THE CHOICE OF SUPPLY CHAIN STRATEGY TYPES

(A Critical Review of Literature)

BY:

MAGUTU OBARA PETERSON

D80/80027/2008

An Independent Paper Presented in Partial Fulfillment of the Requirements for the Award of Degree of Doctor of Philosophy in Business Management, School of Business, University of Nairobi

MAY 2011

DECLARATION

DECLARATION BY CANDIDATE:

This independent study paper is my original work and has not been submitted for a degree in this or any other university.

Signed: _____ Date: 21.11.2011

MAGUTU PETERSON OBARA

D80/80027/2008

DECLARATION BY SUPERVISORS:

This independent study paper has been submitted for examination with my approval as the university supervisor.

Signed: _____ . Date: 22.11.2011 .

PROF. ISAAC MEROKA MBECHE

Professor, Department of Management Science, University of Nairobi - School of Business

ABSTRACT

This paper discusses the factors which influence the choice of supply chain strategy type. It is intended to provide an insight into the empirical literature to date relating to the factors which influence the choice of supply chain strategy type in the manufacturing sector. Companies select different supply chain types in order to gain additional operational benefits. This creates a supply chain frontier of physical efficiency and market responsiveness; a concept that deserves further attention by researchers. This forms the basis of this study.

The intended research will survey through the factors that influence the choice of supply chain management type in manufacturing. This will cluster the industries in the manufacturing sectors according to their supply chain management type, and then determine the factors that favor these supply chain types. The research will be broken into two: first, data will be collected to first identify the most commonly used types of supply chain management strategies for particular industries in the manufacturing sector. The industries will be sampled to have at least ten from each category in the manufacturing sector to enable good representation and frequency tabling; then secondly a survey will be conducted by visiting all the industries which use common types of supply chain management strategies.

This will be aimed at achieving three objectives: to identify the most commonly used types of supply chain management strategies for particular industries in the manufacturing sector; to determine why some supply chain management types are preferred by some industries as opposed to other industries; and lastly, to document the benefits of using given types of supply chain management strategies in the manufacturing sector.

TABLE OF CONTENTS

1.1 Overview of Supply Chain Management

Management science and operations research have applied traditional modeling techniques in areas such as inventory management and the supply chain field. Empirical operations management scholars and programs have also gravitated to the supply chain space. The field of marketing, particularly the sub-field of marketing channels, has also jumped on the supply chain bandwagon. And linkages are present in other academic disciplines that provide a nexus to the supply chain area. Theories such as the resource-based view of the firm and transaction cost perspective have been applied to these questions within strategy, and have great relevance to supply chain research in fields such as logistics and transportation (Grimm, 2004).

"Supply management" is viewed as both an emergent field of practice and an emerging academic domain. Neither perspective is fully mature but each has considerable promise. The future progress of each will be enhanced and indeed, is ultimately dependent upon the other. (Store, et al., 2006). The area of supply chain management (SCM) has seen a rapid increase in interest amongst many organizations. Numerous reasons have been offered for this. Firstly, a SCM focus has provided firms with competitive advantage given the diminishing returns that are being derived from intra-enterprise improvement initiatives (Maloni and Benton, 2000). Secondly, a restructuring of industries as a result of technological discontinuities has led to natural evolution of SCM; thirdly, SCM has been seen as a practical response to globalisation, deregulation and dynamic competitive markets (Christopher, 1998). Finally, dependencies that firms have on others as a result of developments such as lean operations, outsourcing and JIT have intensified, leading firms to engage in SCM more strongly.

If supply chain management is to mature as a discipline there needs to be further progress in clarifying its domain, its central problems, its core components, its theories and its theoretical map (Storey et al., 2006). From any of these perspectives, SCM is clearly seen as a means of generating innovations which can improve performance. While the imperative for SCM orientation is clear, what remains unclear are the actual factors which generate supply chain innovations. Closer examination of the literature shows three distinct forms of bias: disciplinary bias towards the fields of economics, logistics and purchasing; industry bias

towards the automotive, consumer goods and retail trade areas; and, research bias towards the positivist tradition (Ho et al., 2002). If organizations are to generate supply chain innovations, then, as a first step, they need to understand the dynamics of the supply chains that they are involved in (Keller et al., 2002).

In today's international business dynamic, globally competitive environment supply chain management is a critical strategic initiative. Many researchers argue that supply chain management creates competitive values through the active involvement of supply chain entities and their supportive systems for enterprise interaction (Store, et al., 2006). Sustainable business successes are no longer measured by a single entity's performance outcomes but through the competitive advantage of the collaborative supply chain network (Spekman et al., 1994). Since the customer is the ultimate judge of supply chain performance, effective and timely responses to ever- changing customer tastes and preferences have become essential components for successful business performance (Nahm et al., 2004).

Increasingly, firms are required to become more customer-oriented through their supply chains (Deshpande et al., 1993; Shapiro, 1988: Spekman et al., 1998). This study therefore intends to narrow the gap on the factors which influence the choice of supply chain management type in manufacturing, inorder to achieve global competitiveness.

Market globalization, intensifying competition and an increasing emphasis on customer orientation are regularly cited as catalysing the surge in interest in supply chain management (Gunasekaran et al., 2005; Webster, 2002). Against this backdrop, effective supply chain management is treated as key to building a sustainable competitive edge through improved inter and intra-firm relationships (Ellinger, 2000). Supply chains comprise all activities associated with the flow and transformation of goods from the raw material stage through to the end user (Handfield and Nichols, 1999). A range of benefits has been attributed to supply chain management, including reduced costs, increased market share and sales, and solid customer relations (Ferguson, 2000). However, there is some evidence to suggest this may be hyperbole rather than organizational reality. Similarly, an international study of modern manufacturing practices reported moderate uptake and perceived effectiveness of supply chain management (Clegg et al., 2002). In view of these modest levels of uptake and effectiveness, one would expect interest in developing measurement systems and metrics for

evaluating supply chain performance to be burgeoning. Measuring supply chain performance can facilitate a greater understanding of the supply chain, positively influence actors' behaviour, and improve its overall performance (Chen and Paulraj, 2004). However, until recently this topic has received little attention and significant gaps remain in the literature.

A number of analysts have already sought to comprehend and substantially redraw the boundaries of, and the essential nature of, this domain of theorizing and practice. For example, in one of the more coherent and developed attempts at a re-conceptualization, Harland et al. (1999) present the case for a new expanded body of knowledge and field of practice which they suggest should be labelled "supply strategy". The rationale behind this is the intent to improve upon the more limited concepts of "operations management" and "operations strategy". They suggest that supply strategy can embrace logistics, operations management, purchasing and supply management, industrial relationship marketing and service management. But, they suggest it is not just an aggregation of these: the underpinning idea is to exploit "relational strategies" in a holistic way. When approached in such a way the field merges imperceptibly into the strategic management literature concerned with strategic partnerships (Storey, 2002). Strategic partnerships can be formed "horizontally" and "vertically" – the latter being expressions of supply or channel relationships.

The essential point is to identify and describe a domain of theory and practice where there is potential for some additional gain by reconceptualising it in a particular way. The important idea captured at least in part by "supply strategy" (or "strategic supply management") is that a mode of thinking and action which encompasses, and seeks to exploit, interlocking relationships could potentially be used as a powerful lever for competitive advantage (Ketchen and Giunipero, 2004). If supply chain management is to mature as a discipline, there needs to be further progress in clarifying its domain, its central problems, its core components, its theories and its theoretical map (Tranfield and Starkey, 1998; Croom and Romano, 2000; Storey et al., 2005).

The challenge for firms today maybe not just to take up a supply chain management (SCM) initiative but to implement it successfully as the future shall see a war between supply chains. But such an initiative can be a failure unless one is aware of the issues that may arise during its implementation (Storey et al., 2005).

The challenge for many firms, however, could be what to do with customer orientation beyond their immediate organizational boundaries. It is not enough to say, "We have implemented customer orientation in our organization." The challenge is how to implement customer orientation within the complex network of the supply chain (Ferguson, 2000). Although market orientation and customer orientation is explored in the marketing literature, its application in the supply chain context needs further refinement and expansion.

A few studies (Chae and Hill, 2000; Tu et al., 2004; Russel and Hoag, 2004) have addressed the needs of such an expanded approach. This study will consider customer orientation as one of the critical aspects of supply chain management and explore its implementation process. Specifically, the study will examine how customer orientation can influence the choice of supply chain management type in manufacturing supply chain system infrastructure.

The perceived extent of change in SCM due to innovation can be measured at four levels. The first, incremental, involves small step changes such as that that can be achieved by a team working within a narrow functional area. The second, architectural, refers to reconfiguration of existing system components. The third, radical, involves large step improvement in either process or market activities. The fourth, transformational, covers fundamental changes to the nature of the business or society. It is not clear what types of innovations, or what level of change, SCM generates. Successful SCM involves horizontal cross functional integration both across and within firms. These arrangements involve relinquishing control and distancing operations from traditional functional hierarchies. Such change is accomplished by moving away from formal arrangements and developing inter-organisational relationships which increase trust and collaboration (van Hoek, 2001).

It is apparent that much of the focus in the increasingly voluminous literature on supply strategy, operations strategy and supply chain management is directed at meaning making. Often this comprises assertions about what it essentially "is". There is need therefore to try and understand the underlying concept of SCM and its multi dimensions as in the next section.

1.1.1 Definition of Supply Chain Management

SCM is a fairly new concept which started to make a significant appearance in the management literature in the 1980s (Oliver and Webber, 1982; Houlihan, 1985; Stevens, 1989) and has, since, been popularized by several authors as an independent field of study (Cooper and Ellram, 1993; Gibson, et al., 2000). However, much of the underlying thinking dates back several decades. In fact, the roots of SCM can be traced to systems dynamics and analysis (Forrester, 1959), integrated logistics management (Bowersox et al., 1959) and the idea of forming cooperative relationships with suppliers (Farmer and MacMillan, 1976). Along with the growing attention to SCM in the management literature, over the past two decades, there has been an increasing divergence in the way "supply chain" and "SCM" are understood and defined by the management theorists.

The term "supply chain" emerged on the business scene only about a decade ago. It spoke of a process management concept and sparked a hope that senior management would finally see value in investing in a well-orchestrated supply chain. In this period, the concept has taken root. The objectives of supply chain integration have developed around some fairly common themes. But, what has been developed and presented as a supply chain within distinct companies has varied widely. In essence, no two companies' supply chains look alike. Some companies have even taken to calling their operations a supply chain when, if the operation were measured against most definitions, they don't really have a supply chain at all. This obviously creates a lot of confusion.

Various definitions of SCM exist in literature. Ellram and Cooper (1990) defined SCM as an integrative philosophy to manage the total flow of distribution channel from supplier to ultimate user. This definition according to Siddharth et al., (2006) considers SCM as a management philosophy which tries to bring about integration among various functions. Total flow implies flow of raw material, work-in-progress (WIP) inventory and finished goods. It is not clear whether flow also includes information and finances. This definition does not relate SCM to enhanced competitiveness for the company.

Sengupta and Turnbull (1996) looked at SCM as the process of effectively managing the flow of materials and finished goods from vendors to customers using manufacturing facilities and warehouses as intermediate stops. According to Siddharth et al., (2006) effectively managing the flow would mean managing in such a way as to achieve the goals of the organization. But this definition does not talk about the ultimate objective of SCM.

A supply chain may also be defined as "the integration of key business processes from end users through original suppliers that provides products, services, and information that adds value for customers and other stakeholders" (Lambert et al., 1998). Here, a supply chain includes all the value chain processes from suppliers to end customers. This assumes integration of both supply and demand side activities in the value chain. Increasingly, the integration of both supply and demand requires an understanding of the inherent differences. Frohlich and Westbrook (2002) divided such integration into supply chain and demand integration. Trevile et al. (2004) defined demand integrations as that which supports market mediation, with the primary role of demand integration being the transfer of demand information to facilitate greater responsiveness to changing customer needs. They argued that increased access to demand information throughout the supply chain permits rapid and efficient delivery, coordinated planning, and improved logistics communication. This perspective does not include internal infrastructure of a firm, especially the factors which influence the choice of certain types of chain types.

Handfield and Nichols (1999) defined SCM as the integration of these activities (activities associated with flow and transformation of goods from raw materials stage, through to the end user as well as associated information flows) through improved supply chain relationships to achieve sustainable competitive advantage. According to Siddharth et al., (2006), this definition considers SCM as the process of integration of activities across the supply chain. It relates SCM to achieving competitive advantage and includes the flow of material and information, giving importance to relationships among supply chain partners, i.e. suppliers and customers.

According to Zheng et al. (2000) SCM is the process of optimizing a company's internal practices and improving the interaction with its suppliers and customers. This definition treats SCM as a process of optimization of a firm's internal practices but it does not specify what objective is to be achieved through optimization. In addition, Logan and Harold (2001), noted that SCM involves seamlessly moving raw material through production and into the hands of the end user. Seamless movement means there is no accumulation of inventories in the chain. The major flaw of this definition according to Siddharth et al., (2006), is that it ignores the flow of information. It does not relate SCM to its ultimate goal of achieving enhanced customer value.

Russell (2001) looked at SCM as the practice of co-coordinating the flow of goods, services, information, and finances as they move from raw material to parts supplier to manufacturer to wholesaler to retailer to consumer. According to Siddharth et al., (2006), this gives an elaborate picture of SCM including all types of flows including information, services, and finances. Co-coordinating the flow means that goods, information, services, and finances must reach the correct place at the correct time, but the definition does not relate SCM to either achieving competitive advantage or enhancing customer value.

Quiett (2002) looked at SCM to be more than a simple tool to evaluate and optimize a supply chain; it is a complex, structured business relationship model. It takes into consideration all aspects of the events required to produce a company's product in the most efficient and cost effective manner possible. The major drawback is the fact that it limits itself to production of the goods only and only focuses on cost. It also ignores service supply chains.

Shapiro (2004) defined SCM as a new business paradigm motivated by interest in integrating procurement, manufacturing, and distribution activities – integration made possible by advances in IT. This considers SCM as an integration of activities focuses on the importance of IT as an enabler for SCM, but does not talk of the ultimate goal of SCM. Mohanty and Deshmukh (2005) looked at SCM as a loop which starts with customer and ends with customer. Through the loop flow all materials, finished goods, information, and transactions. It requires looking at business as one continuous, seamless process. This process absorbs distinct functions such as forecasting, purchasing, manufacturing, distribution, sales, and marketing into a continuous business transaction.

Supply chain management (SCM) is the process of planning, implementing and controlling the operations of the supply chain 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. The objective is to be able to have the right products in the right quantities (at the right place) at the right moment at minimal cost (Gadde, 2001). Each organization seeks to solve the problem from its own perspective. Small changes in consumer demand result in large variations in orders placed upstream, dramatic order size variation and amplification of order size variation as one moves up the supply chain

SCM is often portrayed as involving many elements (Mentzer et al., 2001). For this reason, firms need to understand and master SCM if they are to successfully transform themselves and survive into the future (Bowersox et al., 2002). However, how such mastery is gained remains less obvious. Distinct biases in the literature are possibly retarding the development of such knowledge. Apart from a lack of consensus on the theoretical and historical determinants of SCM, there is also considerable bias toward extrapolating principles from consumer markets (most notably automotive and computer industries) to other types of supply chains. Such research has most often been conducted within a single discipline and generally within a positivist paradigm. While the SCM literature stresses the importance of social and political factors and places emphasis on the need for collaboration and trust, research in such topics is still relatively scanty. Furthermore, research on how industrial markets using mature technologies can use SCM principles to improve their effectiveness is even more scanty. There is considerable scope to widen the SCM research agenda in terms of comprehensiveness in order to better meet present and future challenges.

Mohanty and Deshmukh's, (2005) definition is a very comprehensive and critical definition since SCM includes all types of flows, focuses on customer, relates SCM to other processes like forecasting, sales, and distribution. Supply chain management is therefore the management of materials, information and financial flows in a network consisting of suppliers, manufacturers, distributors and customers. This will form the basis of the intended study.

1.1.2 The Evolution and Practice of Supply Chain Management

Evolution of supply chain management in the management theory is a fairly new concept which started to make a significant appearance in the management literature in the 1980s (Oliver and Webber, 1982; Houlihan, 1985; Stevens, 1989) and has, since, been popularized by several authors as an independent field of study (Cooper and Ellram, 1993; Cooper et al., 1997; Christopher, 2005; Skjoett-Larsen, 1999; Mentzer et al., 2001; Gibson, et al., 2005). However, much of the underlying thinking dates back several decades. In fact, the roots of SCM can be traced to systems dynamics and analysis (Forrester, 1959), integrated logistics management (Bowersox et al., 1959) and the idea of forming cooperative relationships with suppliers (Farmer and MacMillan, 1976).

Along with the growing attention to SCM in the management literature. over the past two decades, there has been an increasing divergence in the way "supply chain" and "SCM" are understood and defined by the management theorists. There is no one single definition of supply chain or SCM. One reason for this is that the "supply chain" has been viewed and studied from different theoretical perspectives (Skjoett-Larsen, 1999). Moreover, different researchers have used different units of analysis in their approach to SCM. These units of analysis include relationships covering the issues of trust, power and collaboration (Hines and Samuel, 2006), resources including manufactured means of production and human resources (Bowersox and Closs, 1996) and flow of information, material and economic-value (Forrester, 1959; Hines and Rich. 1997). Finally, the concept of SCM has re-emerged in many different variations and under different names in a range of management streams such as, relationship marketing (Berry, 1983; Gummesson. 1996), co-makership (Merli, 1991), value chain competitiveness (Porter, 1985). industrial networks (Ha°kansson, 1987; Ha°kansson and Snehota. 1995) and financial value chain analysis (Shank and Govindarajan. 1993).

