rental and movie exhibition fields. It can be proved, that

the optimal revenue sharing and buyback contracts are equivalent, i.e., they generate the same

profits for the partners.

Options:The option contracts are originated from the product and stock exchange. With an

option contract, the customer can give fixed orders in advance, as well as buy rights to

purchase more (call option) or return (put option) products later. The options can be bought at

a predefined option price and executed at the execution price. This approach is a

generalization of some previous contract types.

VMI contract:This contract can be used when the buyer does not order, only communicates

the forecasts and consumes from the inventory filled by the supplier. The VMI contract

specifies that not only the consumed goods should be paid, but also the forecast imprecision,

i.e., the difference between the estimated and realized demand. In this way, the buyer is

inspired to increase the forecast quality, and the risk of market uncertainty is shared between

the partners.

CHAPTER VII

Materials Logistics Management

Materials management can deal with campus planning and building design for the movement

of materials, or with logistics that deal with the tangible components of a supply chain.

Specifically, this covers the acquisition of spare parts and replacements, quality control of

purchasing and ordering such parts, and the standards involved in ordering, shipping, and

warehousing the said parts. he goal of materials management is to provide an unbroken chain

of components for production to manufacture goods on time for the customer base. The

materials department is charged with releasing materials to a supply base, ensuring that the

materials are delivered on time to the company using the correct carrier. Materials is generally measured by accomplishing on time delivery to the customer, on time delivery from the supply base, attaining a freight budget, inventory shrink management, and inventory accuracy. The materials department is also charged with the responsibility of managing new launches.

In some companies materials management is also charged with the procurement of materials by establishing and managing a supply base. In other companies the procurement and management of the supply base is the responsibility of a separate purchasing department. The purchasing department is then responsible for the purchased price variances from the supply base.

In large companies with multitudes of customer changes to the final product over the course of a year, there may be a separate logistics department that is responsible for all new acquisition launches and customer changes. This logistics department ensures that the launch materials are procured for production and then transfers the responsibility to the plant. There are no standards for materials management that are practiced from company to company. Most companies use ERP systems such as SAP, Oracle, BPCS, MAPICS, and other systems to manage materials control. Small concerns that do not have or cannot afford ERP systems use a form of spreadsheet application to manage

materials. Some other construction projects use barcode and GPS materials management

systems like Track'em.Materials management is not a science and depending upon the

relevance and importance that company officials place upon controlling material flow,

the level of expertise changes. Some companies place materials management on a level

whereby there is a logistics director, other companies see the importance level as

managing at the plant level by hiring an inventory manager or materials manager, and

still other companies employ the concept that the supervisors in the plant are responsible

accompanied by a planners.Because there are no standards there is only best practices for

any particular business sector that are widely used. For example, the generation of

releases to the supply base come in many forms from the lowest level that requires

sending facsimilies and PDF files, the EDI information exchange, to the ultimate practice

of a supplier web base site. The major challenge that materials managers face is

maintaining a consistent flow of materials for production. There are many factors that

inhibit the accuracy of inventory which results in production shortages, premium freight,

and often inventory adjustments. The major issues that all materials managers face are

incorrect bills of materials, inaccurate cycle counts, un-reported scrap, shipping errors,

receiving errors, and production reporting errors. Materials managers have striven to

determine how to manage these issues in the business sectors of manufacturing since the

beginning of the industrial revolution. Although there are no known methods that

eliminate the afore mentioned inventory accuracy inhibitors, there are best methods

available to eliminate the impact upon maintaining an interrupted flow of materials for

production.One challenge for materials managers is to provide timely releases to the

supply base. On the scale of worst to best practices, sending releases via facsimile or PDF

file is the worst practice and transmitting releases to the supplier based web site is the

best practice. Why? The flaw in transmitting releases via facsimile or email is that they

can get lost or even interpreted incorrectly into the suppliers system resulting in a stock

out. The problem with transmitting EDI releases is that not all suppliers have EDI

systems capable of receiving the release information. The best practice is to transmit the

releases to a common supplier web base site where the suppliers can view (for free) the

releases. The other advantage is that the supplier is required to use the carrier listed in the

web site, must transmit an ASN (advanced shipping notification), and review the

accumulative balances of the order. Redundancy can be reduced and effectiveness is increased when service points are clustered to reduce the amount of redundancy. An effective materials management program can also resolve ―island‖ approaches to shipping, receiving, and vehicle movement. Solutions can include creating a new central loading location, as well consolidating service areas and docks from separate buildings into one. Developing better campus circulation infrastructure also means re-evaluating truck delivery and service vehicle routes. Vehicle type, size, and schedules are studied to make these more monument for other uses. Each year, an entire week is dedicated to celebrating resource and materials management professionals for their outstanding contributions to healthcare and the overall success of the supply chain. Sponsored by the Association for Healthcare Resource & Materials Management (AHRMM), National Healthcare Resource & Materials Management Week (MM Week) provides an opportunity to recognize the integral role materials management professionals play in delivering high-quality patient care throughout the health care industry. Materials management plans and designs for the delivery, distribution, storage, collection, and removal of occupant-generated streams of materials and services. It is usually an additional service that is offered as part of a campus planning process or a building design project. It is most beneficial for university, health care, and corporate

environments. Materials management looks at the planning and design considerations

needed to support the efficient delivery and removal of goods and services that support

occupant activity. The streams of occupant-generated materials and activity include mail,

office supplies, lab supplies, food, special deliveries, custodial services, building

supplies, waste and recycling, and service calls.

A materials management plan may include planning guidelines or full design for the

following:

Truck delivery and service vehicle routes, to reduce vehicle / pedestrian conflict.

Loading docks and delivery points, to increase accommodation and reduce

queuing and vehicle idling.

Recycling, trash, and hazardous waste collection and removal, to increase waste

diversion and reduce costs

Service equipment and utility infrastructure relocation or concealment, to improve

aesthetics and realize landscaping goals

Regulatory and operation planning

Benefits: The effective materials management plan builds from and enhances an institutional

master plan by filling in the gaps and producing an environmentally responsible and efficient

outcome. An institutional campus, office, or housing complex can expect a myriad of benefits

from an effective materials management plan. For starters,there are long-term cost savings, as

consolidating, reconfiguring, and better managing a campus' core infrastructure reduces annual

operating costs. An institutional campus, office, or housing complex will also get the highest and

best use out of campus real estate.An effective materials management plan also means a more

holistic approach to managing vehicle use and emissions, solid waste, hazardous waste,

recycling, and utility services. As a result, this means a ―greener,‖ more sustainable environment

and a manifestation of the many demands today for institutions to become more environmentally

friendly. In fact, thanks to such environmental advantages, creative materials management plans

may qualify for LEAD Innovation in Design credits.And finally, an effective materials

management plan can improve aesthetics. Removing unsafe and unsightly conditions, placing

core services out of sight, and creating a more pedestrian-friendly environment will improve the

visual and physical sense of place for those who live and work there.

Material requirements planning (MRP): Material requirements planning (MRP) is a

production planning and inventory control system used to manage manufacturing processes.

Most MRP systems are software-based, while it is possible to conduct MRP by hand as well.

An MRP system is intended to simultaneously meet three objectives:

Ensure materials are available for production and products are available for

delivery to customers.

Maintain the lowest possible material and product levels in store

Plan manufacturing activities, delivery schedules and purchasing activities.

Prior to MRP, and before computers dominated industry, reorder-point/reorder-quantity

(ROP/ROQ) type methods like EOQ (Economic Order Quantity) had been used in

manufacturing and inventory management. In 1964, as a response to the TOYOTA

Manufacturing Program, Joseph Orlicky developed Material Requirements Planning (MRP).

The first company to use MRP was Black & Decker in 1964, with Dick Alban as project

leader. In 1983 Oliver Wight developed MRP into manufacturing resource planning (MRP II).

Orlicky's book is entitled The New Way of Life in Production and Inventory Management

(1975). By 1975, MRP was implemented in 150 companies. This number had grown to about

8,000 by 1981. In the 1980s, Joe Orlicky's MRP evolved into Oliver Wight's manufacturing

resource planning (MRP II) which brings master scheduling, rough-cut capacity planning,

capacity requirements planning, S&OP in 1983 and other concepts to classical MRP. By

1989, about one third of the software industry was MRP II software sold to American industry

($1.2 billion worth of software).

The scope of MRP in manufacturing:

The basic functions of an MRP system include: inventory control, bill of material processing,

and elementary scheduling. MRP helps organizations to maintain low inventory levels. It is

used to plan manufacturing, purchasing and delivering activities."Manufacturing

organizations, whatever their products, face the same daily practical problem - that customers

want products to be available in a shorter time than it takes to make them. This means that

some level of planning is required."Companies need to control the types and quantities of

materials they purchase, plan which products are to be produced and in what quantities and

ensure that they are able to meet current and future customer demand, all at the lowest

possible cost. Making a bad decision in any of these areas will make the company lose money.

A few examples are given below:

If a company purchases insufficient quantity of an item used in manufacturing (or the

wrong item) it may be unable to meet contract obligations to supply products on time.

If a company purchases excessive quantities of an item, money is wasted - the excess

quantity ties up cash while it remains as stock and may never even be used at all.

Beginning production of an order at the wrong time can cause customer deadlines to be

missed.

MRP is a tool to deal with these problems. It provides answers for several questions:

What items are required?

How many are required?

When are they required?

MRP can be applied both to items that are purchased from outside suppliers and to subassemblies,

produced internally, that are components of more complex items.The data that

must be considered include:

The end item (or items) being created. This is sometimes called Independent Demand, or

Level "0" on BOM (Bill of materials).

How much is required at a time.

When the quantities are required to meet demand.

Shelf life of stored materials.

Inventory status records. Records of net materials available for use already in stock (on

hand) and materials on order from suppliers.

Bills of materials. Details of the materials, components and sub-assemblies required to

make each product.

Planning Data. This includes all the restraints and directions to produce the end items.

This includes such items as: Routing, Labor and Machine Standards, Quality and Testing

Standards, Pull/Work Cell and Push commands, Lot sizing techniques (i.e. Fixed Lot

Size, Lot-For-Lot, Economic Order Quantity), Scrap Percentages, and other inputs.

Outputs: There are two outputs and a variety of messages/reports:

Output 1 is the "Recommended Production Schedule" which lays out a detailed schedule

of the required minimum start and completion dates, with quantities, for each step of the

Routing and Bill Of Material required to satisfy the demand from the Master Production

Schedule (MPS).

Output 2 is

Introduction to Supply Chain Management

Supply chain management (SCM) is the management of the flow of goods. It includes the movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption. Here the term raw material or feedstock is the basic material from which goods, finished products or intermediate materials that are also feedstocks are manufactured or made. The term raw material is frequently used with an extended meaning. As feedstock, the term connotes it is a bottleneck asset critical to the production of other

products. For example, crude oil is a feedstock raw material providing finished products in the fuels, plastics and industrial chemicals and pharmaceuticals industries.Interconnected or interlinked networks, channels and node businesses are involved in the provision of products and services required by end customers in a supply chain. Supply chain management has been defined as the "design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally." A supply chain is a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw materials, and components into a finished product that is delivered to the end customer. In sophisticated supply chain systems, used products may re-enter the supply chain at any point where residual value is recyclable. Supply chains link value chains.SCM draws heavily from the areas of operations management, logistics, procurement, and information technology, and strives for an integrated approach,where the terms are explained as
Operations management is an area of management concerned with overseeing, designing, and controlling the process of production and redesigning business operations in the production of goods or services. It involves the responsibility of ensuring that business operations are efficient in terms of using as few resources as needed, and effective in terms of meeting customer requirements. It is concerned with managing the process that converts inputs (in the forms of materials, labor, and energy) into outputs (in the form of goods and/or services).
Logistics is the management of the flow of resources between the point of origin and the point of consumption in order to meet some requirements, for example, of customers or corporations. The resources managed in logistics can include physical items, such as food, materials, equipment, liquids, and staff, as well as abstract items, such as time, information, particles, and energy. The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, warehousing, and often security. The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in logistics for import and export.
Procurement is the acquisition of goods, services or works from an outside external source. It is favourable that the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location. Corporations and public bodies often define processes intended to promote fair and open competition for their business while minimizing exposure to fraud and collusion.
Information technology (IT) is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data, often in the context of a business or other enterprise. The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as television and telephones. Several industries are associated with information technology, such as computer hardware, software, electronics, semiconductors, internet, telecom equipment, e-commerce and computer services.