It is notable that globalization of trade, sophistication of technology and markets (La Londe and Masters, 1994), increased competition, and the rise and dominance of the Japanese production philosophies (Womack and Jones, 1996) have immensely contributed to the evolution of SCM and its core concepts.

Fisher, (1997) developed a framework to help managers understand the nature of demand for their products and then devise the supply chain that can best satisfy that demand. The framework was devised on dimensions like product lifecycle, demand predictability, product variety, and market standards for lead times and services. He reckons that the root cause of supply chain problems is a mismatch between the type of product and type of supply chain. But this model does not explicitly look at the factors that influence the choice of supply chain strategy in a manufacturing setting, a gap which this study intends to narrow. The dimensions are not sufficient since their focus is demand alone, neglecting suppliers.

Despite the diversity in the way SCM is defined in the literature, central to all these definitions is customer satisfaction as a shared objective of the whole supply chain. Yet, the literature review shows that the existing supply chain improvement literature largely remains focused on efficiency improvements as their prime objective, e.g. time-based competition

(Stalk and Hout, 1990; Womack and Jones, 1996; La Londe and Masters, 1994; Christopher, 2005), cash-to-cash time (Bowersox and Closs, 1996), quality-based competition (Womak et al., 1990) and cost-based competition (Shank and Govindarajan, 1993; Cavinato, 1991).

Few recent publications, however, emphasize the importance of supply chain effectiveness in the context of the supply chain (Zokaei and Simons, 2006a). Mentzer et al. (2001) argue that SCM, as an integrative paradigm, is about directing all firms along the chain to focus on developing innovative solutions to create individualized sources of consumer value. In this context, understanding consumers' attributes and jointly striving on augmentation of consumer satisfaction are imperative to successful SCM.

According to Keivan and Peter, (2007) on conceptualizations of the supply chain or SCM, the evolution of supply chain can be traced as follows:

Heikkila¨ (2002) pointed out the need to shift the emphasis from the supply side to the demand side of supply chain management. Martin and Grbac (2003) claimed that supply chain management is very critical to the responsiveness to customer needs, and in supporting customer orientation in the supply chain. Grunert et al. (2005) developed a conceptual model of market orientation in value chains using four case studies, where their main emphasis was customer orientation in value chains. According to Sawhney and Piper (2002), firms with a high customer value focus achieve a higher level of business performance outcomes than those that show weaker customer value emphasis. Hajjat (2002) studied the construction of measurements and validation of customer orientation of organizations. The above studies separately address the nature of customer orientation, cultural factors, structural requirements, and their potential benefits. These studies have not clearly stated the key factors that implicate the choice of supply chain management type. But the issues raised like efficient delivery, coordinated planning, cultural factors, structural requirements, and their potential benefits and improved logistics communication can be explored as some of the factors determining supply chain type in the intended study.

Forrester (1959) observed that company (and supply chain) will come to be recognized not as a collection of separate functions but as a system in which the flows of information, materials, manpower, capital equipment, and money setup forces that determine the basic tendencies towards growth, fluctuation, and decline. According to Keivan and Peter, (2007), Forrester's observation shows the importance of the interrelationships between company

functions and between the company and its network. Indeed, the dynamics of relationships between the flows of information and materials should be studied and standard management methods should be extracted from such studies.

Houlihan (1985) viewed the supply chain as a single process with a shared objective of every function in the chain. SCM calls for a different perspective on inventories which are used as balancing mechanism of last, not first, resort. According to Keivan and Peter, (2007) a new approach to systems is required –integration rather than interfacing. They argue that, traditional logistics and materials management approaches, which sought trade-offs among various conflicting key functional objectives of purchasing, production, distribution and sales, does not work very well any longer. It is needed to adopt a new approach which is SCM.

Jones and Riley (1985) noted that SCM deals with the planning and control of total flow of materials from suppliers through end-users. According to Keivan and Peter, (2007) key to managing a supply chain efficiently is to plan and control the inventories and activities as an integrated single entity. Porter (1985) proposes the value chain model and subsequently the value system model as means of analysis of intra/inter firm competitiveness. According to Keivan and Peter, (2007) the value chain and value system Models are process-based views of the firm and its supply chain: every firm/supply chain is a collection of value activities (processes) performed to create a product valuable to buyers. The value system model is probably, today, recognized as value stream map. The value system model disaggregates the supply chain into strategically relevant processes in order to understand the sources of competitive advantage. It emphasizes the importance of the linkages of processes along the chain.

According to Stevens, (1989) the objective of managing the supply chain is to synchronize the requirements of customer with the flow of materials from suppliers in order to effect a balance between what are often seen as conflicting goals off high customer service, low inventory management, and low unit costs. Stevens (1989) proposes a structured framework for developing an integrated supply chain strategy which is even applicable to today's supply chains. According to Keivan and Peter, (2007) this framework has three stages, identifying the customer needs, diagnosing supply chain opportunities and developing an action plan for implementation.

Further according to Christopher (1992) SCM is the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole. In the same note, Keivan and Peter, (2007) argued that the industry is entering an era of supply chain competition as opposed to single firm competition, i.e. individual firms cannot compete in isolation anymore. Towill et al. (1992) looked at a supply chain as a system, whose constituent parts will include material suppliers, production facilities, distribution services and customers linked together via the feed-forward flow of materials and the feedback flow of information. Focus on supply chain efficiency and information flows. Proposes that the efficiency of the system can be improved through free exchange of information concerning true market demand.

According to Cooper and Ellram, (1993) supply chain is an integrated business process, from the end-user through different tiers of suppliers to the raw material producer. SCM is an integrative philosophy to manage the total flow of a distribution from the supplier to the ultimate user. Stipulates a set of characteristics for SCM, i.e. coordination across the chain, long-term orientation, joint reduction of channel inventories, presence of a channel leader, long-term sharing of the risks and rewards, compatibility of the corporate philosophies, and channel-wide approach to cost efficiencies.

Hewitt (1994) contends that SCM approach is sharply distinct from the conventional logistics management. Hewitt regards this level of logistical evolution as integrated intra-company and inter-company supply chain management. According to Keivan and Peter, (2007) successful SCM depends on the recognition and management of three critical dimensions in the chain: physical flow (work activity); information flow; and decision/authority flow.

La Londe and Masters (1994) indicated that SCM involves expanding the integrated logistics concept beyond the corporate borders of the firm to include the logistics operations of the vendors and customers. The authors "refer to the strategy of applying integrated logistics to all elements of a supply chain as supply chain management". Cooper et al. (1997, p. 2) "SCM is the integration of business processes from end-user through original suppliers that provides products, services and information that add value for customers" (p. 2) The authors argue that a new understanding of SCM is emerging re-conceptualizing SCM as a notion broader than logistics embracing all business processes cutting across all organizations within the supply chain

Council of Logistics Management (CLM) (1998) noted that SCM is the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual companies and the supply chain. According to Keivan and Peter, (2007) CLM distinguishes SCM from logistics management and acknowledges that logistics is one of the aspects of SCM. Mentzer et al. (2001) further noted that SCM is concerned with improving both efficiency (i.e. cost reduction) and effectiveness (i.e. customer service) in a strategic context (i.e. creating customer value and satisfaction through integrated SCM) to obtain competitive advantage that ultimately brings profitability. Mentzer et al. (2001) distinguish between SCM philosophy and implementation. The view that companies across the chain constitute a potentially coordinated entity is branded as supply chain orientation. Subsequently, SCM is defined as the implementation of this understanding.

Gibson, et al. (2005) observed that in essence Supply Chain Management integrates supply and demand management within and across companies. This contribution reports on the results of a Council of SCM Professionals survey of its members'.

In fact, according to Keivan and Peter, (2007) the above contributions are all apt in the capacity of the industry or the historical background from which they have emerged. What matters is that most of these contributions regard the supply chain, solely, as a source of efficiency improvement, implicitly or explicitly (e.g. reducing inventories, improving the flow of information and material, or collaborating towards lower costs). Those few definitions which associate the supply chain with enhancement of the consumer value (Mentzer et al., 2001; Porter, 1985; Hewitt, 1994; Christopher, 2005), however, do not show how this can be delivered through better SCM.

In summary, "supply management" can be viewed as both an emergent field of practice and an emerging academic domain. Neither perspective is fully mature but each has considerable promise. The future progress of each will be enhanced and indeed is ultimately dependent upon the other. Hence, the purpose of this subsection was to take stock of developments in theory and practice to date and to identify barriers and possibilities (factors) in the choice of supply chain types. According to William, (2001) supply (chain) management is ultimately about influencing the behaviour of customers and suppliers in particular directions and in

particular ways, thus the underlying logics, drivers, enablers and barriers merit and require close attention.

1.1.3 Supply Chain Management: A New Paradigm

The following overview of the supply chain management strategy paradigm provides a foundation in preparation for extension into the choice of supply chain management strategy type. A number of analysts have already sought to comprehend and substantially redraw the boundaries of, and the essential nature of, this domain of theorising and practice. For example, in one of the more coherent and developed attempts at a reconceptualisation, Harland et al. (1999) present the case for a new expanded body of knowledge and field of practice which they suggest should be labelled "supply strategy". The rationale behind this is the intent to improve upon the more limited concepts of "operations management" and "operations strategy". They suggest that supply strategy can embrace logistics, operations management, purchasing and supply management, industrial relationship marketing and service management.

Operations Management (OM) is a function that enables organizations to achieve their goals through efficient acquisition and utilization of resources (Krajewski et al., 2007; Chase et al., 2006). In earlier decades, the term ''Operations Management'' referred primarily to manufacturing production. However, over the period of time the field has expanded to include service systems as well, since operations permeate every functional area of the organization ranging from marketing, accounting, purchasing/logistics, information management to engineering and human resources. Emphasizing this shift, Chopra et al. (2004) define the area of OM as the design and management of transformation processes that create value for society. In fact, this shift makes the limits of OM field blurred (Hayes, 2000; Pilkington and Liston-Heyes, 1999). However, OM is crucial to any organization because only through successful management of people, capital and materials that an organization can meet its goals.

The realization that optimization of single firm operations does not result in appreciable system improvements led many firms to seek closer coordination and integration with suppliers than was possible in transactional buyer-seller relationships. Multiple firms working together through shared goals and integrated processes may improve the

performance of each of the individual members. Hence, the supply chain concept was born (Gruen, 1997; Weigand, 1968; Ellram and Cooper, 1990). The Council of Supply Chain Management Professionals (CSCMP, formerly The Council of Logistics Management (CLM)), an influential professional organization focused on supply chain management (SCM) practice and education, provides the following definition of SCM: Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies (www.cscmp.org). Another key factor influencing this paradigm shift in SCM is the rise of the Japanese production philosophies and lean thinking. The concept of value chain/system was later adapted as a key element of lean thinking (Womack and Jones, 1996).

Today's businesses have become extremely complex. The interplay of the three Cs, namely, consumers, competition and convergence, has thrown open new challenges for organizations all over the world. Consumers have become highly discerning in their choice of products and services. The pressure of competition has accelerated product changes, raised by shortening product and technology development lifecycles. Convergence has shifted the balance of power in favor of the consumers thereby giving way to globalization of businesses and integration of economies. Although this may have thrown open a plethora of opportunities for all – in the form of variety and choice, it has at the same time added the highest degree of uncertainty and unpredictability to business processes. To combat these risks and challenges, organizations round the globe are re-organizing and streamlining their supply chains. Formally, a supply chain is an integrated process wherein raw materials are manufactured into final products, then delivered to customers (via distribution, retail, or both) (Sahay and Mohan, 2003).

Market globalization, intensifying competition and an increasing emphasis on customer orientation are regularly cited as catalysing the surge in interest in supply chain management (Gunasekaran et al., 2001; Webster, 2002). Against this backdrop, effective supply chain management is treated as key to building a sustainable competitive edge through improved inter and intra-firm relationships (Ellinger, 2000). Supply chains comprise all activities associated with the flow and transformation of goods from the raw material stage through to

the end user (Handfield and Nichols, 1999). A range of benefits has been attributed to supply chain management, including reduced costs, increased market share and sales, and solid customer relations (Ferguson, 2000).

Recent academic research supports the view of SCM as a strategic level concept (Bowersox et al., 1999; Cooper et al., 1997; Mentzer, 2001), emphasizing a multi-firm focus on creating strategic differential advantage by maximizing the total value delivered to end-customers. Supply chain management is currently perceived as an effective means to achieving successful international competitiveness (Evans et al., 1996). Worldwide, interest in supply chain management has increased steadily since the 1980s when organizations began to see the benefits of collaborative relationships (Gattorna, 1998). Companies are striving to achieve the best possible performance from their supply chains by many different means such as increased information sharing, supply chain planning tools, collaborative forecasting and replenishment, as well as third-party logistics solutions. However, before any of these measures are taken, the design of the supply chain has to be considered. Cohen and Fine (1998) and Fine (1998, 2000) discuss supply chain design as a separate dimension besides product and process design.

The relationship between product characteristics and process choice has been investigated by Hayes and Wheelwright (1979a, b, 1984) introducing the product-process matrix, which describes the best fit between product and process designs. This model is one of the most widely recognized concepts in the manufacturing strategy arena, and has been tested empirically (Spencer and Cox, 1995; Safizadeh et al., 1996; McDermott et al., 1997; Ahmad and Schroeder, 2002). Companies are struggling to improve not only their manufacturing operations but also their supply chain operations, recognizing the increasing importance of finding the best process and supply chain for their products.

Consequently, the individual manufacturing company needs tools to match the supply chain to their product lines. Fisher (1997) suggests that an effective supply chain has to be designed with respect to the product that is going to be supplied through the chain, supported by case studies of Campbell Soup and Sport Obermeyer (Cachon and Fisher, 1997; Fisher, 1997; Fisher et al., 1994, 1997). The foundation for Fisher's theory is that products can be either functional or innovative depending on their demand pattern and market expectations. A supply chain, on the other hand, can emphasize the physical function in delivering the goods

or the market mediating function for conveying information. A functional product is assumed to require a physical efficient supply chain, whereas an innovative product would require a market-responsive supply chain. Similar approaches for matching products and supply chains are found in Ramdas and Spekman (2000), Childerhouse et al. (2002), Huang et al. (2002), Lee (2002), all building on Fisher's model.

The Agility Forum has defined ``agility'' as the ability of an organization to thrive in a continuously changing, unpredictable business environment. Simply put, an agile firm has designed its organization, processes and products such that it can respond to changes in a useful time frame (Agility Forum, 1994). Another perspective on alternative supply chain designs is the distinction between lean and agile supply chains (Naylor et al., 1999; Mason-Jones et al., 2000; Aitken et al., 2002), where a lean supply chain is physically efficient, using Fisher's terminology, and an agile supply chain has similar characteristics as the market-responsive in Fisher's model. Changes in the environment have remarkably been so dramatic and sudden that organizations have realized the inappropriateness of competing effectively in isolation from their suppliers and other associates of the supply chain. Today, every industry spends an exceptionally high amount of 12 to 15 per cent of its revenue on logistics. Close to 22 per cent of the aggregate sales in the industrial sector, amounting to over US$25 billion , is tied up in inventories in the supply chain network countrywide (CMIE, 2000).

Historically, organisations have moved from physical distribution to logistics management. They are now on course to graduating to supply chain management, the preferred name for actualisation of "integrated logistics" (Vrat, 1998). As a result, more and more organisations today have embarked on the process of developing and implementing a comprehensive supply chain strategy – and then linking this strategy to the overall business strategy.

2.1 Supply Chain Management Theories

Supply chain management, as both a key functional area for business and a thriving academic field, has clearly emerged over the past decade and shows no signs of slowing down. Multiple fields have moved into the supply chain terrain. The field of logistics and transportation has evolved naturally into a supply chain orientation; indeed, most traditional academic programs in logistics and transportation have morphed into a supply chain

management approach. A number of other disciplines have maneuvered for apiece of the supply chain pie. Management science and operations research have applied traditional modeling techniques in areas such as inventory management and the supply chain field. Empirical operations management scholars and programs have also gravitated to the supply chain space (Grimm, 2004).

Supply chain as an academic field continues to draw interest from neighboring academic areas with longer standing as disciplines. The following three theories can be used in the process for choosing a supply chain strategy. The main theories are:

2.1.1 The Principal-Agent Theory

This is commonly referred to as the Agency Theory and is concerned why one party on one hand, the principal, is in need of another party, the agent, to undertake specific actions on behalf of the principal (Jensen and Meckling, 1976; Ross, 1973). Agency theory research concentrates on examining dyadic relationships between one principal and one agent. It borrows heavily from the Economics/Finance discipline whereby there is separation of ownership and control of economic activities between the agent and the principal. This has been used to provide a rationalization of the now popular concept of alliances or collaborations found in today's supply chains between companies and their service providers. This is compounded due to the asymmetric information between the principal and the agent; conflicting objectives, differences in risk aversion, outcome uncertainty and behaviour based on self-interest, and bounded rationality.