Origin of the term and definitions:

The term "supply chain management" entered the public domain when Keith Oliver, a consultant at Booz Allen Hamilton (now Booz & Company), used it in an interview for the Financial Times

in 1982. The term was slow to take hold. It gained currency in the mid-1990s, when a flurry of articles and books came out on the subject. In the late 1990s it rose to prominence as a management buzzword, and operations managers began to use it in their titles with increasing regularity.

Commonly accepted definitions of supply chain management include:

The management of upstream and downstream value-added flows of materials, final goods, and related information among suppliers, company, resellers, and final consumers.

The systematic, strategic coordination of traditional business functions and tactics across all business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.

A customer-focused definition is given by Hines —Supply chain strategies require a total systems view of the links in the chain that work together efficiently to create customer satisfaction at the end point of delivery to the consumer. As a consequence, costs must be lowered throughout the chain by driving out unnecessary expenses, movements, and handling. The main focus is turned to efficiency and added value, or the end-user's perception of value. Efficiency must be increased, and bottlenecks removed. The measurement of performance focuses on total system efficiency and the equitable monetary reward distribution to those within the supply chain. The supply chain system must be responsive to customer requirements."

The integration of key business processes across the supply chain for the purpose of creating value for customers and stakeholders.

According to the Council of Supply Chain Management Professionals (CSCMP), supply chain management encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management. It also includes coordination and collaboration with channel partners, which may be suppliers, intermediaries, third-party service providers, or customers. Supply chain management integrates supply and demand management within and across companies. More recently, the loosely coupled, self-organizing network of businesses that cooperate to provide product and service offerings has been called the Extended Enterprise.

A supply chain, as opposed to supply chain management, is a set of organizations directly linked by one or more upstream and downstream flows of products, services, finances, or information from a source to a customer. Supply chain management is the management of such a chain.

Supply chain management software includes tools or modules used to execute supply chain transactions, manage supplier relationships, and control associated business processes. Supply chain management software (SCMS) is a business term which refers to a whole range of software tools or modules used in executing supply chain transactions, managing supplier relationships and controlling associated business processes.While functionality in such systems can often be broad – it commonly includes:

Customer requirement processing

Purchase order processing

Inventory management

Goods receipt and Warehouse management

Supplier Management/Sourcing

A requirement of many SCMS often includes forecasting. Such tools often attempt to balance the disparity between supply and demand by improving business processes and using algorithms and consumption analysis to better plan future needs.SCMS also often includes integration

technology that allows organizations to trade electronically with supply chain partners. In 2012, the global supply chain management software market is estimated at $8.3 billion. The shift to global supply chain networks shifted supply chain systems to cloud-based technology. This encouraged technology that have all partners on the same software version, a single source of truth for all software, and the implementation of software technology with pay for what you use software.upply chain event management (SCEM) considers all possible events and factors that can disrupt a supply chain. With SCEM, possible scenarios can be created and solutions devised.In many cases the supply chain includes the collection of goods after consumer use for recycling. Including third-party logistics or other gathering agencies as part of the RM repatriation process is a way of illustrating the new endgame strategy.

Problems addressed

Supply chain management addresses the following problems:

Distribution network configuration: the number, location, and network missions of suppliers, production facilities, distribution centers, warehouses, cross-docks, and customers.

Distribution strategy: questions of operating control (e.g., centralized, decentralized, or shared); delivery scheme (e.g., direct shipment, pool point shipping, cross docking, direct store delivery, or closed loop shipping); mode of transportation (e.g., motor carrier, including truckload, less than truckload (LTL), parcel, railroad, intermodal transport, including trailer on flatcar (TOFC) and container on flatcar (COFC), ocean freight, airfreight); replenishment strategy (e.g., pull, push, or hybrid); and transportation control (e.g., owner operated, private carrier, common carrier, contract carrier, or third-party logistics (3PL)). A third-party logistics provider (abbreviated 3PL, or sometimes TPL) is a firm that provides service to its customers of outsourced (or "third party") logistics services for part, or all of their supply chain management functions. Third party logistics providers typically specialize in integrated operation, warehousing and transportation services that can be scaled and customized to customers' needs based on market conditions and the demands and delivery service requirements for their products and materials. Often, these services go beyond logistics and included value-added services related to the production or procurement of goods, i.e., services that integrate parts of the supply chain. Then the provider is called third-party supply chain management provider (3PSCM) or supply chain management service provider (SCMSP). Third Party Logistics System is a process which targets a particular Function in the management. It may be like warehousing, transportation, raw material provider, etc. According to the Council of Supply Chain Management Professionals, 3PL is defined as "a firm that provides multiple logistics services for use by customers. Preferably, these services are integrated, or bundled together, by the provider. Among the services 3PLs provide are transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding. hird-party logistics providers include freight forwarders, courier companies, as well as other companies integrating & offering subcontracted logistics and transportation services. ertz and Alfredsson (2003) describe four categories of 3PL providers: (a)Standard 3PL Provider: this is the most basic form of a 3PL provider. They would perform activities such as, pick and pack, warehousing, and distribution (business) – the most basic functions of logistics. For a majority of these firms, the 3PL function is not their main activity.(b) Service Developer: this type of 3PL provider will offer their customers advanced value-added services such as: tracking and tracing, cross-docking, specific packaging, or providing a unique security system. A solid IT foundation and a

focus on economies of scale and scope will enable this type of 3PL provider to perform these types of tasks.(c) The Customer Adapter: this type of 3PL provider comes in at the request of the customer and essentially takes over complete control of the company's logistics activities. The 3PL provider improves the logistics dramatically, but do not develop a new service. The customer base for this type of 3PL provider is typically quite small.(d) The Customer Developer: this is the highest level that a 3PL provider can attain with respect to its processes and activities. This occurs when the 3PL provider integrates itself with the customer and takes over their entire logistics function. These providers will have few customers, but will perform extensive and detailed tasks for them.

Trade-offs in logistical activities: The above activities must be coordinated in order to achieve the lowest total logistics cost. Trade-offs may increase the total cost if only one of the activities is optimized. For example, full truckload (FTL) rates are more economical on a cost-per-pallet basis than are LTL shipments. If, however, a full truckload of a product is ordered to reduce transportation costs, there will be an increase in inventory holding costs, which may increase total logistics costs. The planning of logistical activities therefore takes a systems approach. These trade-offs are key to developing the most efficient and effective logistics and SCM strategy.

Information: The integration of processes through the supply chain in order to share valuable information, including demand signals, forecasts, inventory, transportation, and potential collaboration.

Inventory management: Management of the quantity and location of inventory, including raw materials, work in process (WIP), and finished goods.

Cash flow: Arranging the payment terms and methodologies for exchanging funds across entities within the supply chain.

Supply chain execution means managing and coordinating the movement of materials, information and funds across the supply chain. The flow is bi-directional. SCM applications provide real-time analytical systems that manage the flow of products and information throughout the supply chain network.

Functions of Supply Chain Management:

Supply chain management is a cross-functional approach that includes managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other firms that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing managerial control of daily logistics operations. Less control and more supply chain partners led to the creation of the concept of supply chain management. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement.

Importance of Supply Chain Management:

Organizations increasingly find that they must rely on effective supply chains, or networks, to compete in the global market and networked economy. In Peter Drucker's (1998) new management paradigms, this concept of business relationships extends beyond traditional enterprise boundaries and seeks to organize entire business processes throughout a value chain of multiple companies.In recent decades, globalization, outsourcing, and information technology have enabled many organizations, such as Dell and Hewlett Packard, to successfully operate

collaborative supply networks in which each specialized business partner focuses on only a few key strategic activities (Scott, 1993). This inter-organisational supply network can be acknowledged as a new form of organisation. However, with the complicated interactions among the players, the network structure fits neither "market" nor "hierarchy" categories (Powell, 1990). It is not clear what kind of performance impacts different supply network structures could have on firms, and little is known about the coordination conditions and trade-offs that may exist among the players. From a systems perspective, a complex network structure can be decomposed into individual component firms (Zhang and Dilts, 2004). Traditionally, companies in a supply network concentrate on the inputs and outputs of the processes, with little concern for the internal management working of other individual players. Therefore, the choice of an internal management control structure is known to impact local firm performance (Mintzberg, 1979).In the 21st century, changes in the business environment have contributed to the development of supply chain networks. First, as an outcome of globalization and the proliferation of multinational companies, joint ventures, strategic alliances, and business partnerships, significant success factors were identified, complementing the earlier "just-in-time", lean manufacturing, and agile manufacturing practices.Second, technological changes, particularly the dramatic fall in communication costs (a significant component of transaction costs), have led to changes in coordination among the members of the supply chain network (Coase, 1998).Many researchers have recognized supply network structures as a new organisational form, using terms such as "Keiretsu", "Extended Enterprise", "Virtual Corporation", "Global Production Network", and "Next Generation Manufacturing System". A keiretsu (system, series, grouping of enterprises, order of succession) is a set of companies with interlocking business relationships and shareholdings. It is a type of informal business group. The keiretsu maintained dominance over the Japanese economy for the last half of the 20th century.The member companies own small portions of the shares in each other's companies, centered on a core bank; this system helps insulate each company from stock market fluctuations and takeover attempts, thus enabling longterm
planning in innovative projects. It is a key element of the automotive industry in Japan.In general, such a structure can be defined as "a group of semi-independent organisations, each with their capabilities, which collaborate in ever-changing constellations to serve one or more markets in order to achieve some business goal specific to that collaboration‖.
The security management system for supply chains is described in ISO/IEC 28000 and ISO/IEC 28001 and related standards published jointly by the ISO and the IEC.Supply Chain Management draws heavily from the areas of operations management, logistics, procurement, and information technology, and strives for an integrated approach.

CHAPTER II

Historical Development of Supply Chain Management

Six major movements can be observed in the evolution of supply chain management studies are
1. Creation,
2. Integration
3. Globalization
4. Specialization phases one
5. Specialization phases two
6. SCM 2.0.

Creation era

The term "supply chain management" was first coined by Keith Oliver in 1982. Oliver defined in

1982 the Supply Chain concept as follows: ―Supply chain management (SCM) is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption‖. Since then, almost all Supply Chain Book authors have developed their own definitions. Some of them are subtle variations and others add more detail, but most of them remain close to Oliver's original definition. A 2003 article in a Strategy+Business Issue named When Will Supply Chain Management Grow Up? by Tim Laseter and Keith Oliver himself describes anecdotically the moment in which the term Supply Chain Management was coined prior to the Financial Times interview: Oliver began to develop a vision to tear down the functional silos inside an organization (manufacturing, marketing, distribution, sales and finance). He and his team called it Integrated Inventory Management, abbreviated I2M in the late 70's. They believed that the term was catchy and the I2M acronym would be well received, but it all changed during a key steering committee meeting with Dutch electronics giant Philips. At the meeting, he and his team found out that their catchy phrase was not that catchy, and Oliver was challenged by one of the customer's managers: Mr. Van t'Hoff. Oliver explained Mr. Van t'Hoff what he meant by I2M: ―We're talking about the management of a chain of supply as though it were a single entity,‖ Mr. Oliver replied, ―not a group of disparate functions.‖ ―Then why don't you call it that?‖ Mr. Van t'Hoff said. ―Call it what?‖ Mr. Oliver asked. ―Total supply chain management.‖Scott Stephens, Former Chair of the Supply-Chain Council (SCC) (1983–1997) and Former Chief Technology Officer of the SCC (1997–2005) states in his blog that after knowing the story, he was not really sure if it was Keith Oliver or Mr. Van t'Hoff who coined the term. But as Oliver developed the concept prior to the meeting and used it first in public during the Financial Times interview, gives credit to Oliver's story to be the Ring of Truth.However, the concept of a supply chain in management was of great importance long before, in the early 20th century, especially with the creation of the assembly line. The characteristics of this era of supply chain management include the need for large-scale changes, re-engineering, downsizing driven by cost reduction programs, and widespread attention to Japanese management practices.

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. This era has continued to develop into the 21st century with the expansion of Internet-based collaborative systems. This era of supply chain evolution is characterized by both increasing value added and cost reductions through integration.A supply chain can be classified as a stage 1, 2 or 3 network. In a stage 1–type supply chain, systems such as production, storage, distribution, and material control are not linked and are independent of each other. In a stage 2 supply chain, these are integrated under one plan and is ERP enabled. Enterprise resource planning (ERP) is business management software—usually a suite of integrated applications—that a company can use to store and manage data from every stage of business, including:

Product planning, cost and development
Manufacturing
Marketing and sales
Inventory management
Shipping and payment

ERP provides an integrated real-time view of core business processes, using common databases

maintained by a database management system. ERP systems track business resources—cash, raw materials, production capacity—and the status of business commitments: orders, purchase orders, and payroll. The applications that make up the system share data across the various departments (manufacturing, purchasing, sales, accounting, etc.) that entered the data. ERP facilitates information flow between all business functions, and manages connections to outside stakeholders.Enterprise system software is a multi-billion dollar industry that produces components that support a variety of business functions. IT investments have become the largest category of capital expenditure in United States-based businesses over the past decade. Though early ERP systems focused on large enterprises, smaller enterprises increasingly use ERP systems.Organizations consider the ERP system a vital organizational tool because it integrates varied organizational systems and facilitates error-free transactions and production. However, ERP system development is different from traditional systems development. ERP systems run on a variety of computer hardware and network configurations, typically using a database as an information repository.

A stage 3 supply chain is one that achieves vertical integration with upstream suppliers and downstream customers. Vertically integrated companies in a supply chain are united through a common owner. Usually each member of the supply chain produces a different product or (market-specific) service, and the products combine to satisfy a common need. It is contrasted with horizontal integration. Vertical integration has also described management styles that bring large portions of the supply chain not only under a common ownership, but also into one corporation (as in the 1920s when the Ford River Rouge Complex began making much of its own steel rather than buying it from suppliers).An example of this kind of supply chain is Tesco.

Globalization era

The third movement of supply chain management development, the globalization era, can be characterized by the attention given to global systems of supplier relationships and the expansion of supply chains over national boundaries and into other continents. Although the use of global sources in organizations' supply chains can be traced back several decades (e.g., in the oil industry), it was not until the late 1980s that a considerable number of organizations started to integrate global sources into their core business. This era is characterized by the globalization of supply chain management in organizations with the goal of increasing their competitive advantage, adding value, and reducing costs through global sourcing.

Specialization era (phase I): outsourced manufacturing and distribution

In the 1990s, companies began to focus on "core competencies" and specialization. They abandoned vertical integration, sold off non-core operations, and outsourced those functions to other companies. This changed management requirements, by extending the supply chain beyond the company walls and distributing management across specialized supply chain partnerships. This transition also refocused the fundamental perspectives of each organization. Original equipment manufacturers (OEMs) became brand owners that required visibility deep into their supply base. They had to control the entire supply chain from above, instead of from within. Contract manufacturers had to manage bills of material with different part-numbering schemes from multiple OEMs and support customer requests for work-in-process visibility and vendormanaged
inventory (VMI).

The specialization model creates manufacturing and distribution networks composed of several individual supply chains specific to producers, suppliers, and customers that work together to design, manufacture, distribute, market, sell, and service a product. This set of partners may

change according to a given market, region, or channel, resulting in a proliferation of trading partner environments, each with its own unique characteristics and demands.

Specialization era (phase II): 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.

Market forces sometimes demand rapid changes from suppliers, logistics providers, locations, or customers in their role as components of supply chain networks. This variability has significant effects on supply chain infrastructure, from the foundation layers of establishing and managing electronic communication between trading partners, to more complex requirements such as the configuration of processes and work flows that are essential to the management of the network itself.

Supply chain specialization enables companies to improve their overall competencies in the same way that outsourced manufacturing and distribution has done; it allows them to focus on their core competencies and assemble networks of specific, best-in-class partners to contribute to the overall value chain itself, thereby increasing overall performance and efficiency. The ability to quickly obtain and deploy this domain-specific supply chain expertise without developing and maintaining an entirely unique and complex competency in house is a leading reason why supply chain specialization is gaining popularity.

Outsourced technology hosting for supply chain solutions debuted in the late 1990s and has taken root primarily in transportation and collaboration categories. This has progressed from the application service provider (ASP) model from roughly 1998 through 2003, to the on-demand model from approximately 2003 through 2006, to the software as a service (SaaS) model currently in focus today.The internet hosting provides computer-based services to customers over a network. Software offered using an ASP model is also sometimes called on-demand software or software as a service (SaaS). The most limited sense of this business is that of providing access to a particular application program (such as customer relationship management) using a standard protocol such as HTTP.The need for ASPs has evolved from the increasing costs of specialized software that have far exceeded the price range of small to medium sized businesses. As well, the growing complexities of software have led to huge costs in distributing the software to end-users. Through ASPs, the complexities and costs of such software can be cut down. In addition, the issues of upgrading have been eliminated from the end-firm by placing the onus on the ASP to maintain up-to-date services, 24 x 7 technical support, physical and electronic security and in-built support for business continuity and flexible working.The importance of this marketplace is reflected by its size. As of early 2003, estimates of the United States market range from 1.5 to 4 billion dollars. Clients for ASP services include businesses, government organizations, non-profits, and membership organizations. There are several forms of ASP business. These are:

A specialist or functional ASP delivers a single application, such as credit card payment processing or timesheet services;

A vertical market ASP delivers a solution package for a specific customer type, such as a dental practice;

An enterprise ASP delivers broad spectrum solutions;

A local ASP delivers small business services within a limited area.

Some analysts identify a volume ASP as a fifth type. This is basically a specialist ASP

that offers a low cost packaged solution via their own website. PayPal was an instance of this type, and their volume was one way to lower the unit cost of each transaction.
In addition to these types, some large multi-line companies (such as HP and IBM), use ASP concepts as a particular business model that supports some specific customers.

Supply chain management 2.0 (SCM 2.0)

Building on globalization and specialization, the term "SCM 2.0" has been coined to describe both changes within supply chains themselves as well as the evolution of processes, methods, and tools to manage them in this new "era". The growing popularity of collaborative platforms is highlighted by the rise of TradeCard's supply chain collaboration platform, which connects multiple buyers and suppliers with financial institutions, enabling them to conduct automated supply-chain finance transactions. TradeCard, Inc. was an American software company. Its main product, also called TradeCard, was a SaaS collaboration product that was designed to allow companies to manage their extended supply chains including tracking movement of goods and payments.TradeCard has improved visibility, cash flow and margins for over 10,000 retailers and brands, factories and suppliers, and service providers (financial institutions, logistics service providers, customs brokers and agents) operating in 78 countries. Clients include retailers and brands such as Coach, Inc. Levi Strauss & Co., Columbia Sportswear, Guess (clothing), Rite Aid, and Perry Ellis International.Deloitte cited TradeCard for its entrepreneurial and disruptive cloud technology enterprise resource planning solution that provides new IT architectures designed to address unmet needs of enterprises. TradeCard is headquartered in New York City, with offices in San Francisco, Amsterdam, Hong Kong, Shenzhen, Shanghai, Taipei, Seoul, Colombo and Ho Chi Minh City.On January 7, 2013, TradeCard and GT Nexus announced plans to merge creating a global supply-chain management company that would employ about 1,000 people and serve about 20,000 businesses in industries including manufacturing, retail and pharmaceuticals

Web 2.0 is a trend in the use of the World Wide Web that is meant to increase creativity, information sharing, and collaboration among users. At its core, the common attribute of Web 2.0 is to help navigate the vast information available on the Web in order to find what is being bought. It is the notion of a usable pathway. SCM 2.0 replicates this notion in supply chain operations. It is the pathway to SCM results, a combination of processes, methodologies, tools, and delivery options to guide companies to their results quickly as the complexity and speed of the supply chain increase due to global competition; rapid price fluctuations; surging oil prices; short product life cycles; expanded specialization; near-, far-, and off-shoring; and talent scarcity.

SCM 2.0 leverages solutions designed to rapidly deliver results with the agility to quickly manage future change for continuous flexibility, value, and success. This is delivered through competency networks composed of best-of-breed supply chain expertise to understand which elements, both operationally and organizationally, deliver results, as well as through intimate understanding of how to manage these elements to achieve the desired results. The solutions are delivered in a variety of options, such as no-touch via business process outsourcing, mid-touch via managed services and software as a service (SaaS), or high-touch in the traditional software deployment model.

CHAPTER III

Supply Chain Business Process Integration

Successful SCM requires a change from managing individual functions to integrating activities into key supply chain processes. In an example scenario, a purchasing department places orders

as its requirements become known. The marketing department, responding to customer demand, communicates with several distributors and retailers as it attempts to determine ways to satisfy this demand. Information shared between supply chain partners can only be fully leveraged through process integration.

Supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems, and shared information. According to Lambert and Cooper (2000), operating an integrated supply chain requires a continuous information flow. However, in many companies, management has concluded that optimizing product flows cannot be accomplished without implementing a process approach. The key supply chain processes stated by Lambert (2004) are:

Customer relationship management: Customer relationship management (CRM) is a model for managing a company's interactions with current and future customers. It involves using technology to organize, automate, and synchronize sales, marketing, customer service, and technical support.

Customer service management

Demand management style: Demand management is a planning methodology used to manage and forecast the demand of products and services.

Order fulfillment: Order fulfillment (in British English order fulfilment) is in the most general sense the complete process from point of sales inquiry to delivery of a product to the customer. Sometimes Order fulfillment is used to describe the more narrow act of distribution or the logistics function, however, in the broader sense it refers to the way firms respond to customer orders

Manufacturing flow management

Supplier relationship management: Supplier relationship management (SRM) is the discipline of strategically planning for, and managing, all interactions with third party organizations that supply goods and/or services to an organization in order to maximize the value of those interactions. In practice, SRM entails creating closer, more collaborative relationships with key suppliers in order to uncover and realize new value and reduce risk.

Product development and commercialization: Commercialization is the process or cycle of introducing a new product or production method into the market. The actual launch of a new product is the final stage of new product development and the one where the most money will have to be spent for advertising, sales promotion, and other marketing efforts.