However, the relationship is driven by the contract between the principal and the agent; to mitigate this Eisenhardt (1989) and Logan (2000) is by putting in place the "most efficient contract" which among other things should detail the right mix of behavioural and by having outcome-based incentives to motivate the agent to act in the interests of the principal. This theory is of great importance to the SCI as noted by among others Narayanan and Raman, (2004); Baiman and Rajan (2002) as companies become partners as opposed to the traditional one of business contracts. The agency theory mainly drives the contractual relation of the players in the supply chain. As a result of adopting a supply chain perspective, members can act as both principal and agent, in all the relationships along the chain that are of interest, in particular goals and incentives (Picot et al., 1997). Agency theory might help us understand

under what conditions a supply chain member is likely to attempt to exploit other members (Eisenhardt, 1989).

2.1.2 Transaction Cost Economics

The transaction cost analysis, which is also referred to as transaction cost economics borrows heavily from the economics law and organization theory as base disciplines (Gundlach and Murphy, 1993; Williamson, 1975, 1979, 1996). It states that company's main goal is to maximize profits by keeping transaction cost low by following any of the following strategies:"market (arms-length, one-off transactions for standard investment); hierarchical (vertical integration through direct ownership); and hybrid structures (combining elements of the market and hierarchical mechanism)". From the various literature reviewed many companies outsource none core activities. In the SCI context TCA offers a "normative economic approach" to establish the firm's confines as well as efficiency while entering inter-organizational arrangements such as cooperating with external partners (Williamson, 1975, 1985, 1996).

It brings economies to the transaction costs by introducing negotiating while enforcing contracts and internal controls (Faulkner and de Rond, 2000; Palmer, 2001). More specifically within the OM literature, it has been used to explore the make-or-buy decision (see for example, Nesheim, 2001; Ettlie and Sethuraman, 2002; Williams et al 2002; Grover and Malhotra, 2003). It has however been criticized by Faulkner and de Rond (2000), Nooteboom (1999) who have noted that it does not recognized some of the essential characteristics of SCI such as cooperation which gives raise to trust (Besanko et al., 2000). However, it still provides basis for SCI in making decisions to make or buy (Pessali and Fernandez, 1999).

2.1.3 Network Theory

Network theory explains that logistics outsourcing enables the company to manage its supply chain as a single entity through the application of relational contracting and network coordination. A network is defined by Ford et al. (2003) as"a structure where a number of *nodes are related to each other by specific threads.*" *Powell (1990) has identified a network to* be characterized by lateral and horizontal exchange between autonomous partners, of resources and communication. Jones et al. (1997) have identified that the network definitions

are usually based on two key concepts: "model of interaction based on exchange and relationships", and "flow of resources between independent units". Firms in business-to-business markets are embedded in a complex network of relationships with suppliers, customers as well as a number of other stakeholders.

2.1.4 Systems Theory

Systems theory assumes that the material and information flow related activities which are internal and external to a company to be complex and are considered only in the context of interactions. Systems theory further stresses the interconnected nature of organizational activities (Ashmos and Huber, 1987). The theory suggests that the outsourced activity impact on the performance of organizations since it is affected by processes external to the firm. This calls for well-integrated supply chains.

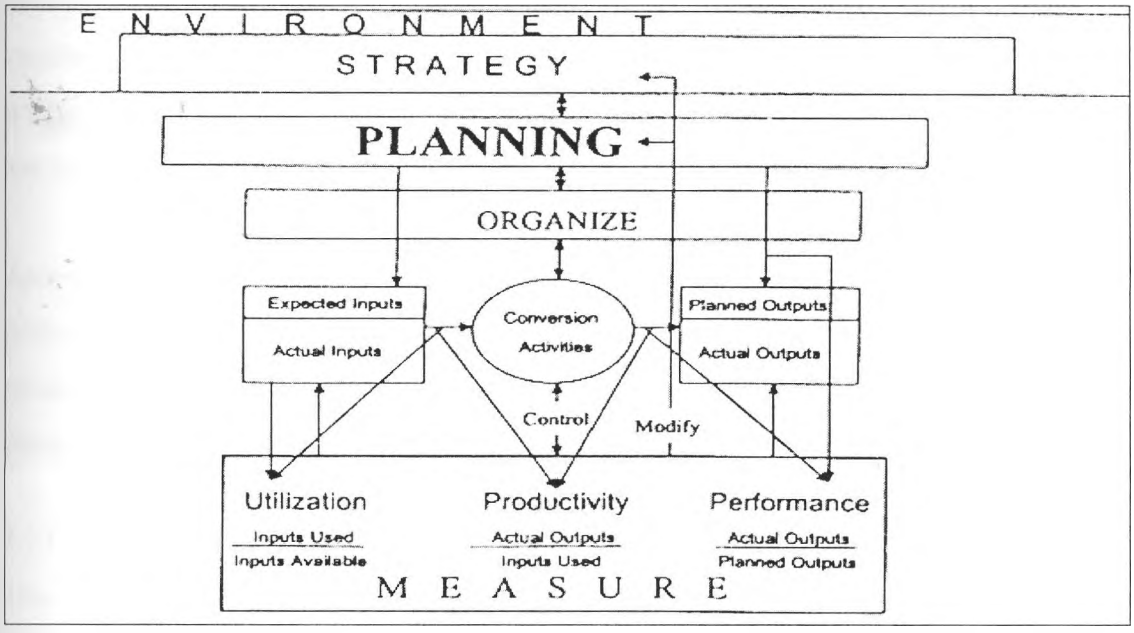
From the foregoing discussion on supply chain theories, supply chain as an emergent area of management therefore utilizes the system-wide approach for all parties involved starting with the outbound suppliers to the delivery to the customers. Transaction cost theory in supply chain management enables all parties involved to cut down on costs in order to achieve competitive advantage. The network theory is characterized with relational contracting and network coordination which is a major feature of supply chain management where number of nodes is related to each other by specific threads by lateral and horizontal exchange of information and materials. The principal agency theory addresses the challenges in supply chain management especially where there is outsourcing, one party on one hand, the principal, is in need of another party, the agent. to undertake specific actions on behalf of the principal. However, the measurement and management of supply chains continues to be a challenge to practitioners, this will be developed in the next.

2.2Measuring and Managing Supply Chains

In order to understand the concept of supply chain management better, we will explore how to measure and manage this new area of management in this section. The management functions range from planning, organizing, directing, and controlling up to staffing. The key functions that apply to SCM are planning and control. This paper will concentrate on these two key functions in relation to supply chains strategies.

According to Stewart, (1995) environment is important to strategy formation. Some scholars believe that strategies must be constrained by, and must react to, ever-changing environmental conditions. Planning follows the articulation of strategy. Planning has been defined as a deliberate process to produce systematically a preconceived outcome based on an integrated system of decisions. It helps us prepare for the inevitable, preempt the undesirable, and manage uncontrollable events. Supply chain planning involves objective setting, that is, predetermination of the intended outcomes. It also includes extensive and ongoing audits of the external and internal environments. According to Gunasekaran et al., (2004) supply chain planning involves analyses and decision making, including changing decisions previously made based on newly acquired knowledge.

Figure 2.1: Measuring Performance in Supply Chain (Internally Focused)



Source: Gunasekaran A., Patel C., Ronald E. McGaughey,. 2004. A framework for supply chain performance measurement. International journal of Production Economics. 87. pp. 345

Planning contemplates the implications of current decisions and future possible decisions. Planning involves forecasting and scheduling. It contemplates and directs measurement of actual performance and emergent outcomes to allow for their comparison to planned performance and intended outcomes. This function is an essential antecedent to measurement. The value of a measure can inform a decision only if it can be compared to a stated goal; otherwise, it is non-actionable, and not worth calculating company pursuing a strategy of low cost opts for a centralized, wide span of control logistics organization, while a

more customer-intimate firm prefers smaller, more focused, and flexible logistics organizations. There is no research to support the implication that the wider the span, the greater the control and integration. Perhaps increasing complexity associated with larger logistics organizations gets in the way of coordinating and integrating its activities. This is an area for future research.

Identification of the three key logistics processes in the supply chain requires the inclusion of supplier and customer interfaces in the planning and organizing of logistics activities. Understanding specifically what customers want and their resulting input expectations is fundamental to achieving customer satisfaction. Similarly, as a customer of its supplier, the firm must articulate its specific needs and expectations to the supplier. In controlling the work of people and technologies, only two phenomena can be observed, counted, and monitored: behavior and the outputs that result from the behavior. Control can be conceptualized as an evaluation process that is based on the monitoring and evaluation of behavior or outputs. It is a process of monitoring something, comparing it to some standard, and then providing some selective rewards or adjustments (Gunasekaran et al., 2004).

According to Stewart, (1995) and Gunasekaran et al., (2004) measuring supply chain performance is two fold, performance measurements and metrics in SCM. The metrics and measures will be discussed in the context of the following supply chain activities or processes: plan, source, make/assemble, and delivery/customer in the following subsections.

2.2.1 Metrics for Order Planning

This makes use of the order entry method, which determines the way and extent to which customer specifications are converted into information exchanged along the supply chain. Secondly, the method utilizes order lead-time, which is the total order cycle time, called order to delivery cycle time, refers to the time elapsed in between the receipt of customer order until the delivery of finished goods to the customer. The reduction in order cycle time leads to reduction in supply chain response time, and as such is an important performance measure and source of competitive advantage (Christopher, 1992).

The third element is the customer order path. The path that an order traverses is another important measure whereby the time spent in different channels can be determined. By analyzing the customer order path, non-value adding activities can be identified so that

suitable steps can be taken to eliminate them. The evaluation of supply link is also important. Traditionally supplier performance measures were based on price variation, rejects on receipt and on time delivery. For many years, the selection of suppliers and product choice were mainly based on price competition with less attention afforded to other criteria like quality, and reliability. More recently, the whole approach to evaluating suppliers has undergone drastic change (Gunasekaran et al., 2004).

2.2.2 Evaluation of suppliers

The evaluation of suppliers in the context of the supply chain (efficiency, flow, integration, responsiveness and customer satisfaction) involves measures important at the strategic, operational and tactical level. Strategic level measures include lead time against industry norm, Quality level, Cost saving initiatives, and supplier pricing against market. Tactical level measures include the efficiency of purchase order cycle time, booking in procedures, cash flow, quality assurance methodology and capacity flexibility. Operational level measures include ability in day to day technical representation, adherence to developed schedule, ability to avoid complaints and achievement of defect free deliveries. Purchasing and supply management must analyze on a periodic basis their supplier abilities to meet the firm's long-term needs. The areas that need particular attention include the supplier's general growth plans, future design capability in relevant areas, role of purchasing and supply management in the supplier's strategic planning, potential for future production capacity and financialability to support such growth (Fisher, 1997).

Supply chain partnership is a collaborative relationship between a buyer and seller which recognises some degree of interdependence and cooperation on a specific project or for a specific purchase agreement (Ellram, 1991; van Hoek, 2001). Such a partnership emphasises direct, long-term association, encouraging mutual planning and problem solving efforts (Maloni and Benton, 1997). Supplier partnerships have attracted the attention of practitioners and researchers (Macbeth and Ferguson, 1994; Ellram, 1991; Graham et al., 1994). Partnership maintenance is no less important. Performance evaluation of buyers or suppliers is simply not enough relationships must be evaluated.

The parameters that need to be considered in the evaluation of partnerships are the ones that promote and strengthen them. For example, the level of assistance in mutual problem solving

is indicative of the strength of supplier partnerships. Partnership evaluation based on such criteria will result in win–win partnerships leading to more efficient and more thoroughly integrated supply chains (Gunasekaran et al., 2004).

2.2.3 Measures and metrics at production level

After the order is planned and goods sourced. the next step in to make/assemble products. This is the activity carried out by organisations that own production sites, and their performance has a major impact on product cost, quality, speed of delivery and delivery reliability, and flexibility (Mapes et al., 1997; Slack et al., 1995). As it is quite an important part of the supply chain, production needs to be measured and continuously improved. Suitable metrics for the production level are as follows:

Range of product and services: According to Mapes et al. (1997), a plant that manufactures a broad product range is likely to introduce new products more slowly than plants with a narrow product range. Plants that can manufacture a wide range of products are likely to perform less well in the areas of value added per employee, speed and delivery reliability. This clearly suggests that product range affects supply chain performance.

Capacity utilization: From the above assertion, it is clear that the role-played by capacity in determining the level of activities in a supply chain is quite important. According to Slack et al. (1995), of the many aspects of production performance, capacity utilization directly affects the speed of response to customer demand through its impact on flexibility, leadtime and deliverability.

Effectiveness of scheduling techniques: Scheduling refers to the time or date on or by which activities are to be undertaken. Such fixing determines the manner in which resources will flow in an operating system, the effectiveness of which has an important impact on production and thus supply chain performance. For example, scheduling techniques such as *JIT, MRP* and *ERP* have implications on purchasing, throughput time and batch size. In case of the supply chain, since scheduling depends heavily on customer demands and supplier performance, the scheduling tools should be viewed in that context (Little et al., 1995).

2.2.4 Evaluation of delivery link

The link in a supply chain that directly impacts customers is delivery. It is a primary determinant of customer satisfaction; hence, measuring and improving delivery is always desirable to increase competitiveness. Delivery by its very nature takes place in a dynamic and ever-changing environment, making the study and subsequent improvement of a distribution system difficult. It should be noted that it is not an easy matter to anticipate how changes to one of the major elements within a distribution structure will affect the system as a whole (Rushton and Oxley, 1989).

Measures for delivery performance evaluation: According to Stewart (1995), an increase in delivery performance is possible through a reduction in leadtime attributes. Another important aspect of delivery performance is on-time delivery. On-time delivery reflects whether perfect delivery has taken place or otherwise and is also a measure of customer service level. A similar concept, on time order fill, was used by Christopher (1992), describing it as a combination of delivery reliability and order completeness. Another aspect of delivery is the percentage of finished goods in transit, which if high signifies low inventory turns, leading to unnecessary increases in tied up capital. Various factors that can influence delivery speed include vehicle speed, driver reliability, frequency of delivery, and location of depots. An increase in efficiency in these areas can lead to a decrease in the inventory levels (Novich, 1990).

Number of faultless notes invoiced: An invoice shows the delivery date, time and condition under which goods were received. By comparing these with the previously made agreement, it can be determined whether perfect delivery has taken place or not, and areas of discrepancy can be identified so that improvements can be made Gunasekaran et al. (2004) .

Flexibility of delivery systems to meet particular customer needs: This refers to flexibility in meeting a particular customer delivery requirement at an agreed place, agreed mode of delivery and with agreed upon customised packaging. This type of flexibility can influence the decision of customers to place orders, and thus can be regarded as important in enchanting and retaining customers (Novich, 1990).

Total distribution cost: Perhaps the most important research concerning logistics is going on in the area of design of efficient and cost effective distribution systems. For this, an

understanding of total distribution cost is essential, so that proper trade-offs can be applied as a basis for planning and reassessment of distribution systems (Gunasekaran et al., 2004). The urgency of dealing with transportation cost was highlighted by Thomas and Griffin (1996), who argued that since transportation cost accounts for more than half of the total logistics cost, more active research is needed in the area. To deal with distribution costs, measuring individual cost elements together with their impact on customer service encourages tradeoffs that lead to a more effective and efficient distribution system.

2.2.5 Measuring Customer Service and Satisfaction

To a world class organisation, a happy and satisfied customer is of the utmost importance. In a modern supply chain customers can reside next door or across the globe. and in either case they must be well served. Without a contented customer, the supply chain strategy cannot be deemed effective. Lee and Billington (1992) and van Hoek et al. (2001) emphasised that to assess supply chain performance, supply chain metrics must centre on customer satisfaction.

Flexibility: Of the factors by which supply chains compete, flexibility can be rightly regarded as a critical one. Being flexible means having the capability to provide products/services that meet the individual demands of customers. Some flexibility measures include: product development cycle time, machine or toolset up time, economies of scope (Christopher, 1992) and number of Inventory turns.

Customer query time: Customer query time relates to the time it takes for a firm to respond to a customer query with the required information. It is not unusual for a customer to enquire about the status of order, potential problems on stock availability, or delivery. A fast and accurate response to those requests is essential in keeping customers satisfied (Gunasekaran et al., 2004).

Post transaction measures of customer service: The function of a supply chain does not end when goods are provided to the customer. Post transaction activities play an important role in customer service and provide valuable feedback that can be used to further improve supply chain performance (Gunasekaran et al., 2004).

2.2.6 Supply Chain and Logistics Cost

The efficiency of a supply chain can be assessed using the total logistics, which is a financial measure. It is necessary to assess the financial impact of broad level strategies and practices that contribute to the flow of products in a supply chain. Since logistics cut across functional boundaries, care must be taken to assess the impact of actions to influence costs in one area in terms of their impact on costs associated with other areas (Cavinato, 1992). For example, a change in capacity has a major effect on cost associated with inventory and order processing.

Cost associated with assets and return on investment: Supply chain assets include accounts receivable, plant, property and equipment, and inventories. With increasing inflation and decreased liquidity, pressure is on firms to improve the productivity of capital, to make the assets sweat. In this regard it is essential to determine how the cost associated with each asset, combined with its turnover, affects total cash flow time. One way to address this is by expressing it as an average days required to turn cash invested in assets employed into cash collected from a customer (Stewart, 1995). Thus, total cash flow time can be regarded as a metric to determine the productivity of assets in a supply chain. Once the total cash flow time is determined, this can be readily combined with profit to provide insight into the rate of return on investment (ROI). This determines the performance by top management is terms of earnings on the total capital invested in a business.