Returns management

Much has been written about demand management. Best-in-class companies have similar characteristics, which include the following:

Internal and external collaboration

Initiatives to reduce lead time

Tighter feedback from customer and market demand

Customer-level forecasting

One could suggest other critical supply business processes that combine these processes stated by Lambert, such as:

a. Customer service management

b. Procurement

c. Product development and commercialization

d. Manufacturing flow management/support

e. Physical distribution

f. Outsourcing/partnerships
g. Performance measurement
h. Warehousing management

a) Customer service management process

Customer relationship management concerns the relationship between an organization and its customers. Customer service is the source of customer information. It also provides the customer with real-time information on scheduling and product availability through interfaces with the company's production and distribution operations. Successful organizations use the following steps to build customer relationships:
determine mutually satisfying goals for organization and customers
establish and maintain customer rapport
induce positive feelings in the organization and the customers

b) Procurement process

Strategic plans are drawn up with suppliers to support the manufacturing flow management process and the development of new products. In firms whose operations extend globally, sourcing may be managed on a global basis. The desired outcome is a relationship where both parties benefit and a reduction in the time required for the product's design and development. The purchasing function may also develop rapid communication systems, such as electronic data interchange (EDI) and Internet linkage, to convey possible requirements more rapidly. Electronic data interchange (EDI) is a document standard which when implemented acts as a common interface between two or more computer applications in terms of understanding the document transmitted. It is commonly used by big companies for e-commerce purposes, such as sending orders to warehouses or tracking their order. It is more than mere e-mail; for instance, organizations might replace bills of lading and even cheques with appropriate EDI messages. It also refers specifically to a family of standards.
Activities related to obtaining products and materials from outside suppliers involve resource planning, supply sourcing, negotiation, order placement, inbound transportation, storage, handling, and quality assurance many of which include the responsibility to coordinate with suppliers on matters of scheduling, supply continuity, hedging, and research into new sources or programs.Here Quality assurance (QA) is a way of preventing mistakes or defects in manufactured products and avoiding problems when delivering services to customers.
QA refers to administrative and procedural activities implemented in a quality system so that requirements and goals for a product, service or activity will be fulfilled. It is the systematic measurement, comparison with a standard, monitoring of processes and an associated feedback loop that confers error prevention. This can be contrasted with quality control, which is focused on process outputs.
Two principles included in QA are: "Fit for purpose", the product should be suitable for the intended purpose; and "Right first time", mistakes should be eliminated. QA includes management of the quality of raw materials, assemblies, products and components, services related to production, and management, production and inspection processes.
Suitable quality is determined by product users, clients or customers, not by society in general. It is not related to cost, and adjectives or descriptors such as "high" and "poor" are not applicable. For example, a low priced product may be viewed as having high quality because it is disposable, where another may be viewed as having poor quality because it is not disposable

c) Product development and commercialization

Here, customers and suppliers must be integrated into the product development process in order

to reduce the time to market. As product life cycles shorten, the appropriate products must be developed and successfully launched with ever-shorter time schedules in order for firms to remain competitive. According to Lambert and Cooper (2000), managers of the product development and commercialization process must:

1. coordinate with customer relationship management to identify customer-articulated needs;
2. select materials and suppliers in conjunction with procurement; and
3. develop production technology in manufacturing flow to manufacture and integrate into the best supply chain flow for the given combination of product and markets.

d) Manufacturing flow management process

The manufacturing process produces and supplies products to the distribution channels based on past forecasts. Manufacturing processes must be flexible in order to respond to market changes and must accommodate mass customization. Orders are processes operating on a just-in-time (JIT) basis in minimum lot sizes. Changes in the manufacturing flow process lead to shorter cycle times, meaning improved responsiveness and efficiency in meeting customer demand. This process manages activities related to planning, scheduling, and supporting manufacturing operations, such as work-in-process storage, handling, transportation, and time phasing of components, inventory at manufacturing sites, and maximum flexibility in the coordination of geographical and final assemblies postponement of physical distribution operations.

e) Physical distribution

This concerns the movement of a finished product or service to customers. In physical distribution, the customer is the final destination of a marketing channel, and the availability of the product or service is a vital part of each channel participant's marketing effort. It is also through the physical distribution process that the time and space of customer service become an integral part of marketing. Thus it links a marketing channel with its customers (i.e., it links manufacturers, wholesalers, and retailers).

f) Outsourcing/partnerships

This includes not just the outsourcing of the procurement of materials and components, but also the outsourcing of services that traditionally have been provided in house. The logic of this trend is that the company will increasingly focus on those activities in the value chain in which it has a distinctive advantage and outsource everything else.This movement has been particularly evident in logistics, where the provision of transport, warehousing, and inventory control is increasingly subcontracted to specialists or logistics partners. Also, managing and controlling this network of partners and suppliers requires a blend of central and local involvement: strategic decisions are taken centrally, while the monitoring and control of supplier performance and day-to-day liaison with logistics partners are best managed locally.

g) Performance measurement

Experts found a strong relationship from the largest arcs of supplier and customer integration to market share and profitability. Taking advantage of supplier capabilities and emphasizing a longterm
supply chain perspective in customer relationships can both be correlated with a firm's performance. As logistics competency becomes a critical factor in creating and maintaining competitive advantage, measuring logistics performance becomes increasingly important, because the difference between profitable and unprofitable operations becomes narrower. A.T. Kearney Consultants (1985) noted that firms engaging in comprehensive performance measurement realized improvements in overall productivity. According to experts, internal

measures are generally collected and analyzed by the firm, including cost, customer service, productivity, asset measurement, and quality. External performance is measured through customer perception measures and "best practice" benchmarking. A best practice is a method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark. In addition, a "best" practice can evolve to become better as improvements are discovered. Best practice is considered by some as a business buzzword, used to describe the process of developing and following a standard way of doing things that multiple organizations can use.Best practices are used to maintain quality as an alternative to mandatory legislated standards and can be based on self-assessment or benchmarking. Best practice is a feature of accredited management standards such as ISO 9000 and ISO 14001.Some consulting firms specialize in the area of Best Practice and offer pre-made 'templates' to standardize business process documentation. Sometimes a "best practice" is not applicable or is inappropriate for a particular organization's needs. A key strategic talent required when applying best practice to organizations is the ability to balance the unique qualities of an organization with the practices that it has in common with others.Good operating practice is a strategic management term. More specific uses of the term include good agricultural practices, good manufacturing practice, good laboratory practice, good clinical practice and good distribution practice.

h) Warehousing management

A warehouse management system (WMS) is a key part of the supply chain and primarily aims to control the movement and storage of materials within a warehouse and process the associated transactions, including shipping, receiving, putaway and picking. The systems also direct and optimize stock putaway based on real-time information about the status of bin utilization. A WMS monitors the progress of products through the warehouse. It involves the physical warehouse infrastructure, tracking systems, and communication between product stations.More precisely, warehouse management involves the receipt, storage and movement of goods, (normally finished goods), to intermediate storage locations or to a final customer. In the multiechelon
model for distribution, there may be multiple levels of warehouses. This includes a central warehouse, a regional warehouses (serviced by the central warehouse) and potentially retail warehouses (serviced by the regional warehouses).Warehouse management systems often utilize automatic identification and data capture technology, such as barcode scanners, mobile computers, wireless LANs and potentially radio-frequency identification (RFID) to efficiently monitor the flow of products. Once data has been collected, there is either a batch synchronization with, or a real-time wireless transmission to a central database. The database can then provide useful reports about the status of goods in the warehouse.Warehouse design and process design within the warehouse (e.g. wave picking) is also part of warehouse management. Warehouse management is an aspect of logistics and supply chain management. The objective of a warehouse management system is to provide a set of computerized procedures for management of warehouse inventory with the goal of minimizing cost and fulfillment times.This includes:

A standard receiving process to properly handle a shipment when it arrives. This process can be individualized to each warehouse or product type

The receipt of stock and returns into a warehouse facility. An efficient warehouse management system helps companies cut expenses by minimizing the amount of unnecessary parts and products in storage. It also helps companies keep lost sales to a minimum by having enough stock on hand to meet demand.

Modeling and managing the logical representation of the physical storage facilities (e.g. racking, etc.). For example, if certain products are often sold together or are more popular

than others, those products can be grouped together or placed near the delivery area to speed up the process of picking, packing and shipping to customers.
Enabling a seamless link to order processing and logistics management in order to pick, pack, and ship product out of the facility.
Tracking where products are stocked, which suppliers they come from, and the length of time they are stored. By analysing such data, companies can control inventory levels and maximize the use of warehouse space. Furthermore, firms are more prepared for the demands and supplies of the market, especially during special circumstances such as a peak season on a particular month. Through the reports generated by the inventory management software, firms are also able to gather important data that may be put in a model for it to be analyzed.
Alone warehouse management cannot automate the process. It also involves the combination of business process to be followed along with system to achieve 100% productivity and accuracy .

CHAPTER IV

Resource-Based View Theory

Currently there's a gap in the literature on supply chain management studies present: there is no theoretical support for explaining the existence or the boundaries of supply chain management. A few authors, such as Halldorsson et al. (2003), Ketchen and Hult (2006), and Lavassani et al. (2009), have tried to provide theoretical foundations for different areas related to supply chain by employing organizational theories. These theories include:
Resource-based view (RBV): The resource-based view (RBV) as a basis for the competitive advantage of a firm lies primarily in the application of a bundle of valuable tangible or intangible resources at the firm's disposal (Mwailu & Mercer, 1983 p142, Wernerfelt, 1984, p172; Rumelt, 1984, p557-558; Penrose, 1959). To transform a shortrun competitive advantage into a sustained competitive advantage requires that these resources are heterogeneous in nature and not perfectly mobile (: p105-106; Peteraf, 1993, p180). Effectively, this translates into valuable resources that are neither perfectly imitable nor substitutable without great effort (Barney, 1991;: p117). If these conditions hold, the bundle of resources can sustain the firm's above average returns. The VRIO and VRIN (see below) model also constitutes a part of RBV. There is strong evidence that supports the RBV (Crook et al., 2008).
The key points of the theory are:
1. Identify the firm's potential key resources.
2. Evaluate whether these resources fulfill the following criteria (referred to as VRIN):
Valuable – A resource must enable a firm to employ a value-creating strategy, by either outperforming its competitors or reduce its own weaknesses (: p99;: p36). Relevant in this perspective is that the transaction costs associated with the investment in the resource cannot be higher than the discounted future rents that flow out of the value-creating strategy (Mahoney and Pandian, 1992, p370; Conner, 1992, p131).
Rare – To be of value, a resource must be rare by definition. In a perfectly competitive strategic factor market for a resource, the price of the resource will be a reflection of the expected discounted future above-average returns .
In-imitable – If a valuable resource is controlled by only one firm it could be a source of a competitive advantage (: p107). This advantage could be

sustainable if competitors are not able to duplicate this strategic asset perfectly (Peteraf, 1993, p183; Barney, 1986b, p658). The term isolating mechanism was introduced by Rumelt (1984, p567) to explain why firms might not be able to imitate a resource to the degree that they are able to compete with the firm having the valuable resource (Peteraf, 1993, p182-183; Mahoney and Pandian, 1992, p371). An important underlying factor of inimitability is causal ambiguity, which occurs if the source from which a firm's competitive advantage stems is unknown (Peteraf, 1993, p182; Lippman and Rumelt, 1982, p420). If the resource in question is knowledgebased or socially complex, causal ambiguity is more likely to occur as these types of resources are more likely to be idiosyncratic to the firm in which it resides (Peteraf, 1993, p183; Mahoney and Pandian, 1992, p365;: p110). Conner and Prahalad go so far as to say knowledge-based resources are —…the essence of the resource-based perspective‖

Non-substitutable – Even if a resource is rare, potentially value-creating and imperfectly imitable, an equally important aspect is lack of substitutability (Dierickx and Cool, 1989, p1509;: p111). If competitors are able to counter the firm's value-creating strategy with a substitute, prices are driven down to the point that the price equals the discounted future rents (Barney, 1986a, p1233; Sheikh, 1991, p137), resulting in zero economic profits.

3. Care for and protect resources that possess these evaluations, because doing so can improve organizational performance (Crook, Ketchen, Combs, and Todd, 2008).