With customer service requirements constantly increasing, effective management of inventory in the supply chain is crucial (Slack et al., 1995). In a supply chain, the total cost associated with inventory can be broken down into the following (Stewart, 1995; Christopher, 1992; Slack et al., 1995; Lee and Billington, 1992; Levy, 1997): Opportunity cost, consisting of warehousing, capital and storage; Cost associated with inventory at the incoming stock level and work in progress; Service costs, consisting of cost associated with stock management and insurance; Cost of finished goods including those in transit; Risk costs, consisting of cost associated with pilferage, deterioration, and damage; Cost associated with scrap and rework; and Cost associated with too little inventory accounting for lost sales/lost production.

Information processing cost: This includes costs such as those associated with order entry, order follow/updating, discounts, and invoicing. On the basis of survey results from various industries, Stewart (1995) identified information processing cost as the largest contributor to

total logistics cost. The role of information technology is shifting from a general passive management enabler through databases, to a highly advanced process controller that can monitor activities and decide upon an appropriate route for information. Modern information technology, through its power to provide timely, accurate, and reliable information, has led to a greater integration of modern supply chains than possible by any other means (Naim, 1997; Benjamin and Wigand, 1995).

2.3 Framework for Performance Measurement in a Supply Chain

According to Beamon, (1999) the two key measures of supply chain performance are resource measures and output measures. Resource measures include: inventory levels, personnel requirements, equipment utilization, energy usage, and cost. Resources are generally measured in terms of the minimum requirements (quantity) or a composite efficiency measure. Resource measurement is an important part of the measurement system. One general goal of supply chain analysis is resource minimization. The list of supply chain resource performance measures include: total cost of resources used; total cost of distribution, including transportation and handling costs; manufacturing cost. Total cost of manufacturing, including labor, maintenance, and re-work costs; and inventory costs associated with held inventory. Inventory cost will be used in this study to measure the supply chain performance.

Output measures include: customer responsiveness, quality, and the quantity of final product produced. Many output performance measures are easily represented numerically, such as: number of items produced; time required to produce a particular item or set of items; number of on-time deliveries (orders). However, there are also many output performance measures that are much more difficult to express numerically, such as: customer satisfaction and product quality (Beamon, 1999). The only output performance measure to be used in this study will be number of items produced.

The framework for performance measures and metrics is presented as in table 2.1 below, considering the four major supply chain activities or processes: plan, source, make or assemble, and deliver (Gunasekaran et al., 2004).

These metrics can be classified at strategic, tactical and operational to clarify the appropriate level of management authority and responsibility for performance. This framework is based in part of a theoretical framework discussed by Gunasekaran et al. (2001).

Table 2.1: Supply chain performance metrics framework

Supply chain activity/ process	**Strategic**	**Tactical**	**Operational**
Plan	Level of customer perceived value of product, Variances against budget, Order lead time, Information processing cost, Net profit Vs productivity ratio, Total cycl e time, Total cash flow time, Product development cycle time	Customer query time, Product development cycle time, Accuracy of forecasting techniques, Planning process cycle time, Order entry methods, Human resource productivity	Order entry methods, Human resource productivity
Source		Supplier delivery performance, supplier leadtime against industry norm, supplier pricing against market, Efficiency of purchase order cycle time, Efficiency of cash flow method, Supplier booking in procedures	Efficiency of purchase order cycle time, Supplier pricing against market
Make/ Assemble	Range of products and services	Percentage of defects, Cost per operation hour, Capacity utilization,Utilization of economic order quantity	Percentage of Defects, Cost per operation hour, Human resource productivity index
Deliver	Flexibility of service system to meet customer needs, Effectiveness of enterprise distribution planning schedule	Flexibility of service system to meet customer needs, Effectiveness of enterprise distribution planning schedule, Effectiveness of delivery invoice methods, Percentage of finished goods in transit, Delivery reliability performance	Quality of delivered goods, On time delivery of goods, Effectiveness of delivery invoice methods, Number of faultless delivery notes invoiced, Percentage of urgent deliveries, Information richness in carrying out delivery, Delivery reliability performance

Source: Gunasekaran A., Patel C., Ronald E. McGaughey,. 2004. A framework for supply chain performance measurement. International journal of Production Economics 87 pp. 345

Measures are grouped in cells at the intersection of the supply chain activity and planning level. For example, Supplier delivery performance can be found at the intersection of the

Source activity and Tactical planning level indicating that it pertains to sourcing activities (source) and the tactical planning level. Supplier delivery performance would thus be a measure useful in analyzing the performance of mid-level managers as they undertake sourcing activities, mid-level managers who are generally the ones responsible for tactical decisions (Gunasekaran et al., 2004).

The importance of individual metrics presented herein might not apply to all supply chains in all industries. Again, the framework is only a starting point. It is hoped that this framework will assist practitioners in their efforts to assess supply chain performance (Gunasekaran et al., 2004).

Given the systems theory, transaction cost. Principal-agency and network theories, strategies must be constrained by, and must react to, ever-changing environmental conditions. The factors that influence the choice of a supply chain strategy can be derived from the framework on supply chain performance measurement. This can be based on the Metrics for Order Planning for example order entry method, which determines the way and extent to which customer specifications are converted into information exchanged along the supply chain and order lead-time, which is the total order cycle time. The second level metrics are on evaluation of suppliers in the context of the supply chain which looks efficiency, flow, integration, responsiveness and customer satisfaction all important at the strategic, operational and tactical level. The Measures and metrics at production level impact on product cost, quality, speed of delivery and delivery reliability, and flexibility. Suitable metrics for the evaluation of delivery link level is always desirable to increase competitiveness.

The metrics for measuring customer service and satisfaction's major focus is a happy and satisfied customer is of the utmost importance. The metric for supply chain and logistics cost is based on the transaction cost theory, for example using the total logistics cost, cost associated with inventory and order processing, assets and return on investment; which is a financial measure and the impact of actions to influence costs in one area in terms of their impact on costs associated with other areas. Both the theories and metrics are not explicit and categorical on how the choices are made among alternative options of strategies. This can be at strategic, tactical and operational level, but the major focus is at strategic level.

3.1 Strategic Choice in Organizations

Choice and strategic choice refer to the process of selecting one option for implementation. An option is a course of action that it appears possible to take. The simplest form of choice is therefore between taking an option and not taking it; doing it or not doing it. A strategic option is a set of related options typically combining options for product or markets and resources that form a potential strategy. Effective management of the value chain could result in competitive advantage through differentiation or through a reduction in costs that may be partially or entirely passed on to the customer as lower prices. Excellent SCM leads to meaningful differentiation, lower cost, or both simultaneously (Porter and Millar, 1985).

3.1.1 Nature of Strategic choice

Strategic choice is the third logical element of the strategy formulation process and it the centre of strategy formulation (Porter, 1985). If there are no choices to be made, there can be little value in thinking about strategy at all. In general, small enterprises tend to be limited by their resources, whereas large enterprises find it difficult to change quickly and so tend to be constrained by their past. In large corporations, managers may find their range of choice limited because some choices are made at a higher level or in another country (Porter, 1987).

Results of strategic choices may depend as much on chance and opportunity as on the deliberate choices of managers. When considering future strategies, unexpected events, play a major role in determining results. When considering choice, it is necessary to take a prescriptive view. Descriptive ways of thinking may help to explain the outcomes after the event (Ansoff, 1987).

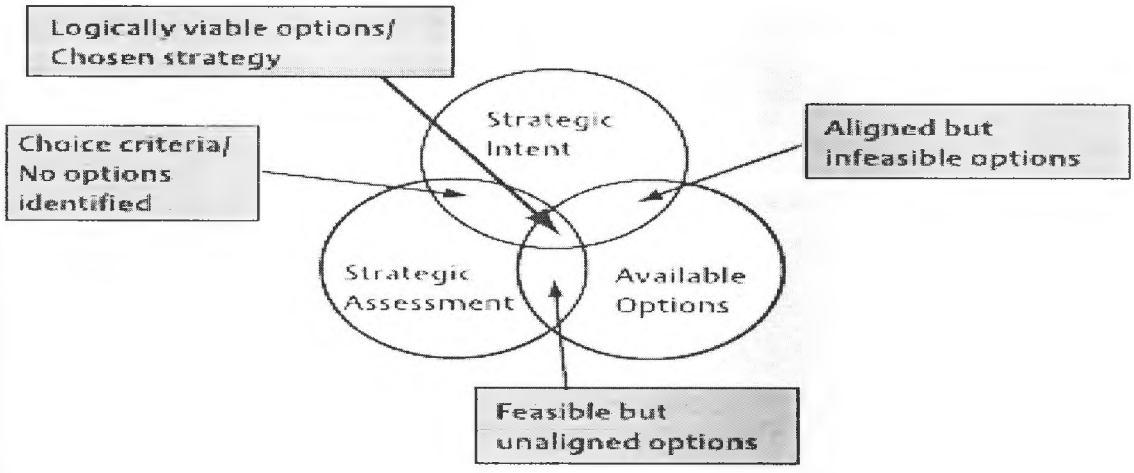
In a tidy logical world, any process of choice could be rationally divided into four steps: identify options, evaluate the options against preference criteria, select the best option, and then take action. This suggests that identifying and choosing options can be done purely analytically. In practice, it may be difficult to identify all possible options with equal clarity or at the same time. Unexpected events can create new opportunities, destroy foreseen opportunities, or alter the balance of advantage between opportunities. Identifying and evaluating options is a useful approach but it has limitations (Faulkner, 1992).

Good strategic choices have to be challenging enough to keep ahead of competitors but also have to be achievable. Analysis has an important role in making strategic choice but judgement and skill are also critical. Strategic choices that keep options open may be preferable in an uncertain future to defined strategies that depend for their success on uncertain events happening. Such judgementss require wisdom as much as analytical skill.

3.1.2 Structure of Strategic Choice

In practice, the process for choosing a strategy may be structured, although the reality is likely to be much messier as in figure 2.2 below. The process of choice starts by identifying available options. The chosen strategy intent should be changed. Infeasible options may seem highly attractive and may have powerful supporters, so the reasons why they are infeasible may need to be carefully argued with clear evidence in support. Choices of what not to do may some- times be as important as choosing what to do (Porter, 1987).

Figure 2.2: Choosing a Strategy From Among Strategic Options

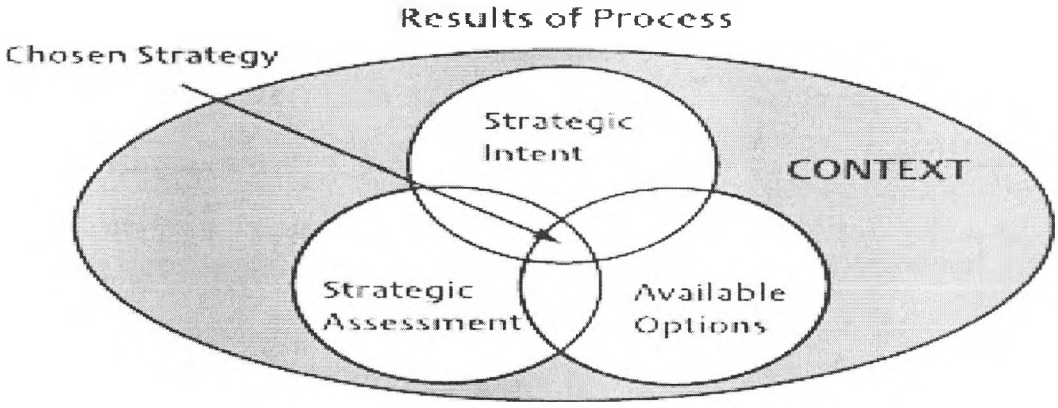


Source: Porter, M. E. (1987) 'From Competitive Strategy to Corporate Strategy', Harvard Business Review, May–June.

The framework in figure 2.2 shows how the three logical elements of the strategy formulation process interlock. The shaded background is a reminder of the importance of context as determining the issues to be resolved by strategic choice. Figure 2.3 expands the detail to illustrate the significance of the overlaps. The common ground between any two circles is of some interest but it is only where all three circles overlap that logically viable options exist. The chosen strategy emerges as the chosen viable option. It is where the

differing requirements of intent and assessment are most fully met, whereby the three logical elements overlap (Porter, 1987).

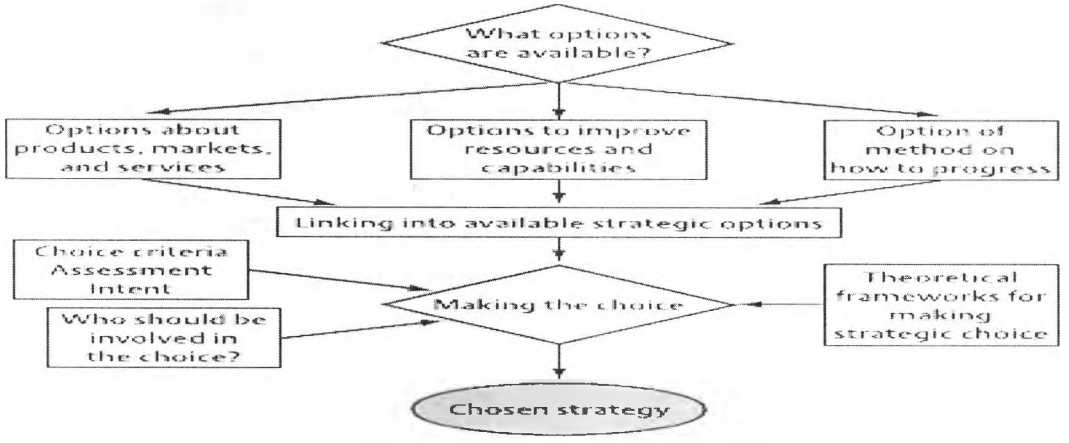
Figure 2.3: Results of the Strategy Formulation Process



Source: Porter, M. E. (1987) 'From Competitive Strategy to Corporate Strategy', Harvard Business Review, May–June.

The areas where any two circles overlap are also of interest. The criteria for choice derive from intent and assessment. Feasible options may exist which are not aligned to strategic intent. This, of course, may raise the question of whether the strategic strategy formulation process intent should be changed. Infeasible options may seem highly attractive and may have powerful supporters, so the reasons why they are infeasible may need to be carefully argued with clear evidence in support. Choices of what not to do may some- times be as important as choosing what to do (Porter, 1987). This can be illustrated with figure 2.4 below.

Figure 2.4: Structure for making Strategic Choice



Source: Porter, M. E. (1987) 'From Competitive Strategy to Corporate Strategy', Harvard Business Review, May–June.

Indeed the choice among strategic options is first to have the intentions, look at available alternatives, followed by making an assessment of the alternatives. Most organizations have a number of alternatives of supply chain strategies, which require such an assessment. But how does one choose the best framework for evaluating and implementing the supply chain strategy types.

3.2 Selecting a Supply Chain Framework

> "Supply chain strategies require a total systems view of the linkages 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 costs and focusing attention on adding value. Throughput efficiency must be increased, bottlenecks removed and performance measurement must focus on total systems efficiency and equitable reward distribution to those in the supply chain adding value. The supply chain system must be responsive to customer requirements." (Hines (2004:p76).

A supply chain, as opposed to supply chain management, is a set of organizations directly linked by one or more of the upstream and downstream flows of products, services, finances, and information from a source to a customer. Managing a supply chain is 'supply chain management' (Mentzer *et al.*, 2001).

As a management tool, a Supply Chain Framework is meant to help identify and map the activities associated with all phases of a supply chain. It is used to identify important components that can enable users to address, improve and communicate supply chain issues and practices, both within and between all parties involved. There are a number of Strategic Issues in Selecting a Supply Chain Framework (Chen, and Paulraj, 2004). It is important to select a framework for analysis that matches the structure of the supply chain as well as the goals for analysis. Frameworks help provide structure to the project, guiding analyses and informing the development of recommendations and performance metrics.

Supply chain activities can be grouped into strategic, tactical, and operational levels. The Strategic level looks at strategic network optimization, including the number. location, and size of warehousing, distribution centers, and facilities. Strategic partnerships with suppliers,

distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking, direct shipping, and third-party logistics. Product life cycle management, so that new and existing products can be optimally integrated into the supply chain and capacity management activities; information technology chain operations; where-to-make and make-buy decisions. Aligning overall organizational strategy with supply strategy. It is for long term and needs resource commitment (Lambert. 2008).

The Tactical level focuses on sourcing contracts and other purchasing decisions. Production decisions, including contracting, scheduling, and planning process definition; Inventory decisions, including quantity, location, and quality of inventory; Transportation strategy, including frequency, routes, and contracting. Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise, and focus on customer demand (Poluha, 2007 and Lambert, 2008).

At Operational level, the focus is on daily production and distribution planning, including all nodes in the supply chain. Production scheduling for each manufacturing facility in the supply chain minute by minute. Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers. Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers. Inbound operations, including transportation from suppliers and receiving inventory. Production operations, including the consumption of materials and flow of finished goods. Outbound operations including all fulfillment activities, warehousing and transportation to customers. Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centers, and other customers. From production level to supply level accounting all transit damage cases & arrange to settlement at customer level by maintaining company loss through insurance company (Poluha, 2007 and Lambert, 2008) .