The VRIN characteristics mentioned are individually necessary, but not sufficient conditions for a sustained competitive advantage. Within the framework of the resourcebased view, the chain is as strong as its weakest link and therefore requires the resource to display each of the four characteristics to be a possible source of a sustainable competitive advantage

History of the resource-based view

Some aspects of theories are thought of long before they are formally adopted and brought together into the strict framework of an academic theory. The same could be said with regard to the resource-based view.While this influential body of research within the field of Strategic Management was named by Birger Wernerfelt in his article A Resource-Based View of the Firm (1984), the origins of the resource-based view can be traced back to earlier research. Retrospectively, elements can be found in works by Coase (1937), Selznick (1957), Penrose (1959), Stigler (1961), Chandler (1962, 1977), and Williamson (1975), where emphasis is put on the importance of resources and its implications for firm performance (Conner, 1991, p122; Rumelt, 1984, p557; Mahoney and Pandian, 1992, p263; Rugman and Verbeke, 2002). This paradigm shift from the narrow neoclassical focus to a broader rationale, and the coming closer of different academic fields (industrial organization economics and organizational economics being most prominent) was a particular important contribution (Conner, 1991, p133; Mahoney and Pandian, 1992).

Two publications closely following Wernerfelt's initial article came from Barney (1986a, 1986b). Even though Wernerfelt was not referenced directly, the statements made by Barney about strategic factor markets and the role of expectations can clearly be seen within the resource-based framework as later developed by Barney (1991). Other concepts that were later integrated into the resource-based framework have been articulated by Lippman and Rumelt

(uncertain imitability, 1982), Rumelt (isolating mechanisms, 1984) and Dierickx and Cool (inimitability and its causes, 1989). Barney's framework proved a solid foundation upon which others might build, and its theoretical underpinnings were strengthened by Conner (1991), Mahoney and Pandian (1992), Conner and Prahalad (1996) and Makadok (2001), who positioned the resource-based view with regard to various other research fields. More practical approaches were provided for by Amit and Shoemaker (1993), while later criticism came from among others from Priem and Butler (2001a, 2001b) and Hoopes, Madsen and Walker (2003).

The resource based view has been a common interest for management researchers and numerous writings could be found for same. A resource-based view of a firm explains its ability to deliver sustainable competitive advantage when resources are managed such that their outcomes cannot be imitated by competitors, which ultimately creates a competitive barrier (Mahoney and Pandian 1992 cited by Hooley and Greenley 2005, p. 96, Smith and Rupp 2002, p. 48). RBV explains that a firm's sustainable competitive advantage is reached by virtue of unique resources being rare, valuable, inimitable, non-tradable, and non-substitutable, as well as firm-specific (Barney 1999 cited by Finney et al. 2004, p. 1722, Makadok 2001, p. 94). These authors write about the fact that a firm may reach a sustainable competitive advantage through unique resources which it holds, and these resources cannot be easily bought, transferred, or copied, and simultaneously, they add value to a firm while being rare. It also highlights the fact that not all resources of a firm may contribute to a firm's sustainable competitive advantage. Varying performance between firms is a result of heterogeneity of assets (Lopez 2005, p. 662, Helfat and Peteraf 2003, p. 1004) and RBV is focused on the factors that cause these differences to prevail (Grant 1991, Mahoney and Pandian 1992, cited by Lopez 2005, p. 662). Fundamental similarity in these writings is that unique value-creating resources will generate a sustainable competitive advantage to the extent that no competitor has the ability to use the same type of resources, either through acquisition or imitation. Major concern in RBV is focused on the ability of the firm to maintain a combination of resources that cannot be possessed or built up in a similar manner by competitors. Further such writings provide us with the base to understand that the sustainability strength of competitive advantage depends on the ability of competitors to use identical or similar resources that make the same implications on a firm's performance. This ability of a firm to avoid imitation of their resources should be analyzed in depth to understand the sustainability strength of a competitive advantage.

Barriers to imitation of resources: Resources are the inputs or the factors available to a company which helps to perform its operations or carry out its activities (, Black and Boal 1994, Grant 1995 cited by Ordaz et al.2003, p. 96). Also, these authors state that resources, if considered as isolated factors, do not result in productivity; hence, coordination of resources is important. The ways a firm can create a barrier to imitation are known as ―isolating mechanisms‖, and are reflected in the aspects of corporate culture, managerial capabilities, information asymmetries and property rights (Hooley and Greenlay 2005, p. 96, Winter 2003,p. 992). Further, they mention that except for legislative restrictions created through property rights, the other three aspects are direct or indirect results of managerial practices.

King (2007, p. 156) mentions inter-firm causal ambiguity may results in sustainable competitive advantage for some firms. Causal ambiguity is the continuum that describes the degree to which decision makers understand the relationship between organizational inputs and outputs (Ghinggold and Johnson 1998, p. 134, Lippman and Rumelt 1982 cited by King 2007, p. 156, Matthyssens and Vandenbempt 1998, p. 46). Their argument is that inability of competitors to understand what causes the superior performance of another (inter-firm causal ambiguity), helps to reach a sustainable competitive advantage for the one who is presently performing at a

superior level. Holley and Greenley (2005, p. 96) state that social context of certain resource conditions act as an element to create isolating mechanisms and quote Wernerfelt (1986) that tacitness (accumulated skill-based resources acquired through learning by doing) complexity (large number of inter-related resources being used) and specificity (dedication of certain resources to specific activities) and ultimately, these three characteristics will result in a competitive barrier.

Referring back to the definitions stated previously regarding the competitive advantage that mentions superior performance is correlated to resources of the firm (Christensen and Fahey 1984, Kay 1994, Porter 1980 cited by Chacarbaghi and Lynch 1999, p. 45) and consolidating writings of King (2007, p. 156) stated above, we may derive the fact that inter-firm causal ambiguity regarding resources will generate a competitive advantage at a sustainable level. Further, it explains that the depth of understanding of competitors—regarding which resources underlie the superior performance—will determine the sustainability strength of a competitive advantage. Should a firm be unable to overcome the inter-firm causal ambiguity, this does not necessarily result in imitating resources. As to Johnson (2006, p. 02) and Mahoney (2001, p. 658), even after recognizing competitors' valuable resources, a firm may not imitate due to the social context of these resources or availability of more pursuing alternatives. Certain resources, like company reputation, are path-dependent and are accumulated over time, and a competitor may not be able to perfectly imitate such resources (Zander and Zander 2005, p. 1521, Santala and Parvinen 2007, p. 172).

They argue on the basis that certain resources, even if imitated, may not bring the same impact, since the maximum impact of the same is achieved over longer periods of time. Hence, such imitation will not be successful. In consideration of the reputation of fact as a resource and whether a late entrant may exploit any opportunity for a competitive advantage, Kim and Park (2006, p. 45) mention three reasons why new entrants may be outperformed by earlier entrants. First, early entrants have a technological know-how which helps them to perform at a superior level. Secondly, early entrants have developed capabilities with time that enhance their strength to out-perform late entrants. Thirdly, switching costs incurred to customers, if they decide to migrate, will help early entrants to dominate the market, evading the late entrants' opportunity to capture market share. Customer awareness and loyalty is another rational benefit early entrants enjoy (Lieberman and Montgomery 1988, Porter 1985, Hill 1997, Yoffie 1990 cited by Ma 2004, p. 914, Agarwal et al. 2003, p. 117).

However, first mover advantage is active in evolutionary technological transitions, which are technological innovations based on previous developments (Kim and Park 2006, p, 45, Cottam et al. 2001, p. 142). The same authors further argue that revolutionary technological changes (changes that significantly disturb the existing technology) will eliminate the advantage of early entrants. Such writings elaborate that though early entrants enjoy certain resources by virtue of the forgone time periods in the markets, rapidly changing technological environments may make those resources obsolete and curtail the firm’s dominance. Late entrants may comply with the technological innovativeness and increased pressure of competition, seeking a competitive advantage by making the existing competencies and resources of early entrants invalid or outdated. In other words, innovative technological implications will significantly change the landscape of the industry and the market, making early movers' advantage minimal. However, in a market where technology does not play a dynamic role, early mover advantage may prevail.

The above-developed framework for the RBV reflects a unique feature, namely, that sustainable competitive advantage is achieved in an environment where competition does not

exist. According to the characteristics of the RBV, rival firms may not perform at a level that could be identified as considerable competition for the incumbents of the market, since they do not possess the required resources to perform at a level that creates a threat and competition. Through barriers to imitation, incumbents ensure that rival firms do not reach a level at which they may perform in a similar manner to the former. In other words, the sustainability of the winning edge is determined by the strength of not letting other firms compete at the same level. The moment competition becomes active, competitive advantage becomes ineffective, since two or more firms begin to perform at a superior level, evading the possibility of single-firm dominance; hence, no firm will enjoy a competitive advantage. Ma (2003, p. 76) agrees stating that, by definition, the sustainable competitive advantage discussed in the RBV is anticompetitive. Further such sustainable competitive advantage could exist in the world of no competitive imitation (, Peteraf 1993 cited by Ma 2003, p. 77, Ethiraj et al., 2005, p. 27).
Based on the empirical writings stated above, RBV provides the understanding that certain unique existing resources will result in superior performance and ultimately build a competitive advantage. Sustainability of such an advantage will be determined by the ability of competitors to imitate such resources. However, the existing resources of a firm may not be adequate to facilitate the future market requirement, due to volatility of the contemporary markets. There is a vital need to modify and develop resources in order to encounter the future market competition. An organization should exploit existing business opportunities using the present resources while generating and developing a new set of resources to sustain its competitiveness in the future market environments; hence, an organization should be engaged in resource management and resource development (Chaharbaghi and Lynch 1999, p. 45, Song et al., 2002, p. 86). Their writings explain that in order to sustain the competitive advantage, it is crucial to develop resources that will strengthen the firm's ability to continue the superior performance. Any industry or market reflects high uncertainty and, in order to survive and stay ahead of competition, new resources become highly necessary. Morgan (2000 cited by Finney et al. 2005, p. 1722) agrees, stating that the need to update resources is a major management task since all business environments reflect highly unpredictable market and environmental conditions. The existing winning edge needed to be developed since various market dynamics may make existing value-creating resources obsolete.

Criticism/Limitations

In 2001, one of the most interesting academic debates in strategic management was published in Vol.26 (1) of the Academy of Management Review. Priem and Butler (2001a) started off by their critique of Barney's (1991) original article. Barney (2001) then responded and defended his research, followed by another critical comment by Priem and Butler (2001b).
Priem and Butler (2001) raised many key points of criticism: The RBV may be tautological, or self-verifying. Barney has defined a competitive advantage as a value-creating strategy that is based on resources that are, among other characteristics, valuable (1991, p106). This reasoning is circular and therefore operationally invalid (Priem and Butler, 2001a, p31). For more info on the tautology, see also Collis, 1994. According to Priem and Butler (2001a), Barney's perspective does not constitute a theory of the firm. The conditions of lawlike generalizations (Rudner, 1966) of empirical content, nomic necessity and generalized conditionals are not met.Different resource configurations can generate the same value for firms and thus would not be competitive advantage
The role of product markets is underdeveloped in the argument
Limited focus on capabilities
Retrospective causality issues: any current success could be attributed to a

number of reasons (e.g. unique resources), but the causality is not always clear.
The theory has limited prescriptive implications
However, Barney (2001) provided counter-arguments to these points of criticism. For example, he said that any theory could be rephrased to appear tautological. He also stated that his theory applies to static (equilibrium) environments, but not to dynamic environments. As today's business realities are clearly not static but dynamic and characterized by high velocity and rapid change, Barney (2001) thus admitted that his 1991 VRIN theory has little potential for applicability to the real world. It does, however, provide a good way for senior managers to better understand their resource base. Barney (2001) also suggested re-defining the criterion of "value" and pointed to different ways of describing "competitive advantage" as strategic advantage, above-average industry profits and economic rents. The tone of his paper appears defensive at times, showing that Priem and Butler (2001a) have actually raised some important issues.
Priem and Butler (2001a;2001b), however could be criticized for slightly missing the point. This is because they focus on the status of the RBV as a theory, the tautology allegation and sustainable competitive advantage. In business reality, senior managers are often not interested whether or not the RBV constitutes a real theory or not. Instead, they require guidance for achieving competitite survival. As Ludwig and Pemberton (2011) have shown, any firm operating in today's dynamic external business environments needs to focus on competitive survival and their capabilities.
Furthermore, it is not difficult to retrospectively criticise a theory. Priem and Butler (2001a) were arguably ten years too late in their critique of Barney's (1991) framework. In the process, they engaged in and instigated a rather superfluous debate instead of focussing on really important issues facing senior managers.