The two broadly available supply chain frameworks for implementing supply chain management are the Global Supply Chain Framework (GSCF) and The Supply Chain Operations Reference (SCOR) Model.

3.2.1 The Global Supply Chain Forum (GSCF)

Global supply chain forum - supply chain management is the integration of key business processes across the supply chain for the purpose of creating value for customers and

stakeholders (Lambert, 2008). GCSF defines supply chain management as the "integration of key business processes from end user through original suppliers that provide products, services and information that add value for customers and other stakeholders (Lambert, 2006)."

Implementation is carried out through three elements: supply chain network structure, supply chain business processes and supply chain management components (Chen, and Paulraj, 2004). The supply chain management processes highlighted in the GSCF model are all cross-functional and can be broken down into sequences of strategic and operational sub-processes. Each sub-process is described by a set of activities. Cross functional teams define the structure of managing the process at the strategic level and implement it at the operational level (Chen, and Paulraj, 2004 and Lambert, *2006).*

3.2.2 The Supply Chain Operations Reference (SCOR)

SCOR was developed by the Supply Chain Council and includes four business processes: Plan, sorce, make and deliver. The SCOR model focuses on customer interactions, from order entry through paid invoice; product transactions (physical, material and service) from the supplier to the customer; and market interactions, from understanding of aggregate demand to fulfillment of each order (Poluha, 2007). The SCOR approach encourages individuals to think of themselves more as team players than as narrow functional specialists.

Figure 2.5: *SCOR Model in Supply Chain Management*

Souce: Poluha R. G (2007). *Application of the SCOR Model in Supply Chain Management.* Youngstown, New York 2007, ISBN 1934043230 p. 62.

Plan balances aggregate demand and supply to develop a course of action which best meets sourcing, production and delivery requirements. Source, which includes activities related to procuring goods and services to meet planned and actual demand. Make, which includes activities related to transforming products into a finished state to meet planned or actual demand. Deliver, which provides finished goods and services to meet planned or actual demand, typically including order management, transportation management and distribution management (Poluha, 2007). For a supply chain with an important reverse logistics component, "Return" is also included as a fifth business process. It deals with returning or receiving returned products for a season and extends into post delivery customer support (Nagurney, 2006 and Lambert, 2006).

There are characteristics of each framework that make them more or less relevant to different supply chain settings. For example: SCOR focuses on transactional efficiency while GSCF focuses on relationship management. SCOR is used when there is a need to identify areas of improvement to provide rapid cost reductions and improved efficiencies (Poluha, 2007). Each GSCF process is aligned with organizational and functional strategies through customer and supplier relationship management, whereas SCOR processes are developed from operations strategy. Positioning SCOR within this overall strategy and prioritizing implementation initiatives that result from the framework will help maximize impact by aligning resources and goals (Chen, and Paulraj, 2004). The GSCF framework is very broad in its scope, including activities such as product development, demand generation, relationship management and returns avoidance. In contrast, the scope of the SCOR framework is limited: it focuses only on the forward and backward movement of products as well as those planning components required to efficiently manage these flows (Nagurney, 2006).

Both frameworks emphasize cross-functional involvement, but the limited scope of the SCOR model means that an analysis using this framework would focus only on engaging partners from the logistics, production and purchasing functions of the supply chain. The GSCF framework on the other hand touches all aspects of the business, so would also add stakeholders from, for example, marketing and finance. The relatively narrow focus of SCOR may therefore make it somewhat easier to implement, since the activities of logistics,

production and purchasing may already be somewhat naturally integrated within an organizational structure (Nagurney, 2006).

Additionally, SCOR includes a set of benchmarking tools for performance and process evaluation. Performance benchmarking allows an organization to assess their results on key operational metrics such as inventory turns or fill rates. Process benchmarking helps identify and duplicate supply chain best practices (Chen. and Paulraj, 2004).

In summary, the SCOR includes a set of benchmarking tools for performance and process evaluation. Global supply chain forum focuses on the creating value for customers and stakeholders through original suppliers that provide products, services and information that add value for customers and other stakeholders. Both frameworks apply when choosing, evaluating and implementing the supply chain strategy types. Supply chain strategies require a total systems view. To this level, the options of supply chain types available are not clear. This is explored in the next section.

4.1 Supply Chain Strategies

Supply chain strategy has been where it is today because of three aspects. First, there are many models. Second, these models only effectively deliver on their promise when aligned with the way in which the company wants to go to the market. And third, most companies don't have one chain, they have many, and several of them are actually networks (Gadde, 2001).

According to Chase et al., (2006) supply chain management is becoming a hot topic in business today because of its total systems approach to managing the entire flow of information, materials, and service from raw materials suppliers through factories and warehouses to the end customers. According to them, the term supply chain comes from a picture of how organizations are linked together as viewed from a particular company.

Chase et al., (2006) illustrates that the supply chain network gets inputs from suppliers, and then transformation takes place at the manufacturing and service support operations, followed by localization through distribution or local service providers to final yield outputs to customers.

4.2 Traditional Supply Chain Strategies

Lee, (2002) characterizes four types of supply chain strategies, where information technology is seen to play an important role in shaping such strategies. The four types are:

Firstly, Efficient Supply Chain Types: According to Lee, (2002) these are supply chains that utilize strategies aimed at creating the highest cost efficiency, achievable through elimination of non-value-adding activities, pursuing scale economies, deploying optimization techniques in capacity utilization in both production and distribution. He further argues that information linkages should be established to ensure efficient, accurate and cost effective transmission of information across the supply chain.

Secondly, Risk-hedging Supply Chain Type: According to Lee, (2002) these are supply chains that utilize strategies aimed at pooling and sharing resources in a supply chain so that the risk in supply disruption can be shared. This implies that, a single entity in the supply chain can be vulnerable to supply disruptions, but if there is more than one supply source or alternative supply resources are available, and then the risk disruption is reduced. This type of strategy is common in retailing, where different retail stores or dealership share inventory. Information technology is important for the success of these strategies since real-time information on inventory and demand allow the most cost-effective management and transshipment of goods and services between partners sharing the inventory.

Thirdly, Responsive Supply Chain Type: These are supply chains that utilize strategies aimed at being responsive and flexible to the changing and diverse needs of customers. According to Lee, (2002) to be responsive, companies use build-to-order and customization processes as a means to meet the specific requirements of customers. Lastly, Agile Supply Chain Type: These supply chains utilize strategies aimed at being responsive and flexible to customer needs, while the risks of supply shortages or disruptions are hedged by pooling inventory and other capacity resources. According to Chase et al., (2006) these supply chains essentially have strategies in place that combine the strengths of "hedged" and "responsive" supply chains. They are agile because they have ability to be responsive to changing, diverse, and unpredictable demands of customers on the front end, while minimizing the back-end risks of supply disruptions.

The four types of supply chain above do not depict the key factors that influence their choice as the best candidate for implementation. Although, it is a better schema as compared to Fisher's framework of 1997. According to chase et al., (2006), Lee's model has captured demand and uncertainty in the process of trying to understand supply chain strategy. Due to shorter product life cycles, pressure for dramatically adjusting and adopting a company's supply chain strategy is great. The key tools for coping with demand and supply uncertainty range from outsourcing, global sourcing, mass customization and postponement.

Gattorna, (2007) established how to use a dynamic alignment model to mobilize a company around delivering what the customers want and not what you think they want. With a liberal view of the scope of supply chains, building more responsive supply chains and adding the missing behavioural dimensions to supply chains, building up to a dynamic perspective that culminates in four generic supply chains described broadly in familiar terms.

Gattorna, (2007) explains them as: Continuous replenishment supply chain: Predictable demand, easily managed through tight collaboration with customers. Focus on retention of customer relationships (collaborative customer segment type). Lean supply chain: Demand predictable (for example, from an historic off-take) but the loose relationship does not necessitate an extreme service level. Focus on efficiency (efficiency/consistency customer segment type). Agile supply chain: Unplanned or unforeseen demand and a sometimes loose relationship with customers – almost always demands an agile response at higher cost-to-serve. Focus on speed and capacity (demanding/quick response customer segment type). Fully flexible supply chain: Responding opportunistically and managing yield. Focus on providing creative solutions for premium price (innovative solutions customer segment type).

Each of these supply chain types provides a value proposition that serves customers according to their specific cultures and preferences as indicated in the customer segment types. Says Gattorna, (2007) "There is only one 'right' and cost-effective way to group or segment customers: according to their dominant buying preferences and behaviours. Supply chain configurations that lack a dynamic capability to 'flex' between different delivery service propositions will inevitably lead to service failures and reduced operational and financial performance. But still no study is able to clearly state the factors that influence the choice of the various supply chain types.

4.3 Contemporary Supply Chain Strategy Types

Strategy can be defined as "a set of dynamic, integrated decisions that one must make in order to position one's business in the complex environment". Thus, strategy represents the overall actions or approach to be taken to achieve the firm's goals and business objectives (Gattorna, 1998). Today's business environment, as explained in the introductory sections, cannot be addressed by strategies characterized by individual organizations looking to achieve dominance against all competitors and solely relying on order-winning criteria that are product-based. Instead, it requires a focus on synchronized management of the flow of physical goods, associated information and allied services from sourcing through consumption (Christopher, 2001). Supply chain management covers the entire gamut in its decision-making framework.

The supply chain strategy cannot truly be aligned to overall business strategy (unless all the functions of the enterprise are integrated and unless strategic relationships have been established with supply chain partners) based on trust and information sharing, so that it can quickly respond to customer's demand with unique and tailored offerings. Effective integration is the key because if one of these links fail, the organization's performance may suffer and may not meet the expectations of its customers, or the service level of its competitors. The primary benefit of integration is that all business units and supply chain partners share the same data, synchronize actions and minimize distortions in demand management (Kalambi, 2000).

In essence, research indicates that there are 16 basic forms of supply chains/networks in use today. Each brings with it relative strengths and weaknesses and varying degrees of complexity (Gattorna, 2007; Gadde, 2001). In a two-year study concluded in the fall of 2001, staff from the Center for Strategic Supply Leadership interviewed executives and managers from 63 companies about what they perceived to be their company's competitive advantages.

Gottorna's (2007) study employed precepts of qualitative research in case study formats. The sequence was first to identify the competitive intent and approach of the range of companies and then to map the inbound, internal, and outbound "chains and networks" in use. From that, a series of summary analyses were performed. The research involved extensive visits to companies; it became obvious that a number of supply chains/networks in use today can be

categorized into 16 types, based on the intended output companies are seeking to obtain, as discussed in the following subsection.

The research further sought to categorize these basic chains according to degree of complexity, using measures of expenditures, numbers of employees, steps in processes, and the range of control systems employed. In addition, a loose categorization was made based on whether each chain/network was perceived or known by the interviewee to produce a competitive advantage or top-line contribution to profit. In many cases, company executives reported that this information was "known but not measured formally," while others said, "We know for sure" (Gattorna, 2007; Gadde, 2001).

4.3.1 None: "Current functions are fine as is"

This is believed to provide competitive advantage. An organization does not know what competitiveness could attain through logistics/supply chain/networks. Functions operate inefficiently and at high cost. It highly exhibits competitive and financial vulnerability (Gattorna, 2007).

The notion of the supply chain manager as the new corporate hero, championing reduced costs, improving efficiencies and rewarding customers with reduced prices, seems somewhat incongruous to those brought up on the notion that marketing was the dominant corporate paradigm. Indeed at least one generation of business students and practitioners were taught that it was marketing that was responsible for inculcating customer values into the organization and that this was the ultimate means of fostering competitive advantage. It is firms that consistently and persistently manage their cost structures that are seen as the over-achievers. A number of potential dangers arise from this new supply chain dominance of corporate thinking. Not the least is that supply chain efficiency is mistaken for effectiveness, with undue short-term emphasis on cost reduction at the expense of contribution to broader gaols. In particular customer needs may ultimately be seen in simplistic terms revolving simply around reduced price as a major determinant of satisfaction (Rainbird, 2004).

4.3.2 Don't Know: "Our third-party logistics firm handles it"

Businesses often outsource to cut costs. In this type of strategy, supply chain/logistics are outsourced at a cost-plus arrangement. In practice, one or more logistics function of a firm are outsourced to a third-party logistics provider. Typical outsourced logistics functions

include customs, warehousing and distribution. It is common with firm with complex distribution networks and in firms whose core business is not logistics (Gattorna, 2007).

It has commodity-like logistics services, but provides no competitive advantage. It also exhibits competitive and financial vulnerability. In fact, this chain simply gives outside logistics companies a blank check. Internal managers, in return, get relief from the pressure of having to innovate and provide a competitive edge to their client customer (Gattorna, 2007).

4.3.3 Chains that Tie Down the Firm: "Conform to the System"

The third basic form (Chains That Tie Down the Company) illustrate the "tail wagging the dog" syndrome. This supply chain lags competititors in supply chain efficiency and costs customer side of the business. It places inordinate emphasis upon an internal aspect of the company to the detriment of the total chain. It exhibits competitive and financial vulnerability. In this model, a very strong head of logistics builds an infrastructure of company private fleets and warehouses and requires inbound, interfacility, and outbound flows to fill these assets in order to get transportation and warehousing efficiencies. Common in the retail industry up until the 1990s, these have high fixed costs, employ large numbers of people, and are complex to manage. The problem with these chains is that the logistics-centric processes often slow down inventory flow, and purchasing, manufacturing, and sales are simply forced to conform to the system (Gattorna, 2007). This approach can be characterized by low unit transport and storage costs (which are measured and reported) against high inventory levels, low inventory turns, and lost sales (which are often not measured).

Operational practices related to customer-oriented supply chains include lean systems, postponement, and time-based management. Lean systems focus on reducing waste in the form of unnecessary costs, time, and processes throughout the entire supply chain (Handfield and Nichols, 1999; Rich and Hines, 1997; Taylor, 1999). Postponement is defined as the practice of moving forward as far as possible one or more operations or activities to a later point in the supply chain (Van Hoek et al., 1999). Time-based management increases flexibility in production and distribution to reduce delays (Wu et al., 2004).

4.3.4 Nano-Chain: "Internal system that efficiently feeds production"

Nano-Chain maximizes manufacturing efficiencies. It can sub optimize inbound and outbound processes. It can divert corporate strategic emphasis, energies toward mostly internal activities and processes. The product innovation and customer service not emphasized. Purchasing serves manufacturing (Gattorna, 2007).

Supply chain performance is two-dimensional, consisting of effectiveness and efficiency. Simply put, efficiency is doing things right and effectiveness is doing the right things. Supply chain effectiveness is measured in terms of consumer satisfaction (Zokaei and Simons, 2006a). Supply chain efficiency, however, relates to the performance of the individual processes; it is the reciprocal of the resources absorbed by the supply chain (Hewitt, 1994). Effectiveness can be improved through enhancement of the value proposition; for instance new features could be added to a product to fulfill an unmet consumer need or a supply chain setup could be altered to deliver the exact requirements of the final-consumer. On the other hand, efficiency is improved through waste elimination that is, reducing the input levels while increasing the output levels. It is argued that the efficiency of the supply chain is contingent upon alignment to the overall effectiveness of the value proposition.

The focus of many supply chain improvement efforts has, so far, solely been on efficiency gains, i.e. lowering the supply chain costs, better use of capacity, on-time/in-full deliveries and reducing inventories. It is obvious that such improvements will have – often positive – repercussion in terms of consumer satisfaction and supply effectiveness. For example, JIT applications can simultaneously reduce inventory costs and improve deliveries.

4.3.5 Micro-Chain: "Balance Purchasing, Materials, Manufacturing and Distribution"

A micro chain integrates the physical and information flows for the creation of product and service creation and delivery. It is a classic logistics model. The Nano-Chain (number 4) is designed to support production efficiency. It is common in automobile and other heavy asset assembly and process industries where high fixed costs demand high plant utilization (Gattorna, 2007).

According Navi, (2000) aircraft and ship building assembly, for example, use a classic Nano-Chain structure. This high-volume regime is where just in time, materials requirement planning, and other purchasing-materials-production practices were applied starting in the

early 1980s. The classic logistics model of balancing inbound flows with manufacturing and/or service generation and outbound distribution is represented in the Micro-Chain. Today, a micro-chain, which spans a company's operational flows, is seen as having a strong internal focus on physical and informational flows. These flows start with customer delivery and reach back through the company to inbound delivery and sometimes procurement. This chain is often a developmental stepping stone for complex companies that are seeking to gain efficiencies from silo-based organizational structures.

4.3.6 Project Logistics Chain: "Efficiently Create and Deliver In Project Situations"

Logistics management is that part of the supply chain which plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer and legal requirements. Logistics involves the integration of information, transportation, inventory, warehousing, material handling, and packaging, and occasionally security. Logistics is a channel of the supply chain which adds the value of time and place utility (Baziotopoulos, 2008).

Project logistics chain creates supply, flow and logistics for specific projects. Project Logistics, provides complete services for entire large-scale, heavy-lift projects. It sets up capable integrated suppliers to perform fully service component work. Closely akin to the Nano-Chain is the Project Logistics Chain. This approach is useful in settings such as oil projects and large utility and plant construction. The quest here is to get the project up and running by a certain date. Emphasis is upon supplier sourcing, creating new inbound flow paths, and having goods and services available at the moment of need. In these chains, purchasing plays a strong role coordinating the company's flow needs with suppliers (Gattorna, 2007).