Further criticisms of the RBV are:

There is insufficient focus on depreciating resource value, i.e. the negative effect of external change on the resource/asset base of the SBU. As described earlier, perhaps the entire focus of the RBV on achievement of sustainable competitive advantage should be re-considered. Competitive survival is more important.It is perhaps difficult (if not impossible) to find a resource which satisfies all of the Barney's VRIN criteria.There is the assumption that a firm can be profitable in a highly competitive market as long as it can exploit advantageous resources, but this may not necessarily be the case. It ignores external factors concerning the industry as a whole; a firm should also consider Porter's Industry Structure Analysis (Porter's Five Forces).Long-term implications that flow from its premises: A prominent source of sustainable competitive advantages is causal ambiguity (Lippman & Rumelt, 1982, p420). While this is undeniably true, this leaves an awkward possibility: the firm is not able to manage a resource it does not know exists, even if a changing environment requires this (Lippman & Rumelt, 1982, p420). Through such an external change, the initial sustainable competitive advantage could be nullified or even transformed into a weakness (Priem and Butler, 2001a, p33; Peteraf, 1993, p187; Rumelt, 1984, p566).
Premise of efficient markets: Much research hinges on the premise that markets in general or factor markets are efficient, and that firms are capable of precisely pricing in the exact future value of any value-creating strategy that could flow from the resource (Barney, 1986a, p1232). Dierickx and Cool argue that purchasable assets cannot be sources of sustained competitive advantage, just because they can be purchased. Either the price of the resource will increase to the point that it equals the future above-average return, or other competitors will purchase the resource as well and use it in a value-increasing strategy that diminishes rents to

zero (Peteraf, 1993, p185; Conner, 1991, p137).

The concept of rarity is obsolete: Although prominently present in Wernerfelt's original articulation of the resource-based view (1984) and Barney's subsequent framework (1991), the concept that resources need to be rare to be able to function as a possible source of a sustained competitive advantage is unnecessary (Hoopes, Madsen and Walker, 2003, p890). Because of the implications of the other concepts (e.g. valuable, inimitable and nonsubstitutability) any resource that follows from the previous characteristics is inherently rare.

Sustainable: The lack of an exact definition of sustainability makes its premise difficult to test empirically. Barney's statement (: p102-103) that the competitive advantage is sustained if current and future rivals have ceased their imitative efforts is versatile from the point of view of developing a theoretical framework, but is a disadvantage from a more practical point of view, as there is no explicit end-goal.

The relational view is an extension of the resource-based view for considering networks and dyads of firms as the unit of analysis to explain relational rents, i.e., superior individual firm performance generated within that network/dyad.

CHAPTER V

Theories of Supply Chain Management

Knowledge-based view (KBV): The knowledge-based theory of the firm considers knowledge as the most strategically significant resource of a firm. Its proponents argue that because knowledge-based resources are usually difficult to imitate and socially complex, heterogeneous knowledge bases and capabilities among firms are the major determinants of sustained competitive advantage and superior corporate performance.This knowledge is embedded and carried through multiple entities including organizational culture and identity, policies, routines, documents, systems, and employees. Originating from the strategic management literature, this perspective builds upon and extends the resource-based view of the firm (RBV) initially promoted by Penrose (1959) and later expanded by others (Wernerfelt 1984, Barney 1991, Conner 1991).Although the resourcebased view of the firm recognizes the important role of knowledge in firms that achieve a competitive advantage, proponents of the knowledge-based view argue that the resourcebased perspective does not go far enough. Specifically, the RBV treats knowledge as a generic resource, rather than having special characteristics. It therefore does not distinguish between different types of knowledge-based capabilities. Information technologies can play an important role in the knowledge-based view of the firm in that information systems can be used to synthesize, enhance, and expedite large-scale intraand inter-firm knowledge management (Alavi and Leidner 2001).Whether or not the Knowledge-based theory of the firm actually constitutes a theory has been the subject of considerable debate. See for example, Foss (1996) and Phelan & Lewin (2000). According to one notable proponent of the Knowledge-Based View of the firm (KBV), ―The emerging knowledge-based view of the firm is not a theory of the firm in any formal sense‖.

Strategic choice theory (SCT): In organizational theory, a topic in sociology, Strategic Choice Theory describes the role that leaders or leading groups play in influencing an organization through making choices in a dynamic political process. Previous to this theory, a common view was that organizations were thought to be designed along operational requirements based on the external environment. Strategic choice theory provided an alternative that emphasized the agency of individuals and

groups within organizations to make choices, sometimes serving their own ends, that dynamically influenced the development of those organizations. These strategic choices formed part of an organizational learning process that adapted to the external environment as well as the internal political situation.

Agency theory (AT): A supposition that explains the relationship between principals and agents in business. Agency theory is concerned with resolving problems that can exist in agency relationships; that is, between principals (such as shareholders) and agents of the principals (for example, company executives). The two problems that agency theory addresses are: 1.) the problems that arise when the desires or goals of the principal and agent are in conflict, and the principal is unable to verify (because it difficult and/or expensive to do so) what the agent is actually doing; and 2.) the problems that arise when the principal and agent have different attitudes towards risk. Because of different risk tolerances, the principal and agent may each be inclined to take different actions.
An agency, in general terms, is the relationship between two parties, where one is a principal and the other is an agent who represents the principal in transactions with a third party. Agency relationships occur when the principals hire the agent to perform a service on the principals' behalf. Principals commonly delegate decision-making authority to the agents. Agency problems can arise because of inefficiencies and incomplete information. In finance, two important agency relationships are those between stockholders and managers, and stockholders and creditors.

Just-in-time (JIT): Just in time (JIT) is a production strategy that strives to improve a business' return on investment by reducing in-process inventory and associated carrying costs. To meet JIT objectives, the process relies on signals or Kanban between different points, which are involved in the process, which tell production when to make the next part. Kanban are usually 'tickets' but can be simple visual signals, such as the presence or absence of a part on a shelf. Implemented correctly, JIT focuses on continuous improvement and can improve a manufacturing organization's return on investment, quality, and efficiency. To achieve continuous improvement key areas of focus could be flow, employee involvement and quality.
JIT relies on other elements in the inventory chain as well. For instance, its effective application cannot be independent of other key components of a lean manufacturing system or it can "end up with the opposite of the desired result." In recent years manufacturers have continued to try to hone forecasting methods such as applying a trailing 13-week average as a better predictor for JIT planning; however, some research demonstrates that basing JIT on the presumption of stability is inherently flawed. The philosophy of JIT is simple: the storage of unused inventory is a waste of resources. JIT inventory systems expose hidden cost of keeping inventory, and are therefore not a simple solution for a company to adopt it. The company must follow an array of new methods to manage the consequences of the change. The ideas in this way of working come from many different disciplines including statistics, industrial engineering, production management, and behavioral science. The JIT inventory philosophy defines how inventory is viewed and how it relates to management.Inventory is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting. This does not mean to say JIT is implemented without an awareness that removing inventory exposes pre-existing manufacturing issues. This way of working encourages businesses to eliminate inventory that does not compensate for manufacturing process

issues, and to constantly improve those processes to require less inventory. Secondly, allowing any stock habituates management to stock keeping. Management may be tempted to keep stock to hide production problems. These problems include backups at work centers, machine reliability, process variability, lack of flexibility of employees and equipment, and inadequate capacity.In short, the Just-in-Time inventory system focus is having ―the right material, at the right time, at the right place, and in the exact amount‖, without the safety net of inventory. The JIT system has broad implications for implementers.

Systems theory (ST): Systems theory is the interdisciplinary study of systems in general, with the goal of elucidating principles that can be applied to all types of systems at all nesting levels in all fields of research. The term does not yet have a wellestablished, precise meaning, but systems theory can reasonably be considered a specialization of systems thinking, a generalization of systems science, a systems approach. The term originates from Bertalanffy's general system theory (GST) and is used in later efforts in other fields, such as the action theory of Talcott Parsons and the social systems theory of Niklas Luhmann.In this context the word systems is used to refer specifically to self-regulating systems, i.e. that are self-correcting through feedback. Selfregulating systems are found in nature, including the physiological systems of our body, in local and global ecosystems, and in climate—and in human learning processes.

Customer relationship management (CRM): Customer relationship management (CRM) is a model for managing a company's interactions with current and future customers. It involves using technology to organize, automate, and synchronize sales, marketing, customer service, and technical support.

Characteristics of CRM:The modern environment requires one business to interact with another via the web. According to a Sweeney Group definition, CRM is ―all the tools, technologies and procedures to manage, improve, or facilitate sales, support and related interactions with customers, prospects, and business partners throughout the enterprise‖. It assumes that CRM is involved in every B2B transaction.Despite the general notion that CRM systems were created for the customer-centric businesses, they can also be applied to B2B environments to streamline and improve customer management conditions. B2C and B2B CRM systems are not created equally and different CRM software applies to B2B and B2C conditions. B2B relationships usually have longer maturity times than B2C relationships. For the best level of CRM operation in a B2B environment, the software must be personalized and delivered at individual levels.

Well-designed CRM includes the following characteristics:

1. Relationship management is a customer-oriented feature with service response based on customer input, one-to-one solutions to customers' requirements, direct online communications with customer and customer service centers that help customers solve their questions.
2. Salesforce automation. This function can implement sales promotion analysis, automate tracking of a client's account history for repeated sales or future sales, and also coordinate sales, marketing, call centers, and retail outlets in order to realize the salesforce automation.
3. Use of technology. This feature is about following the technology trend and skills of value delovering using technology to make ―up-to-the-second‖ customer data available. It applies data warehouse technology in order to aggregate transaction

information, to merge the information with CRM solutions, and to provide KPI (key performance indicators).
4. Opportunity management. This feature helps the company to manage unpredictable growth and demand and implement a good forecasting model to integrate sales history with sales projections.

Available-to-promise (ATP): Available-to-promise (ATP) is a business function that provides a response to customer order enquiries, based on resource availability. It generates available quantities of the requested product, and delivery due dates. Therefore, ATP supports order promising and fulfillment, aiming to manage demand and match it to production plans.Available-to-promise functions are IT-enabled and usually integrated in enterprise management software packages. However, ATP execution may need to be adjusted for the way a certain company operates. A fundamental distinction between ATP functions is based on the push-pull strategy. Push-based ATP is based on forecasts regarding future demand - based on anticipation of demand, ATP quantities and availability dates are computed. A prominent example is the traditional determination of ATP based on the Master Production Schedule. The push-based approach is fundamentally limited by dependence on forecasts, which may prove inaccurate. Gross ATP represents the total available supply, Net ATP represents the supply remaining to support new demands, after existing demands have been accounted for.Pull-based models, on the other hand, dynamically allocate resources in response to actual customer orders. This means that pull-based ATP is able to balance forecast-driven resource replenishment with order-triggered resource utilization,but because resources are allocated with each coming order, the process will yield myopic results. ATP functions can be executed in real time, driven by each individual order, or in batch mode – meaning that at a certain time interval, the system checks availability for orders piled up in that period of time. The process is triggered by the need to check resource availability before making a commitment to deliver an order. For example, ATP calculation using SAP software depends on the level of "stock, planned receipts (production orders, purchase orders, planned orders and so on), and planned requirements (sales orders, deliveries, reservations, etc.)"

Types of CRM: Marketing: CRM systems for marketing track and measure campaigns over multiple communication channels, such as email, search, social media, telephone and direct mail. These systems track clicks, responses, leads and deals.
Customer service and support: CRM systems can be used to create, assign and manage requests made by customers, such as call center software which helps direct customers to agents. CRM software can also be used to identify and reward loyal customers over a period of time.
Appointments:CRM systems can automatically suggest suitable appointment times to customers via e-mail or the web. These can then be synchronized with the representative or agent's calendar
Implementing CRM to the company:There are numerous steps company should follow while implementing CRM system. The project manager is responsible for the success of this process. Some conditions need to be checked by the company before the starting implementation directly:
1. Make a strategic decision concerning CRM desired goal: to improve or to change the business processes of the organization?

2. Choose an appropriate project manager: usually it is IT-department that is responsible for CRM system implementation. However, it is reasonable to hire the manager with a Customer Service/Sales and Marketing business focus as there are a bunch of decisions that are related rather to the business processes rather than to the hardware, software or network
3. Executive sponsorship: provide the top management support and systematic introduction to the project manager
4. Project team commitment and training: make sure team members have enough time and authority to complete project tasks and are committed to its success
5. Define KPI metrics
6. Use phased approach: work towards long-term enterprise with a series of smaller, phased implementations

CRM software:Selecting a CRM program means finding the software that fits the company's needs. All the CRM software comes many features and tools, and despite the fact that many of CRM product offer similar feature sets, there are some unique tools in each one. Programs can be divided into categories by the following criteria: Features mean how well it integrates with other applications (ex. Outlook, Gmail, iCall etc.) and how accessible information is. It covers everything from calendar alerts and to-do lists to mobile access and synchronization capabilities. Contact information ranking outlines the program's ability to store specific information for each contact. Business world is a fastpaced so managers are need to be able to access customer's information quickly. Sales and marketing tools designed to help and maintain current clients and gain new ones. Important that this tools help find campaigns with positive ROI and those that are not performed. Ease of use is about app's design.Programs are checked on clean, quick navigation and easy-to-locate of the most important items. Help and support is about what support CRM software manufacturer provides for their product.

CHAPTER VI

Channel Coordination in Supply Chain Management

Channel coordination (or supply chain coordination) aims at improving supply chain performance by aligning the plans and the objectives of individual enterprises. It usually focuses on inventory management and ordering decisions in distributed inter-company settings. Channel coordination models may involve multi-echelon inventory theory, multiple decision makers, asymmetric information, as well as recent paradigms of manufacturing, such as mass customization, short product life-cycles, outsourcing and delayed differentiation. The theoretical foundations of the coordination are based chiefly on the contract theory. The problem of channel coordination was first modeled and analyzed by Anantasubramania Kumar in 1992.

The decentralized decision making in supply chains leads to a dilemma situation which results in a suboptimal overall performance called double marginalization. Recently, partners in permanent supply chains tend to extend the coordination of their decisions in order to improve the performance for all of the participants. Some practical realizations of this approach are Collaborative Planning, Forecasting, and Replenishment (CPFR), Vendor Managed Inventory (VMI) and Quick Response (QR).The theory of channel coordination aims at supporting the performance optimization by developing arrangements for aligning the different objectives of the partners. These are called coordination mechanisms or schemes, which control the flows of information, materials (or service) and financial assets along the chains. In general, a contracting scheme should consist of the following components:

local planning methods which consider the constraints and objectives of the individual partners,
an infrastructure and protocol for information sharing, and
an incentive scheme for aligning the individual interests of the partners.
The appropriate planning methods are necessary for optimizing the behavior of the production. The second component should support the information visibility and transparency both within and among the partners and facilitates the realization of real-time enterprises. Finally, the third component should guarantee that the partners act upon to the common goals of the supply chain.The general method for studying coordination consists of two steps. At first, one assumes a central decision maker with complete information who solves the problem. The result is a first-best solution which provides bound on the obtainable system-wide performance objective. In the second step one regards the decentralized problem and designs such a contract protocol that approaches or even achieves the performance of the first-best.A contract is said to coordinate the channel, if thereby the partners' optimal local decisions lead to optimal systemwide performance. Channel coordination is achievable in several simple models, but it is more difficult (or even impossible) in more realistic cases and in the practice. Therefore the aim is often only the achievement of mutual benefit compared to the uncoordinated situation.Another widely studied alternative direction for channel coordination is the application of some negotiation protocols. Such approaches apply iterative solution methods, where the partners exchange proposals and counter-proposals until an agreement is reached. For this reason, this approach is commonly referred to as collaborative planning. The negotiation protocols can be characterized according to the following criteria:
The initial proposal is most frequently generated by the buyer company which is called upstream planning. By contrast, when the initiator is the supplier, it is referred to as downstream planning. In several cases there already exists an initial plan (e.g., using rolling schedules or frame plans). There are also some protocols where the initial plan is generated randomly.In order to guarantee finite runtime, the maximal number of rounds should be determined. In addition, the protocol should also specify the number of plans offered in each round. When the number of rounds or plans is high, the practical application necessitates fast local planner systems in order to quickly evaluate the proposals and generate counter-proposals. Generally, the negotiation protocols cannot provide optimality, and they require some special conditions to assure convergence.The counter-proposals usually define side-payments (compensations) between the companies in order to inspire the partner deviating from its previously proposed plan.An also commonly used instrument for aligning plans of different decision makers is the application of some auction mechanisms. However, ―auctions are most applicable in pure market interactions at the boundaries of a supply chain but not within a supply chain", therefore they are usually not considered as channel coordination approaches.

Characteristics of coordination schemes:

There are several classifications of channel coordination contracts, but they are not complete, and the considered classes are not disjoint. Instead of a complete classification, a set of aspects are enumerated below which generalizes the existing taxonomies by allowing classification along multiple viewpoints.

Problem characteristics

Horizon:Most of the related models consider either one-period horizon or two-period horizon with forecast update. In the latter, the production can be based on the preliminary forecast with normal production mode or on the updated forecast with emergency production,

which means shorter lead-time, but higher cost. Besides, the horizon can consist of multiple periods and it can be even infinite. The practically most widespread approach is the rolling horizon planning, i.e., updating and extending an existing plan in each period.
Number of products:Almost all contract-based models regard only one product. Some models study the special cases of substitute or complementary products. However, considering more products in the general case is necessary if technological or financial constraints—like capacity or budget limits—exist.
Demand characteristic:On one hand, the demand can be stochastic (uncertain) or deterministic. On the other hand, it can be considered static (constant over time) or dynamic (e.g., having seasonality).
Risk treatment:In most of the models the players are regarded to be risk neutral. This means that they intend to maximize their expected profit (or minimize their expected costs). However, some studies regard risk averse players who want to find an acceptable trade-off considering both the expected value and the variance of the profit.
Shortage treatment:The models differ in their attitude towards stockouts. Most authors consider either backlogs, when the demand must be fulfilled later at the expense of providing lower price or lost sales which also includes some theoretical costs (e.g., loss of goodwill, loss of profit, etc.). Some models include a service level constraint, which limits the occurrence or quantity of expected stockouts. Even the 100% service level can be achieved with additional or emergency production (e.g., overtime, outsourcing) for higher costs.
Parameters and variables:This viewpoint shows the largest variations in the different models. The main decision variables are quantity-related (production quantity, order quantity, number of options, etc.), but sometimes prices are also decision variables. The parameters can be either constant or stochastic. The most common parameters are related to costs: fixed (ordering or setup) cost, production cost and inventory holding cost. These are optional; many models disregard fixed or inventory holding costs. There exist numerous other parameters: prices for the different contracts, salvage value, shortage penalty, lead-time, etc.
Basic model and solution technique:Most of the one-period models apply the newsvendor model. On two-period horizon, this is extended with the possibility of two production modes. On a multiple period horizon the base-stock, or in case of deterministic demand the EOQ models are the most widespread. In such cases the optimal solution can be determined with simple algebraic operations. These simple models usually completely disregard technological constraints; however, in real industrial cases resource capacity, inventory or budget constraints may be relevant. This necessitates more complex models, such as LP, MIP, stochastic program, and thus more powerful mathematical programming techniques may be required.As for the optimization criteria, the most usual objectives are the profit maximization or cost minimization, but other alternatives are also conceivable, e.g., throughput time minimization. Considering multiple criteria is not yet prevalent in the coordination literature.

Decentralization Characteristics:

Number and role of the players:The most often studied dilemmas involve the two players and call them customer and supplier (or buyer-seller). There are also extensions of this simple model: the multiple customers with correlated demand and the multiple suppliers with different production parameters. Multi-echelon extensions are also conceivable, however, sparse in the literature. When the coordination is within a supply chain (typically a customer-supplier relation), it is called vertical, otherwise horizontal. An example for the latter is when different suppliers of the same customer coordinate their transportation.Sometimes the roles of the participants are also important. The most

frequently considered companies are manufacturers, retailers, distributors or logistic companies.

Relation of the players:One of the most important characteristics of the coordination is the power relations of the players. The power is influenced by several factors, such as possessed process know-how, number of competitors, ratio in the value creation, access to the market and financial resources.The players can behave in a cooperative or opportunistic way. In the former case, they share a common goal and act like a team, while in the latter situation each player is interested only in its own goals. These two behaviors are usually present in a mixed form, since the opportunistic claims for profitability and growth are sustainable usually only with a certain cooperative attitude.The relation can be temporary or permanent. In the temporary case usually one- or two-period models are applied, or even an auction mechanism. However, the coordination is even more important in permanent relations, where the planning is usually done in a rolling horizon manner. When coordinating a permanent supply relation, one has to consider the learning effect, i.e., players intend to learn each other's private information and behavior.

Goal of the coordination:The simplest possible coordination is aimed only at aligning the (material) flows within the supply chain in order to gain executable plans and avoid shortages. In a more advanced form of coordination, the partners intend to improve supply chain performance by approaching or even achieving the optimal plan according to some criteria. Generally, a coordinated plan may incur losses for some of the players compared to the uncoordinated situation, which necessitates some kind of side-payment in order to provide a win-win situation. In addition, even some sort of fairness may be required, but it is not only hard to guarantee, but even to define.Most of the coordination approaches requires that the goal should be achieved in an equilibrium in order to exclude the possibility that an opportunistic player deviates from the coordinated plan.

Information structure:Some papers study the symmetric information case, when all of the players know exactly the same parameters. This approach is very convenient for cost and profit sharing, since all players know the incurring system cost. The asymmetric case, when there is an information gap between the players is more realistic, but poses new challenges. The asymmetry typically concerns either the cost parameters, the capacities or the quantities like the demand forecast. The demand and the forecast are often considered to be qualitative, limited to only two possible values: high and low. In case of stochastic demand, the uncertainty of the forecasts can also be private information.

Decision structure:The decision making roles of the players depend on the specified decision variables. However, there is a more-or-less general classification in this aspect: forced and voluntary compliance. Under forced compliance the supplier is responsible for satisfying all orders of the customer, therefore it does not have the opportunity to decide about the production quantity. Under voluntary compliance, the supplier decides about the production quantity and it cannot be forced to fill an order. This latter is more complex analytically, but more realistic as well. Even so, several papers assume that the supplier decides about the price and then the customer decides the order quantity.

Game theoretic model:From the viewpoint of game theory the models can take cooperative or non-cooperative approaches. The cooperative approach studies, how the players form coalitions therefore these models are usually applied on the strategic level of network design. Other typical form of cooperative games involves some bargaining framework—e.g., the Nash bargaining model—for agreeing upon the parameters of the applied contracts.On the other hand, on the operational level, the non-cooperative approach is used.

Usually the sequential Stackelberg game model is considered, where one of the players, the leader moves first and then the follower reacts. Both cases—the supplier or the customer as the Stackelberg leader—are widely studied in the literature. In case of information asymmetry, a similar sequential model is used and it is called principal–agent setting. The study of the long-term supply relationship can also be modeled as a repeated game.To sum up, a collaboration generally consists of a cooperative, followed by a non-cooperative game. However, most researches concentrate only on one of the phases.