4.3.7 Cash-to-Cash Cycle: "Speed and Retain Cash flow"

Cash-to-Cash Cycle chains maximizes cash spin-off and availability. It can negatively affect suppliers to your own company's detriment. The Cash-to-Cash Cycle Chain provides a company with negative working capital (accounts receivables plus inventories less accounts payables). This leaves a company with high cash holding for use elsewhere. Goods flow quickly. Upon demand, they are converted or distributed and sold to customers who pay

before the supplier's accounts payable is settled. This chain emphasizes a financial goal first, and then logistics and planning are built from that end (Gattorna, 2007).

This is a financial ratio showing for how long a company has to finance its own stock/inventory. It measures the number of days between the initial cash outflow (when the company pays its suppliers) to the time it receives cash from its customers. So a company which keeps its stock for on average of 20 days, which gets paid by its debtors on average within 30 days and which pays its creditors on average within 45 days, has a cash-to-cash cycle of 5 days. Companies that receive cash from their customers at the time of sale and that have their stock under good control will have a short cash-to-cash cycle (Baziotopoulos, 2008).

4.3.8 Synergistic Chains: "Eliminate duplicate costs and gain buying power"

Synergistic chains provide no competitive advantage. It does not know what competitiveness it could attain through logistics/supply chain/networks. Functions operate inefficiently and at high cost. Synergistic chains exhibit competitive and financial vulnerability. Synergistic chains are often found in highly decentralized and multinational companies. They are not actually supply chains in and of themselves. They are, instead, attempts to tie together existing purchasing and materials and/or manufacturing and distribution resources to attain buying clout synergies, manufacturing utilization enhancements, distribution economies, and service improvements. These chains are difficult to lead and manage because they require information gathering to show their potential benefits. They also require educating individual supply chain and line-of-business managers and getting their buy-in. The person leading this charge often attempts to build a virtual supply chain/network effect using existing models within the company. The synergistic chain's success depends upon the supply chain manager's ability to analyze, identify, and sell the benefits of inter-line-of-business coordination (Gattorna, 2007).

There is increasing pressure today for complex companies to adopt this supply chain model. Large retailers such as Wal-Mart, Ahold, Tesco, and Carrefour no longer want to buy from separate lines of business within one supplier company. Instead, the retailers want single points of contact and administration for ordering, information access, billing, payment, logistics, and delivery processes. Most of all they are seeking to make visible to their

suppliers the total volume they purchase across all their lines of business so that they can leverage that total volume.

4.3.9 Demand Chain: "Feed Customers in Ways That Are Efficient For Them"

Demand chain involves close collaborations with customers. It emphasizes ECR and CPFR. Customers might demand all savings, benefits and folst uneconomic practices onto you. Demand chain requires flexibility in serving many customers differently. Today, for many leading authorities, supply chain management (SCM) is emerging into consumer driven value chain management which, in addition to pursuing efficiency improvements, recognizes the importance of consumer needs and attempts to capture the subtleties of consumer value as a source of differentiation and supply chain competitiveness (Godsell and Harrison, 2002; Christopher, 2005; Womack and Jones, 2005). In this situation, not only the product, but also the entire chain of business activities from raw material through to the final point of consumption should be effectively managed continuously to deliver the end-consumer's value requirements. Therefore, it will be a distinct advantage if one supply chain succeeds in effectively capturing the genuine consumer attributes, systematically analyzing the value proposition at each step, identifying the misalignments with the consumer value and duly transforming the products and processes (such as the product features and supply chain activities/relationships) to deliver those requirements.

Large and demanding customers often create the need for "Demand Chains". According to Lee and Whang, (2001) Supply chain personnel work closely with sales personnel in these systems as well as with many of their customers' supply chain and purchasing people. These chains evolve out of strong customer service initiatives on the distribution side of the company where customers demand specific service package configurations and flow requirements. This model is common in companies that sells large volumes of goods to Wal-Mart and other retailers with highly sophisticated flow patterns and consumer orientations. Companies developing these types of chains require a two-pronged emphasis: 1) to have excellent and efficient systems and services (for example, transportation), and 2) to be able to configure these to different demands from different customers such as direct store delivery, specific product package assortment, and other promotional initiatives. This model requires the seller to behave like a chameleon in its sales and distribution services for each and every demanding customer.

4.3.10 Extended Supply Chain: "Suppliers-to-Customer Efficiencies"

In most industries, good for overall costs and flow analysis of all resources for product creation and value-added creation. In extended supply chain, supply chain managers often responsible for make-buy and outsource/insource decisions. In that case SCM seen as manager development area (Gattorna, 2007).

Companies with demand chain situations and high purchase costs and/or high product obsolescence find value in combining their inbound and outbound operations to create coordinated product and information flows and financial impacts. These are the key drivers for Extended Supply Chains. Extended Supply Chains are common in many fast-moving consumer goods companies. They seek benefits from collaboration efforts that reach from their suppliers (and sometimes suppliers' suppliers) all the way through to the consumer, where possible. It was within this context that John Chambers, CEO at Cisco, said in the early 1990s: "In the future, firms won't necessarily compete. Instead, entire supply chains will compete against other supply chains." By developing relationships and efficient flow patterns from suppliers through to customers, the company can both attain efficiencies and seek innovations (Gattorna, 2007).

4.3.11 Market Dominance and Backlog: "Keep Others Out Of Market"

Dominance and backlog chains can build/enjoy monopolistic pricing and market dominance. Not legal in most developed countries. Market Dominance and Blocking Chains/Networks attempt to tie up sources, manufacturing capacity, or distributor networks to prevent competitors from entering the market or to force high market-entry costs upon them. While this is not permitted under American antitrust or anticompetition laws, some companies do practice it in other developed nations and can gain significant market space and financial results from it. It is low in complexity, but it brings high financial impact (Gattorna, 2007).

Customer orientation in supply chain is defined as the degree to which a supply chain focuses on customers and recognizes their desires, placing first priority on meeting their needs with superior products or services through collaboration with other supply chain partners. This definition is similar to those by Rindfleisch and Moorman (2003), Slater (1995), and Deshpande et al. (1993) Rindfleisch and Moorman (2003) defined customer orientation as the set of behaviors and beliefs that place a priority on customer interests and continuously create superior customer value. Slater (1995) stated that customer orientation is a culture that

accentuates the creation of customer value, while Deshpande et al. (1993) stressed the priority of customer interests, ahead of those of other stakeholders.

4.3.12 Supply Integration: "Model and Lead Supplier/Company Linkages"

A relatively new approach to chains/networks evolved out of some companies' efforts to reduce costs between the white spaces of the company's budgetary silos. A supply chain is defined as "the integration of key business processes from end users through original suppliers that provides products, services, and information that adds value for customers and other stakeholders" (Lambert et al., 1998). Here, a supply chain includes all the value chain processes from suppliers to end customers. Supply Integration represents such an endeavor. Supply integration takes a complete customer-to-supplier' supplier view. It is good for price and total cost reduction, and can be useful for many competitive initiatives since it is highly interdisciplinary.

Traditional reductions in the budgets and costs of sales, marketing, distribution, manufacturing, and purchasing departments only went so far in taking costs out of the total overall business. Under Supply Integration, people are assigned to teams across the entire chain from the store customer all the way back to the key suppliers. They are asked to identify and take out costs wherever possible. These efforts generally result in simplified flow processes. Specific persons or small teams are responsible for leading and managing the chain/network efforts both with external companies and with internal departments and groups. This approach to chains/networks holds great promise for nearly every company, especially those with Extended Supply Chains, and it will no doubt become popular throughout this decade (Gattorna, 2007).

It is vital that each supply chain participant adds value from the perspective of the end customer in the supply chain. This assumes integration of both supply and demand side activities in the value chain. Increasingly, the integration of both supply and demand requires an understanding of the inherent differences. In this sense, Frohlich and Westbrook (2002) divided such integration into supply chain and demand integration. Trevile et al. (2004) defined demand integrations as "integration that supports market mediation, with the primary role of demand integration being the transfer of demand information to facilitate greater responsiveness to changing customer needs." They argued that increased access to demand information throughout the supply chain permits rapid and efficient delivery, coordinated

planning, and improved logistics communication. Heikkila" (2002) pointed out the need to shift the emphasis from the supply side to the demand side of supply chain management.

4.3.13 Speed to Market: "Production/Service Launch"

Companies in quickly evolving product situations need the attributes of Speed to Market Chains/Networks. Speed to Market chains emphasizes product development and launch. Flexibility manufacturing and/or nimble outsourcing required. Time is a major metric throughout the company. Selective market distribution at first. The emphasis here is to seek out or possess flexible manufacturing for product-launch and roll-out capabilities. Time is the key metric used for the chain/network managers. The promotional marketing firms that support fast food chains are an example of this system. With this model, the key is to know where current excess production and distribution capacity can be tapped for an immediate product launch opportunity (Gattorna, 2007).

One of the key areas that has attracted increasing levels of attention in the SCM literature is an increasing emphasis placed on the need for providing superior value to the end-user (Mentzer et al., 2001; Hewitt, 1994; Christopher, 2005). SCM is changing focus from supply issues to demand driven value. This is to some degree influenced by the work of Michael Porter of Harvard Business School. Porter (1985) showed that a firm and its supply chain should be disaggregated into groups of value-generating activities (processes) which he referred to as the "value chain/system". For a firm (or a supply chain) to gain competitive advantage over its rivals it must perform those activities more efficiently or perform activities in a unique way that creates differentiation. So in Porter's (1985) model a firm's value chain and value system become sources of augmenting consumer value. The value system model is probably today best recognized as value stream map.

4.3.14 Innovation: "Push Growth Opportunities"

In fast-paced industries with high turnover of product life cycles, Innovation Chains are useful. Company focuses upon creation, launch and growth phases of life cycles. Emphasizes opportunity sourcing. Stresses manufacturing flexibility. Suppliers help generate idea. Manufacturing emphasizes "new" products. Company comfortable having outside logistics and manufacturing partners. Purchasing has both top-line and bottom line responsibility. These types of chains can be found in companies ranging from seasonal toy companies to high-tech electronic companies. Emphasis is on the percentage of revenue from new

products, and the companies in these markets manage the development, introduction, and growth phases of product life cycles as important system attributes. The pressure in this chain/network is to develop ties with suppliers in order to tap their research and development and product creation abilities and then marry them with the company's own development processes. Downstream links are pursued with customers in order to identify and roll out innovation. This requires purchasing and supply personnel to find and create such relationships for the purpose of innovation rather than simple price minimization (Gattorna, 2007).

4.3.15 Value Chain: "Seek Innovation through Partners"

Many people use the term "value chain" for whatever sourcing, distribution, or transportation resources they are managing. This approach focuses upon identifying what adds value to the final product and what does not, with the intent of reducing, streamlining, or eliminating these activities. But in the past few years, the term Value Chain has morphed into a more formalized concept of developing partner-like relationships with other key companies. It focuses on competing with chain partners against another chain. It emphasizes innovation and speed to market for the entire chain. Purchasing focuses on relationship and system management. Shared outcome relationships are common (Gattorna, 2007).

These partnerships create an ongoing flow of technology development and product innovation between the participating companies. The emphasis in this model is on working with chain partners rather than against them or taking advantage of them during supply/demand market shifts. Within the system, the procurement task takes on less of a transactional and negotiating stance and more of a relationship management role with the key "suppliers." Distribution likewise focuses on integrating with customers (Gattorna, 2007).

Inter-organizational integration is essential for supply chain performance (Williamson et al., 2004), and information technology (IT) and partnerships with suppliers are two necessary requirements for supply chain performance (Fearne, 1998; Prasad and Sounderpandian, 2003). We define interactive system infrastructure as the extent of the physical and social setting that supports collaboration in supply chains (Fearne, 1998; McAdam and McCormack, 2001; Neuman and Samuels, 1996).

4.3.16 Information Networks: "Competitiveness in the Information"

At the high end of complexity and competitive advantage are Information Networks. Innovation ideas can rise from any part of the company. It emphasizes core set of efficient and agile processes that can flex and flux with production opportunities and life cycle. Purchasing and supply chain managers are seen as network creators and leader/managers. The emphasis in this model is on data access that can be converted into information, knowledge, and intelligence. Organizations employing this approach seek highly developed and finely tuned visibility of both the supply and demand sides of the business. This visibility extends to include resources and capabilities from other organizations that can be tapped when needed. These businesses mine this data and turn it into revenue and profit-producing opportunities. The complexity that enters into these businesses stems from the need to have some physical asset infrastructures for selling and delivering products and services. As these business models are still emerging, they must have the flexibility to accommodate business direction opportunities that may arise (Gattorna, 2007).

In summary with supply chain strategies, international business dynamic, globally competitive environment supply chain management is a critical strategic initiative. But the literature has not indicated the factors that can influence the choice of any of the above supply chain strategies, and what is the impact on supply chain performance. This will be explored in the next subsection.

4.4 The Choice of Supply Chain Strategy Type

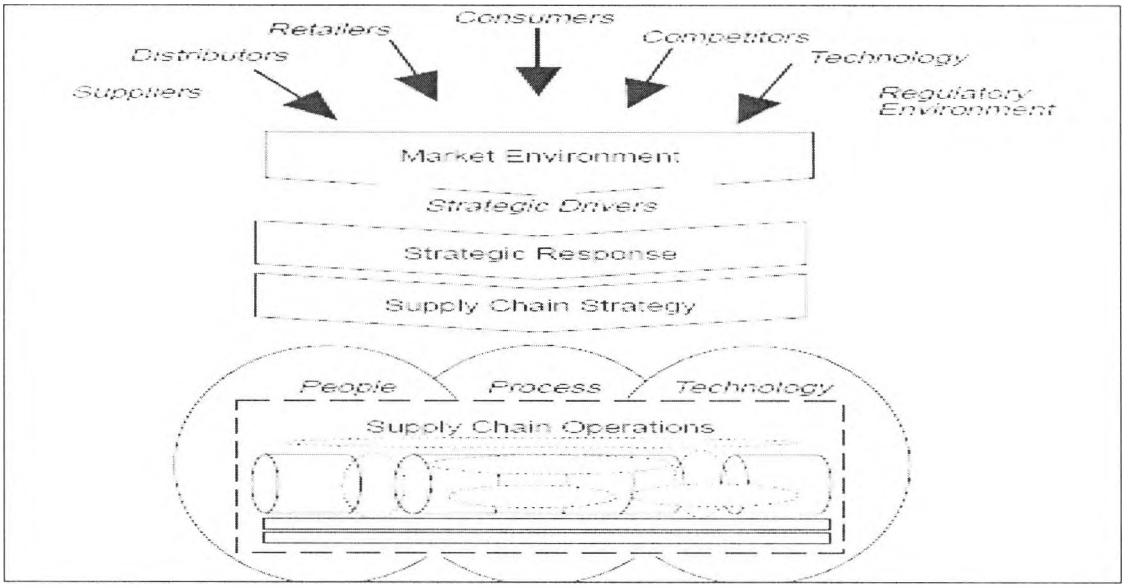
From the above discussion, strategic choice will have to answer the questions 'what', 'how', 'why', 'who', and 'when', so each option will provide provisional answers to each of these questions. The three types are: products/services/markets, resources/capabilities and method of progress, that are typical but not necessarily exhaustive (Porter, 1987).

Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary significantly from industry to industry and firm to firm. Depending on the type of product or service and the sequence of steps in the supply chain process, supply chains can be categorized into various structures (Baziotopoulos, 2008). There are a number of supply chain management strategy types classified in terms of key emphases and business performance impact. The range extends from the very basic forms to

very sophisticated, nona-set supply chain/networks that emphasize the informational and relational aspects of linkages with other companies and organizations. These have been researches of many authors and researches (Gattorna, 2007).

According to Beamon, (1999), a supply chain is an integrated process wherein raw materials are manufactured into final products, then delivered to customers via distribution, retail, or both. A typical supply chain is depicted in Figure 2.4. The supply chain depicted in Figure 2.4 contains four echelons supply. manufacturing, distribution, and consumers, where each level or echelon of the chain may comprise numerous facilities. Thus, the complexity of the supply chain arises from the number of echelons in the chain and the number of facilities in each echelon. Given the inherent complexity of the typical supply chain, selecting appropriate performance measures for supply chain analysis is particularly critical, since the system of interest is generally large and complex. This is in line with Gilmour's (1999) research has been the development of the supply chain framework. In most cases scoring highly on the capabilities which make up the framework will be viewed positively. The supply chain characteristics allocated a score of four are characteristics that progressive supply chain operations should have.

Figure 2.6Strategic Context of Supply Chain Management



Peter Gilmour (1999), a Strategic Audit Framework to Improve Supply Chain Performance: Journal of Business & Industrial Marketing, Vol. 14 no. 5/6 1999 p. 362

Many researchers argue that supply chain management creates competitive values through the active involvement of supply chain entities and their supportive systems for enterprise interaction. Sustainable business successes are no longer measured by a single entity's performance outcomes but through the competitive advantage of the collaborative supply chain network (Spekman et al., 1994). Since the customer is the ultimate judge of supply chain performance, effective and timely responses to ever- changing customer tastes and preferences have become essential components for successful business performance.

Any critical view on the choice of supply chain management strategy type should therefore focus on the overall matrix of the 16 supply chain types presented by Gattorna, (2007) which has given the theory and practice of supply chain management several useful insights for today's supply chain/network manager as they engage in planning processes. First, to identify the output performance needed from a supply chain/network, they need to start with looking at how their company actually competes. This does not mean building up from the current physical map and system of nodes and linkages. Nor does it mean investing in current bottlenecks. True chain/network alignment means starting with a firm understanding of how your business hopes to compete in its markets.

Second, recognize that what was "logistics" is now a new business model in the form of these chains/networks. A positive development that emerged from the explosion of the dot-com world is that senior management started thinking about their companies' business model and about ones that might offer promise for future success. Models 4 through 16 are most representative of how companies articulate their models for competing now and in the future. This is very useful for bringing the language of supply chain managers in line with those of senior management. Third, and finally, in the hyper-competitiveness of today's business world, all companies, managers, and groups are looking for ways to give their organizations an edge in the marketplace. The matrix of supply chain types provides a convenient way of identifying what the next level of competitive posturing might be and the components and roles for attaining them. Hence this study will use Gattorna's, (2007) matrix of supply chain types to provide a convenient way of identifying the factors that influence the choice of supply chain strategy used by manufacturing firms.

Mohanty and Deshmukh's (2005) view of SCM as a loop which starts with customer and ends with customer will form the basis of the intended study. Based on their exposure, the

intended study will first define a supply chain is an integration of procurement, service/manufacturing, and distribution activities with controlled flows of all materials, finished goods, information. and transactions.

Secondly, it will define SCM as emergent field of practice and an emerging academic domain is the total management and manipulation of customers and suppliers behaviors with the underlying logics, drivers, enablers and barriers merit that require close attention using mature technologies to improve their effectiveness and to successfully transform themselves and survive into the future. This should be checked against rapid and efficient delivery, enhanced customer value, coordinated planning, and improved logistics communication.

Thirdly, Lee's, (2002) four types of supply chain types which have been captured in Gattorna's, (2007) schema of sixteen types of supply chain types will form the basis of the supply chain strategy types to be evaluated. The overall matrix of the 16 supply chain types by Gattorna, (2007) has presented several useful insights for today's supply chain/network manager as they engage in planning processes. But what is not clear in terms of research is: what are the factors that influence the choice of supply chain strategy type in any organization. This is supported by Erik and Jan (2007 observation that the biggest research limitations was that instead of treating the supply chain characteristics associated with different supply chain types as either/or choices, some companies select properties from both supply chain types in order to gain additional benefits. They noted that this creates a supply chain frontier of physical efficiency and market responsiveness; a concept that deserves further attention by researchers. This forms the basis of this study on a survey on the factors which influence the choice of supply chain strategy type.

The above analysis provides a number of choices on supply chain strategies, which act as strategic options in supply chain management. No study has been done to show the key factors that influence the choice of supply chain strategy type in any organization, and the operations impacts of such supply chain types.

5.0 Summary

In summary, according to Gattorna, (2007) the first three forms are very basic. Of these, number 4.3.1 (None) and number 4.3.2 (Don't Know) are dangerous to pursue. They ignore the fact that measurable value can be produced by a well-integrated supply chain. The middle

group, (numbers 4.3.4 through 4.3.9) is the most familiar in the logistics/supply chain field. These are generally based upon linking together the physical resources of transportation, warehousing, inventory flows, order management, and asset control systems for efficiency or customer service enhancement. Toward the high end in terms of competitive advantage and profit impacts are chains/networks numbers 4.3.11 through 4.3.16.

Lee's, (2002) four types of supply chain types have been captured in Gattorna's, (2007) schema of sixteen types of supply chain types. But none of them has established the factors that influence the choice of these supply chain types. The existing body of literature on supply chain improvement is largely focused on the mapping and analysis of efficiency constraints. But still no study is able to clearly state the factors that influence the choice of the various supply chain types. The sixteen and any other types will therefore be used in this study to establish the factors that influence the choice of these types.

Hicks (1999) observed that world-class companies expect supply chain management to focus on the following value adding outputs or current research perspectives: Quality – purchased materials and services should be virtually defect free. Many defects can be traced back to bought in items. Cost – minimization of total cost of acquiring, transporting, holding, converting items as well as quality costs. Time – need to minimize time to market for new products as well as minimizing lead-times to increase flexibility. Technology - ensuring that the firm's supply base provides appropriate technology in a timely manner; ensuring that technology associated with core competence is carefully controlled. Continuity of supply - need to reduce risk of supply disruptions. These perspectives of quality, cost, time, flexibility and technology will be used as factors to evaluate the choice of supply chain strategy types

The strategic focus of supply chain include: Integration - the firm's supply chain strategy should be integrated with marketing, production and financial strategies. Business environment - supply chain must address the identification of threats and opportunities (with particular reference to suppliers and customers). Technology - access and control, avoid turning suppliers into competitors. Information systems - need timely, accurate and cost effective transfer of information with buyers and suppliers (e.g. electronic data interchange). Value chain - need to ensure that the value chain of which the company is a part is competitive (e.g. careful management of margins through the supply chain). ABC analysis - concentrate on high value items - decentralise decision making for low value items. The

decision making aspects revolving around Integration, Business environment, value chain and Information systems will be used to generate the factors that will be used to evaluate the choice of supply chain strategy types.

Hicks, (1999) say that the major developments in operations management are: Cross functional teams - engineering, procurement, marketing, tendering, and accounting. Supply chains - management and development to ensure competitiveness. Partnerships and alliances - relationships may be either mutually beneficial open relationships or the creation of a separate legal entity called a joint venture (e.g. capital goods for the oil industry). A disruption affecting an entity anywhere in the supply chain can have a direct effect on a corporation's ability to continue operations, get finished goods to market or provide critical services to customers (Uta, 2005). Modern supply chains are very complex, with many parallel physical and information flows occurring in order to ensure that products are delivered in the right quantities, to the right place in a cost-effective manner. Consequently, some authors have suggested that supply networks may be a more accurate term than supply chains (Christopher et al.., 1997). Effective operation (procurement, marketing, tendering, and accounting) is a key element in the determination of the supply chain strategy type in any organization.

It has also been suggested that the drive towards more efficient supply chains during recent years has resulted in the supply chains becoming more vulnerable to disruption (Christopher and Lee, 2004; McGillivray, 2000; Engardio, 2001). Although awareness is increasing among practitioners, the concepts of supply chain vulnerability and its managerial counterpart supply chain risk management. Risk management is equally an issue in the determination of the supply chain strategy type. Since supply chain management strategies have come to use, two key authors have depicted two different sets of supply chain management types. Lee, (2002) characterizes four types of supply chain strategies (efficient supply chain, risk-hedging supply chain, risk-hedging supply chain and agile supply chain) where information technology is seen to play an important role in shaping such strategies.

6.0 Conclusion

According to Gattorna, (20070 and Gadde, (2001) there are 16 basic forms of supply chains/networks in use today. Each brings with it relative strengths and weaknesses and varying degrees of complexity. No study has been done to show the key factors that

influence the choice of supply chain strategy type in any organization, and the operations impacts of such supply chain types. A study can be done to identify the most commonly used types of supply chain management strategies for particular industries in the manufacturing sector; and secondly to determine the factors that influence the choice of the supply chain strategy types, by examining why some supply chain management types are preferred by some industries as opposed to other industries.

Given the above research gap, this marks the start of a research proposal on the factors which influence the choice of supply chain strategy type. The intended research will survey through the factors that influence the choice of supply chain strategy type in any organization, and the operations impacts of such supply chain types. For example in a manufacturing sector, this will cluster the industries in the manufacturing sectors according to their supply chain strategy type, and then determine the factors that favor these supply chain types and how it influences the performance of their supply chains.

The systems theory and transaction cost theory are the only theories that can be utilized. This will fit the Supply Chain Operations Reference (SCOR). In order to focus the choices being made on the supply chain strategy types, Gunasekaran et al., (2004) framework for supply chain performance measurement will be used to measure the impact of those choices.

REFERENCES

Ahmad, S. and Schroeder, R.G. (2002), "Refining the product-process matrix", *International Journal of Operations & Production Management*, Vol. 20 No. 1, pp. 103-24.

Aitken, J., Christopher, M. and Towill, D. (2002), "Understanding, implementing and exploiting agility and leanness", *International Journal of Logistics*: Research and Applications, Vol. 5 No. 1, pp. 59-74.

Anna Nagurney: Supply Chain Network Economics: Dynamics of Prices, Flows, and Profits, Edward Elgar Publishing, 2006, ISBN 1-84542-916-8

Ansoff, I. (1987) Corporate Strategy, rev. edn. (London: Penguin).

B.S. Sahay and Ramneesh Mohan, (2003): Supply chain management practices in Indian industry, *International Journal of Physical Distribution & Logistics Management* Vol. 33 No. 7, pp. 582-606: MCB UP Limited; 0960-0035

Baziotopoulos (2008). *An Investigation of Logistics Outsourcing Practices In the Greek Manufacturing Sector*. PhD thesis- "".

Benita M. Beamon, (1999) Measuring Supply Chain Performance, *International Journal of Operations & Production Management*, Vol. 19 No. 3, pp. 275-292, # MCB University Press, 0144-3577Ohio, USA

Berry, L.L. (1983), "Relationship marketing", in Berry, L.L., Shostack, G.L. and Upah, G.D. (Eds), Emerging Perspectives on Services Marketing, American Marketing Association, Chicago,

Bowersox, D.J. and Closs, D.J. (1996), Logistical Management: The Integrated Supply Chain Process, McGraw-Hill, New York, NY.

Bowersox, D.J., Closs, D.J. and Cooper, M.B. (2002), Supply Chain Logistics Management, McGraw-Hill, Boston, MA.

Bowersox, D.J., Closs, D.J. and Stank, T.P. (1999), 21st Century Logistics: Making Supply Chain Integration a Reality, The Council of Logistics Management, Oak Brook, IL.

Bowersox, D.J., LaLonde, B.J. and Smykay, E.W. (Eds) (1959), Readings in Physical Distribution Management, Macmillan, New York, NY.

Bowersox, Donald J., Patricia J. Daugherty, Cornelia L. Droge, Richard N. Germain, and, Dale S. Rogers. Logistical Excellence. Burlington, Mass.: Digital Press, 1992. Cachon, G. and Fisher, M. (1997), "Campbell Soup's continuous replenishment program: evaluation and enhanced inventory decision rules", Production and Operations Management, Vol. 6 No. 3, pp. 266-76.

Cavinato, J.L., 1992. Total cost value model for supply chain competitiveness. *Journalof Business Logistics 13 (2),* 285–291.

Center for Monitoring Indian Economy (CMIE) (1999), CMIE: Economic Overview 1999, CMIE,New Delhi.

Chae, M. and Hill. J. (2000), "Determinants and benefits of global strategic marketing planning formality", International Marketing Review, Vol. 17 No. 6, pp. 538-63.

Chase, R.B., Jacobs, F.R. and Aquilano, N.J. (2006), Operations Management for Competitive Advantage, 11th ed., McGraw-Hill, New York, NY.

Chen, I. and Small, M. (1994), "Implementing advanced manufacturing technology: an integrated planning model", OMEGA: *International Journal of Management Science, Vol. 22 No. 1,* pp. 91-103.

Chen, I. J., Paulraj, A. (2004): Towards a theory of supply chain management: the constructs and measurements. In: *Journal of Operations Management*, 22/2: 119-150

Chen, I.J. and Paulraj, A. (2004), "Towards a theory of supply chain management: the constructs and measurements", *Journal of Operations Management, Vol. 22 No. 2*, pp. 119-51.

Childerhouse, P., Aitken, J. and Towill, D. (2002), "Analysis and design of focused demand chains", *Journal of Operations Management, Vol. 20 No. 6*, pp. 675-89.

Chopra, S., Lovejoy, W. and Yano, C. (2004), ''Five decades of operations management and the prospects ahead'', Management Science, Vol. 50 No. 1, pp. 8-14.

Christopher, M. (1992), Logistics and Supply Chain Management: Strategies for Reducing Costs and Improving Services, Pitman, London.

Christopher, M. (1998), Logistics & Supply Chain Management, Pearson Education Limited,Harlow.

Christopher, M. (2001), Logistics and Supply Chain Management: Strategies for Reducing Cost and Improving Service, 2nd Indian reprint, Pearson Education, New Delhi.

Christopher, M. (2005), Logistics and Supply Chain Management, 3rd ed., Pitman, London.

Clegg, C.W., Wall, T.D., Pepper, K., Stride, C., Woods, D., Morrison, D., Cordery, J., Couchman, P., Badham, R., Kuenzler, C., Grote, G., Ide, W., Takahashi, M. and Kogi, K. (2002), "An international survey of the use and effectiveness of modern manufacturing practices", Human Factors & Ergonomics in Manufacturing, Vol. 12, pp. 171-91.

Cohen, M. and Fine, C. (1998), "Architectures in 3-D: concurrent product, process and supply chain development", Vol. 3, working paper, Department of Operations and Information Management, University of Pennsylvania, Philadelphia, PA.

Cooper, M., Lambert, D. and Pagh, J. (1997), "Supply chain management: more than a new name for logistics", *International Journal of Logistics Management, Vol. 8* No. 1, pp. 1-14.

Cooper, M.C. and Ellram, L.M. (1993), "Characteristics of supply chain management and the implications for purchasing and logistics strategy", *The International Journal of Logistics Management, Vol. 4 No. 2*, p. 10.

Croom, S. and Romano, P. (2000), "Supply chain management: an analytical framework for critical literature review", *European Journal of Purchasing & Supply Management, Vol. 6*, pp. 67-83.

Deshpande, R., Farley, J. and Webster, F. (1993), "Corporate culture, customer orientation, and innovativeness in Japanese firms: a quadrad analysis", *Journal of Marketing, Vol. 57*, pp. 23-7.

Dove, R. (1999), ''Agility¼knowledge managementþresponse ability'', Automotive Manufacturing & Production, Vol. 111 No. 3, pp. 16-20.

Ellinger, A.E. (2000), "Improving marketing/logistics cross functional collaboration in the supply chain", Industrial Marketing Management, Vol. 29, pp. 85-96.

Ellram, L.M. and Cooper, M.C. (1990), ''Supply chain management partnership, and the shipper third party relationship'', *The International Journal of Logistics Management, Vol. 1 No. 2*, pp. 1-10.

Ellram, L.M., 1991. A managerial guide for the development and implementation of purchasing partnerships. InternationalJournalof

Engardio, P. (2001), "Why the supply chain broke down", Business Week, No. 3724, 19 March 2001, pp. 41.

Farmer, D.H. and MacMillan, K. (1976), "Voluntary collaboration vs disloyalty to suppliers", *Journal of Purchasing and Material Management, Vol. 12 No. 4*, pp. 3-8.

Faulkner, D. (1992) 'Strategic Alliances: Cooperation for Competition', in The Challenge of Strategic Management, ed. D. Faulkner, and G. Johnson (London: Kogan Page), 119–46.

Fearne, A. (1998), "The evolution of partnerships in the meat supply chain: insights from the British beef industry", Supply Chain Management, Vol. 3 No. 4, pp. 214-31.

Ferguson, B.R. (2000), "Implementing supply chain management", *Production and Inventory Management Journal, March,* pp. 64-7.

Fine, C. (1998), Clockspeed – Winning Industry Control in the Age of Temporary Advantage, Perseus Books, Reading, MA.

Fine, C. (2000), "Clockspeed-based strategies for supply chain design", Production and Operations Management, Vol. 9 No. 3, pp. 213-21.

Fisher, M. (1997), "What is the right supply chain for your product?", Harvard Business Review, Vol. 75 No. 2, pp. 105-16.

Fisher, M.L., Hammond, J., Obermeyer, W. and Raman, A. (1994), "Making supply meet demand in an uncertain world", Harvard Business Review, Vol. 72 No. 3, pp. 83-93.

Fisher, M.L., Hammond, J., Obermeyer, W. and Raman, A. (1997), "Configuring a supply chain to reduce the cost of demand uncertainty", Production and Operations Management, Vol. 6 No. 3, pp. 211-25.

Forrester, J.W. (1959), "Industrial dynamics: a major breakthrough for decision makers", Harvard Business Review, July/August.

Frohlich, M.T. and Westbrook, R. (2002), "Demand chain management in manufacturing and services: web-based integration, drivers, and performance", *Journal of Operations Management, Vol. 20 No. 6,* pp. 729-45.

Gadde, Lars-Erik and Håkan Håkansson. Supply Network Strategies. West Sussex, UK: John Wiley & Sons, 2001.

Gattorna J., (2007) Living Supply Chains: *How to mobilize the enterprise around delivery what your customers want*: Prentice Hall. ISBN: 0-273-70614-4

Gattorna, J.L. (1998), Strategic Supply Chain Management: Best Practices in Supply Chain Management, Gower Publishing, Aldershot. New York, NY, pp. 189-203.

Godsell, J. and Harrison, A. (2002), "Customer responsive supply chains: an exploratory view of performance measurement", paper presented at PMA Conference, Boston, MA.

Graham, T.S., Dougherty, P.J., Dudley, W.N., 1994. The long term strategic impact of purchasing partnerships. *InternationalJournal of Purchasing and Materials Management 30 (4),* 13–18.