Contract types

There are many variants of the contracts, some widespread forms are briefly described below. Besides, there exist several combinations and customized approaches, too.

Two-part tariff:In this case the customer pays not only for the purchased goods, but in addition a fixed amount called franchise fee per order. This is intended to compensate the supplier for his fixed setup cost.

Sales rebate:This contract specifies two prices and a quantity threshold. If the order size is below the threshold, the customer pays the higher price, and if it is above, she pays a lower price for the units above the threshold.

Quantity discount:Under quantity discount contract, the customer pays a wholesale price depending on the order quantity. This resembles to the sales rebate contract, but there is no threshold defined. The mechanism for specifying the contract can be complex. The contract has been applied in many situations, for example, in an international supply chain with fluctuating exchange rates.

Capacity options:While advance capacity purchase is popular in the supply chain practice, there are situations where a manufacturer prefers to delay its capacity purchase to have better information about the uncertain demand.

Buyback/return:With these types of contracts the supplier offers that it will buy back the remaining obsolete inventory at a discounted price. This supports the sharing of inventory risk between the partners. A variation of this contract is the backup agreement, where the customer gives a preliminary forecast and then makes an order less or equal to the forecasted quantity. If the order is less, it must also pay a proportional penalty for the remaining obsolete inventory. Buyback agreements are widespread in the newspaper, book, CD and fashion industries.

Quantity flexibility:In this case the customer gives a preliminary forecast and then it can give fixed order in an interval around the forecast. Such contracts are widespread in several markets, e.g., among the suppliers of the European automotive industry.

Revenue sharing:With revenue sharing the customer pays not only for the purchased goods, but also shares a given percentage of her revenue with the supplier. This contract is successfully used in video cassette rental and movie exhibition fields. It can be proved, that the optimal revenue sharing and buyback contracts are equivalent, i.e., they generate the same profits for the partners.

Options:The option contracts are originated from the product and stock exchange. With an option contract, the customer can give fixed orders in advance, as well as buy rights to purchase more (call option) or return (put option) products later. The options can be bought at a predefined option price and executed at the execution price. This approach is a generalization of some previous contract types.

VMI contract:This contract can be used when the buyer does not order, only communicates the forecasts and consumes from the inventory filled by the supplier. The VMI contract specifies that not only the consumed goods should be paid, but also the forecast imprecision,

i.e., the difference between the estimated and realized demand. In this way, the buyer is inspired to increase the forecast quality, and the risk of market uncertainty is shared between the partners.

CHAPTER VII

Materials Logistics Management

Materials management can deal with campus planning and building design for the movement of materials, or with logistics that deal with the tangible components of a supply chain. Specifically, this covers the acquisition of spare parts and replacements, quality control of purchasing and ordering such parts, and the standards involved in ordering, shipping, and warehousing the said parts. he goal of materials management is to provide an unbroken chain of components for production to manufacture goods on time for the customer base. The materials department is charged with releasing materials to a supply base, ensuring that the materials are delivered on time to the company using the correct carrier. Materials is generally measured by accomplishing on time delivery to the customer, on time delivery from the supply base, attaining a freight budget, inventory shrink management, and inventory accuracy. The materials department is also charged with the responsibility of managing new launches.

In some companies materials management is also charged with the procurement of materials by establishing and managing a supply base. In other companies the procurement and management of the supply base is the responsibility of a separate purchasing department. The purchasing department is then responsible for the purchased price variances from the supply base.

In large companies with multitudes of customer changes to the final product over the course of a year, there may be a separate logistics department that is responsible for all new acquisition launches and customer changes. This logistics department ensures that the launch materials are procured for production and then transfers the responsibility to the plant. There are no standards for materials management that are practiced from company to company. Most companies use ERP systems such as SAP, Oracle, BPCS, MAPICS, and other systems to manage materials control. Small concerns that do not have or cannot afford ERP systems use a form of spreadsheet application to manage materials. Some other construction projects use barcode and GPS materials management systems like Track'em.Materials management is not a science and depending upon the relevance and importance that company officials place upon controlling material flow, the level of expertise changes. Some companies place materials management on a level whereby there is a logistics director, other companies see the importance level as managing at the plant level by hiring an inventory manager or materials manager, and still other companies employ the concept that the supervisors in the plant are responsible accompanied by a planners.Because there are no standards there is only best practices for any particular business sector that are widely used. For example, the generation of releases to the supply base come in many forms from the lowest level that requires sending facsimilies and PDF files, the EDI information exchange, to the ultimate practice of a supplier web base site. The major challenge that materials managers face is maintaining a consistent flow of materials for production. There are many factors that inhibit the accuracy of inventory which results in production shortages, premium freight, and often inventory adjustments. The major issues that all materials managers face are incorrect bills of materials, inaccurate cycle counts, un-reported scrap, shipping errors,

receiving errors, and production reporting errors. Materials managers have striven to determine how to manage these issues in the business sectors of manufacturing since the beginning of the industrial revolution. Although there are no known methods that eliminate the afore mentioned inventory accuracy inhibitors, there are best methods available to eliminate the impact upon maintaining an interrupted flow of materials for production.One challenge for materials managers is to provide timely releases to the supply base. On the scale of worst to best practices, sending releases via facsimile or PDF file is the worst practice and transmitting releases to the supplier based web site is the best practice. Why? The flaw in transmitting releases via facsimile or email is that they can get lost or even interpreted incorrectly into the suppliers system resulting in a stock out. The problem with transmitting EDI releases is that not all suppliers have EDI systems capable of receiving the release information. The best practice is to transmit the releases to a common supplier web base site where the suppliers can view (for free) the releases. The other advantage is that the supplier is required to use the carrier listed in the web site, must transmit an ASN (advanced shipping notification), and review the accumulative balances of the order. Redundancy can be reduced and effectiveness is increased when service points are clustered to reduce the amount of redundancy. An effective materials management program can also resolve ―island‖ approaches to shipping, receiving, and vehicle movement. Solutions can include creating a new central loading location, as well consolidating service areas and docks from separate buildings into one. Developing better campus circulation infrastructure also means re-evaluating truck delivery and service vehicle routes. Vehicle type, size, and schedules are studied to make these more monument for other uses. Each year, an entire week is dedicated to celebrating resource and materials management professionals for their outstanding contributions to healthcare and the overall success of the supply chain. Sponsored by the Association for Healthcare Resource & Materials Management (AHRMM), National Healthcare Resource & Materials Management Week (MM Week) provides an opportunity to recognize the integral role materials management professionals play in delivering high-quality patient care throughout the health care industry. Materials management plans and designs for the delivery, distribution, storage, collection, and removal of occupant-generated streams of materials and services. It is usually an additional service that is offered as part of a campus planning process or a building design project. It is most beneficial for university, health care, and corporate environments. Materials management looks at the planning and design considerations needed to support the efficient delivery and removal of goods and services that support occupant activity. The streams of occupant-generated materials and activity include mail, office supplies, lab supplies, food, special deliveries, custodial services, building supplies, waste and recycling, and service calls.

A materials management plan may include planning guidelines or full design for the following:

Truck delivery and service vehicle routes, to reduce vehicle / pedestrian conflict.

Loading docks and delivery points, to increase accommodation and reduce queuing and vehicle idling.

Recycling, trash, and hazardous waste collection and removal, to increase waste diversion and reduce costs

Service equipment and utility infrastructure relocation or concealment, to improve aesthetics and realize landscaping goals

Regulatory and operation planning

Benefits: The effective materials management plan builds from and enhances an institutional master plan by filling in the gaps and producing an environmentally responsible and efficient outcome. An institutional campus, office, or housing complex can expect a myriad of benefits from an effective materials management plan. For starters,there are long-term cost savings, as consolidating, reconfiguring, and better managing a campus' core infrastructure reduces annual operating costs. An institutional campus, office, or housing complex will also get the highest and best use out of campus real estate.An effective materials management plan also means a more holistic approach to managing vehicle use and emissions, solid waste, hazardous waste, recycling, and utility services. As a result, this means a ―greener,‖ more sustainable environment and a manifestation of the many demands today for institutions to become more environmentally friendly. In fact, thanks to such environmental advantages, creative materials management plans may qualify for LEAD Innovation in Design credits.And finally, an effective materials management plan can improve aesthetics. Removing unsafe and unsightly conditions, placing core services out of sight, and creating a more pedestrian-friendly environment will improve the visual and physical sense of place for those who live and work there.

Material requirements planning (MRP): Material requirements planning (MRP) is a production planning and inventory control system used to manage manufacturing processes. Most MRP systems are software-based, while it is possible to conduct MRP by hand as well.

An MRP system is intended to simultaneously meet three objectives:

Ensure materials are available for production and products are available for delivery to customers.

Maintain the lowest possible material and product levels in store

Plan manufacturing activities, delivery schedules and purchasing activities.

Prior to MRP, and before computers dominated industry, reorder-point/reorder-quantity (ROP/ROQ) type methods like EOQ (Economic Order Quantity) had been used in manufacturing and inventory management. In 1964, as a response to the TOYOTA Manufacturing Program, Joseph Orlicky developed Material Requirements Planning (MRP). The first company to use MRP was Black & Decker in 1964, with Dick Alban as project leader. In 1983 Oliver Wight developed MRP into manufacturing resource planning (MRP II). Orlicky's book is entitled The New Way of Life in Production and Inventory Management (1975). By 1975, MRP was implemented in 150 companies. This number had grown to about 8,000 by 1981. In the 1980s, Joe Orlicky's MRP evolved into Oliver Wight's manufacturing resource planning (MRP II) which brings master scheduling, rough-cut capacity planning, capacity requirements planning, S&OP in 1983 and other concepts to classical MRP. By 1989, about one third of the software industry was MRP II software sold to American industry ($1.2 billion worth of software).

The scope of MRP in manufacturing:

The basic functions of an MRP system include: inventory control, bill of material processing, and elementary scheduling. MRP helps organizations to maintain low inventory levels. It is used to plan manufacturing, purchasing and delivering activities."Manufacturing organizations, whatever their products, face the same daily practical problem - that customers want products to be available in a shorter time than it takes to make them. This means that some level of planning is required."Companies need to control the types and quantities of materials they purchase, plan which products are to be produced and in what quantities and ensure that they are able to meet current and future customer demand, all at the lowest

possible cost. Making a bad decision in any of these areas will make the company lose money.
A few examples are given below:
If a company purchases insufficient quantity of an item used in manufacturing (or the wrong item) it may be unable to meet contract obligations to supply products on time.
If a company purchases excessive quantities of an item, money is wasted - the excess quantity ties up cash while it remains as stock and may never even be used at all.
Beginning production of an order at the wrong time can cause customer deadlines to be missed.
MRP is a tool to deal with these problems. It provides answers for several questions:
What items are required?
How many are required?
When are they required?
MRP can be applied both to items that are purchased from outside suppliers and to subassemblies, produced internally, that are components of more complex items.The data that must be considered include:
The end item (or items) being created. This is sometimes called Independent Demand, or Level "0" on BOM (Bill of materials).
How much is required at a time.
When the quantities are required to meet demand.
Shelf life of stored materials.
Inventory status records. Records of net materials available for use already in stock (on hand) and materials on order from suppliers.
Bills of materials. Details of the materials, components and sub-assemblies required to make each product.
Planning Data. This includes all the restraints and directions to produce the end items. This includes such items as: Routing, Labor and Machine Standards, Quality and Testing Standards, Pull/Work Cell and Push commands, Lot sizing techniques (i.e. Fixed Lot Size, Lot-For-Lot, Economic Order Quantity), Scrap Percentages, and other inputs.
Outputs: There are two outputs and a variety of messages/reports:
Output 1 is the "Recommended Production Schedule" which lays out a detailed schedule of the required minimum start and completion dates, with quantities, for each step of the Routing and Bill Of Material required to satisfy the demand from the Master Production Schedule (MPS).
Output 2 is