Gray K. R., Florida A. M., and Jesse L. 1997. Small-Scale Manufacturing in Kenya: Characteristics, Problems And Sources Of Finance: *Journal of Small Business Management, Vol. 35.*

Gruen, T.W. (1997), "Relationship marketing: the route to marketing efficiency and effectiveness", Business Horizons, Vol. 40 No. 6, pp. 32-8.

Grunert, K.G., Jeppesen, L., Jeppesen, K., Sonne, A., Hansen, K., Trondsen, T. and Young, J.A. (2005), "Market orientation of value chains a conceptual framework based on four case studies from the food industry", *European Journal of Marketing, Vol. 39 Nos 5/6,* pp. 428-55.

Gummesson, E. (1996), "Relationship marketing and the imaginary organisation: a synthesis", *European Journal Marketing, Vol. 30 No. 2,* pp. 31-44.

Gunasekaran A., Patel C., Ronald E. McGaughey,. 2004. A framework for supply chain performance measurement. *International journal of Production Economics 87* pp. 333–347

Gunasekaran, A. (1999), ''Design and implementation of agile manufacturing systems'', *International Journal of Production Economics, Vol. 62,* pp. 1-6.

Gunasekaran, A. (2005), ''The built-to-order supply (BOSC): a competitive strategy for 21st century'', *Journal of Operations Management, Vol. 23,* pp. 419-22.

Gunasekaran, A., Patel, C. and Tirtiroglu, E. (2001), "Performance measures and metrics in a supply chain environment", *International Journal of Operations & Production Management, Vol. 21 Nos 1-2*, pp. 71-87.

Ha°kansson, H. (Ed.) (1987), Industrial Technological Development: A Network Approach, Croom-Helm, London.

Ha°kansson, H. and Snehota, I. (1995), Developing Business Relationships, Routledge, London.

Hajjat, M.M. (2002), "Customer orientation: construction and validation of the CUSTOR scale", Marketing Intelligence & Planning, Vol. 20 No. 7, pp. 428-41.

Handfield, R.B. and Nichols, E.L. (1999), Introduction to Supply Chain Management, Prentice-Hall. Englewood Cliffs, NJ.

Harland, C.M. and Lamming, R. et al., (1999), "Developing the concept of supply strategy", *International Journal of Operations & Production Management, Vol. 14 No. 6*, pp. 40-51.

Hayes, R.H. (2000), ''Toward a new architecture for POM'', Production and Operations Management, Vol. 9 No. 2, pp. 105-10.

Hayes, R.H. and Wheelwright, S.C. (1979a), "Link manufacturing process and product life cycles", Harvard Business Review, Vol. 57 No. 1, pp. 133-40.

Hayes, R.H. and Wheelwright, S.C. (1979b), "The dynamics of process-product life cycles", Harvard Business Review, Vol. 57 No. 2, pp. 127-36.

Hayes, R.H. and Wheelwright, S.C. (1984), Restoring Our Competitive Edge: Competing Through Manufacturing, Wiley, New York, NY.

Hewitt, F. (1994), "Supply chain redesign", *International Journal of Logistics Management, Vol. 5 No. 2*, pp. 1-9.

Hicks, D.A. (1999), ''The state of supply chain strategy'', IIE Solutions, Vol. 31 No. 8, pp. 24-9.

Hines, P. and Rich, N. (1997), "The seven value stream mapping tools", International *Journal of Operations & Production Management, Vol. 17 No. 1.*

Hines, P., Holweg, M. and Rich, N. (2004), "Learning to evolve: a review of contemporary lean thinking", *International Journal of Operations & Production Management, Vol. 24 No. 10,* pp. 994-1012.

Hines, T. 2004. Supply chain strategies: Customer driven and customer focused. Oxford: Elsevier.

Ho, D.C.K. (2002), "Empirical research on supply chain management: a critical review and recommendations", *International Journal of Production Research, Vol. 40 No. 17*, pp. 4415-31.

Houlihan, J. (1985), "International supply chain management", *International Journal of Physical Distribution and Logistics, Vol. 15 No. 1,* pp. 22-38.

Huang, S.H., Uppal, M. and Shi, J. (2002), "A product driven approach to manufacturing supply chain selection", Supply Chain Management: *An International Journal, Vol. 7*

John Store , Caroline Emberson , Janet Godsell and Alan Harrison: Supply chain management: theory, practice and future challenges: *International Journal of Operations & Production Management Vol. 26 No. 7,* pp. 754-774: Emerald Group Publishing Limited 0144-3577 DOI 10.1108/01443570610672220

Jones, T. and Riley, D.W. (1985), "Using inventory for competitive advantage through supply chain management", *International Journal of Physical Distribution & Materials Management, Vol. 15 No. 5,* pp. 16-26.

Juma, C., Torori, C., and Kirima, C.C.M. 1993. The Adaptive Economy: Economic Crisis and Technological Innovation. Nairobi: ACTS Press. In Gray K. R., Florida A. M., and Jesse L. 1997. Small-Scale Manufacturing in Kenya: Characteristics, Problems And Sources Of Finance: *Journal of Small Business Management, Vol. 35.*

Kalambi, N. (2000), "Preparing for supply chain management: time is money", Dataquest, special supplement, pp. 5-9.

Keivan Zokaei and Peter Hines (2007): Achieving consumer focus in supply chains, *International Journal of Physical Distribution & Logistics Management. Vol. 37 No. 3*, pp. 223-247.

Ketchen, D.J.J. and Giunipero, L.C. (2004), "The intersection of strategic management and supply chain management", Industrial Marketing Management, Vol. 33 No. 1, pp. 51-7.

Krajewski, L., Wei, J.C. and Tang, L.L. (2005), "Responding to schedule changes in build-to-order supply chains", *Journal of Operations Management, Vol. 23 No. 5,* pp. 452-69.

Krajewski, L.J., Ritzman, L.P. and Malhotra, M.K. (2007), Operations Management: Process and Value Chains, 8th ed., Prentice Hall, Upper Saddle River, NJ.

La Londe, B.J. and Masters, J.M. (1994), "Emerging logistics strategies: blueprints for the next century", *International Journal of Physical Distribution & Logistics Management, Vol. 24 No. 7,* pp. 35-47.

Lambert, D., (2008) .Supply Chain Management: Processes, Partnerships, Performance, 3rd edition, 2008.

Lambert, D.M. and Pohlen, T.L. (2001), ''Supply chain metrics'', *The International Journal of Logistics Management, Vol. 12 No. 1,* pp. 1-19.

Lambert, D.M., Cooper, M.C. and Pagh, J.D. (1998), "Supply chain management: implementation issues and research opportunities", *International Journal of Logistics Management, Vol. 9 No. 2*, pp. 1-19.

Lambert, D.M., Emmelhainz, A. and Gardner, J. (1996), "So you think you want a partner?", Marketing Management, Vol. 5 No. 2, pp. 24-30.

Lambert. D., (2006) "Supply Chain Management: Processes, Partnerships, Performance", Second Edition

Lee, H.L. (2002), "Aligning supply chain strategies with product uncertainties", California Management Review, Vol. 44 No. 3, pp. 105-20.

Lee, H.L., Billington, C., 1992. Managing supply chain inventory: Pitfalls and opportunities. Sloan Management Review 33 (3), 65–73.

Little, D., Kenworthy, J., Jarvis, P., Porter, K., 1995. Scheduling across the supply chain. Logistics Information Management 8 (1), 42–48.

Logan, Jr. and Harold, R. (2001), ''Controlling the uncontrollable'', Strategic Finance, Vol. 82 No. 10, pp. 56-61.

MacBeth, D.K., Ferguson, N., 1994. Partnership Sourcing: An Integrated Supply Chain Management Approach. Pitman

Maloni, M. and Benton, W.C. (2000), "Power influences in the supply chain", *Journal of Business Logistics, Vol. 21 No. 1,* pp. 49-73.

Maloni, M.J., Benton, W.C., 1997. Supply chain partnerships: Opportunities for operations research. *European Journalof OperationalResearch 101*, 419–429.

Mapes, J., New, C., Szwejczewski, M., 1997. Performance trade-offs in manufacturing plants. *International Journalof Operations & Production Management 17 (10),* 1020–1033.

Mark Rainbird, (2004) " Demand and supply chains: the value catalyst", *International Journal of Physical Distribution & Logistics Management Vol. 34 No. 3/4*, pp. 230-250 :Emerald Group Publishing Limited, 0960-0035

Martin, C. Evans, G.N., Naim, M.M. and Towill, D.R. (1996), "Educating the supply chain: an holistic approach", *International Journal of Materials and Product Technology, Vol. 11 Nos 5/6*, pp. 464-76.

Mason-Jones, R., Naylor, B. and Towill, D.R. (2000), "Engineering the leagile supply chain", *International Journal of Agile Management Systems, Vol. 2 No. 1*, pp. 54-61.

McAdam, R. and McCormack, D. (2001), "Integrating business processes for global alignment and supply chain management", *Business Process Management Journal, Vol. 7 No. 2*, pp. 113-30.

McDermott, C.M., Greis, N.P. and Fischer, W.A. (1997), "The diminishing utility of the product/process matrix – a study of the US power tool industry", *International Journal of Operations & Production Management, Vol. 17 No. 1*, pp. 65-84.

McGillivray, G. (2000), "Commercial risk under JIT", Canadian Underwriter, Vol. 67 No. 1, pp. 26-30.

Mentzer, J.T. (2001): Defining Supply Chain Management, in: *Journal of Business Logistics, Vol. 22, No. 2, 2001*, pp. 1–25

Mentzer, J.T. (2001), Supply Chain Management, Sage, Thousand Oaks, CA.

Mentzer, J.T., Dewitt, W., Keebler, J.S., Soonhong, M., Nancy, W.N., Smith, C. and Zacharia, Z.G. (2001), "Defining supply chain management", *Journal of Business Logistics, Vol. 22 No. 2*.

Merli. G. (1991), Co-makership: The New Supply Strategy for Manufacturers, Productivity Press, Cambridge, MA.

Mohanty, R.P. and Deshmukh, S.G. (2005), Supply Chain Management: Theories and Practices, IIE Solutions, June, pp. 20-4.

Mollenkopf, D., Gibson, A. and Ozanne, L. (2000), "The integration of marketing and logistics functions: an empirical examination of New Zealand firms", *Journal of Business Logistics, Vol. 21 No. 2*, pp. 89-112.

Nahm, A.Y., Vonderembse, M.A. and Koufteros, X. (2004), "The impact of organizational culture on time-based manufacturing and performance", Decision Sciences, Vol. 35 No. 4, pp. 579-607.

Naylor, J.B., Naim, M.M. and Berry, D. (1999), "Leagility: integrating the lean and agile manufacturing paradigms in the total supply chain", *International Journal of Production Economics, Vol. 61 Nos 1/2*, pp. 107-18.

Neuman, J. and Samuels, C. (1996), "Supply chain integration: vision or reality?", Supply Chain Management, Vol. 1 No. 2, pp. 7-10.

Novich, N., 1990. Distribution strategy: Are you thinking small enough? Sloan Management Review 32 (1), 71–77.

Oliver, R.K. and Webber, M.D. (1982), "Supply chain management: logistics catches up with strategy", Outlook, reprinted in Martin Christopher (1992), Logistics: The Strategic Issues, Chapman & Hall, London.

Parker J.C. and Torres, T.R. 1994. "Micro-and Small-Scale Enterprise in Kenya." Results of the 1993 national Baseline Survey. GEMINI Technical Report No. 75. Development Alternatives, Inc.

Peter Gilmour (1999), a Strategic Audit Framework To Improve Supply Chain Performance: *Journal Of Business & Industrial Marketing, Vol. 14 no. 5/6 1999*, pp. 355-363, # MCB University Press, 0885-8624

Pilkington, A. and Liston-Heyes, C. (1999), ''Is production and operations management a discipline? A citation/co-citation study'', *International Journal of Operations & Production Management, Vol. 19 No. 1*, pp. 7-20.

Poluha R. G (2007). Application of the SCOR Model in Supply Chain Management. Youngstown, New York 2007, ISBN 1934043230.

Porter, M. E. (1985) Competitive Advantage: Creating and Sustaining Superior Performance (New York: Free Press).

Porter, M. E. (1987) 'From Competitive Strategy to Corporate Strategy', Harvard Business Review, May–June.

Prasad, S. and Sounderpandian, J. (2003), "Factors influencing global supply chain efficiency: implications for information systems", Supply Chain Management: *An International Journal, Vol. 8 No. 3,* pp. 241-50.

Radjou, Navi. (2000) "Deconstruction of the Supply Chain," Supply Chain Management Review, November/December 2000, 30-41.

Ramdas, K. and Spekman, R.E. (2000), "Chain or shackles: understanding what drives supply-chain performance", Interfaces, Vol. 30 No. 4, pp. 3-21.

Rindfleisch, A. and Moorman, C. (2003), "Interfirm cooperation and customer orientation", *Journal of Marketing Research, Vol. 40,* pp. 421-36.

Rushton, A., Oxley, J., 1989. Handbook of Logistics and Distribution Management. Kogan Page Ltd., London.

Russel, D.M. and Hoag, A.M. (2004), "People and information technology in the supply chain: social and organizational influences on adoption", *International Journal of Physical Distribution & Logistics Management, Vol. 34 No. 2*, pp. 102-22.

Russell, K. (2001), ''Supply chain management'', Computerworld, Vol. 35 No. 51, pp. 32.

Safizadeh, M.H., Ritzman, L.P., Sharma, D. and Wood, C. (1996), "An empirical analysis of the product-process matrix", Management Science, Vol. 42 No. 11, pp. 1576-91.

Sengupta, S. and Turnbull, J. (1996), ''Seamless optimization of the entire supply chain'', IIE Solutions, Vol. 28 No. 10, pp. 28-32.

Shank, J.K. and Govindarajan, V. (1993), Strategic Cost Management, The Free Press, New York, NY.

Shapiro, B.P. (1988), "What the hell is 'market orientation'?", Harvard Business Review, No. 66, pp. 19-25.

Shapiro, J.F. (2004), ''Strategic planning: now more important than ever'', Supply Chain Management Review, pp. 13-14.

Siddharth Varma, Subhash Wadhwa and S.G. Deshmukh (2006) Implementing supply chain management in a firm: issues and remedies: Asia Pacific Jour nal of Marketing and Logistics: Vol. 18 No. 3, pp. 223-243: Emerald Group Publishing Limited 1355-5855

Skjoett-Larsen, T. (1999), "Supply chain management: a new challenge for researchers and managers in logistics", *International Journal of Logistics Management, Vol. 10 No. 2,* pp. 41-53.

Slack, N., Chambers, S., Harland, C., Harrison, A., Johnston, R., 1995. Operations Management. Pitman Publishing, London.

Slater, S.F. (1995), "Issues in conducting marketing strategy research", *Journal of Strategic Marketing, Vol. 3 No. 4,* pp. 257-70.

Spekman, R., Kamauff, J. and Myhr, N. (1998), "An empirical investigation into supply chain management: a perspective on partnerships", Supply Chain Management, Vol. 3 No. 2, pp. 53-67.

Spekman, R., Salmond, D. and Kamauff, J. (1994), "At last procurement becomes strategic", Long-Range Planning, Vol. 27 No. 2, pp. 76-84.

Spencer, M.S. and Cox, J.F. III (1995), "An analysis of the product-process matrix and repetitive manufacturing", *International Journal of Production Research, Vol. 33 No. 5*, pp. 1275-94.

Stalk, G. and Hout, T. (1990), Competing Against Time: How Time-based Competition is Reshaping Global Markets, The Free Press, New York, NY.

Stank, T.P., Keller, S.B. and Closs, D.J. (2002), "Performance benefits of supply chain logistical integration", *Transportation Journal, Vol. 41 Nos 2/3*, pp. 32-46.

Stevens, G.C. (1989), "Integrating the supply chain", *International Journal of Production Distribution and Materials Management, Vol. 19 No. 8*, p. 38.

Stewart, G., 1995. Supply chain performance benchmarking study reveals keys to supply chain excellence. Logistics Information Management 8 (2), 38–44.

Storey, J. (2002), "What are the general manager issues in supply chain management?", *Journal of General Management, Vol. 27 No. 4*, pp. 65-79.

Storey, J., Emberson, C. and Reade, D. (2005), "The barriers to customer responsive supply chain management", *International Journal of Operations Management, Vol. 25 No. 3*.

Taylor, D.H. (1999), "Supply chain improvement; the lean approach", Logistics Source, January/February, pp. 14-20.

The Global Logistics Research Team. World Class Logistics: The Challenge of Managing Continuous Change, Oak Brook, Ill.: Council of Logistics Management, 1995.

Thomas, D.J., Griffin, P.M., 1996. Co-ordinated supply chain management. *European Journalof Operational Research 94 (3)*, 1–15.

Towill, D.R., Naim, M.M. and Wikner, J. (1992), "Industrial dynamics simulation models in the design of supply chains", *International Journal of Physical Distribution & Logistics Management, Vol. 22 No. 5*, pp. 3-14.

Tranfield, D. and Starkey, K. (1998), "The nature, social organization and promotion of management research: towards policy", *British Journal of Management, Vol. 9*, pp. 341-53.

Trevile, S.D., Shpiro, R.D. and Hameri, A. (2004), "From supply chain to demand chain: the role of lead time reduction in improving demand chain performance", *Journal of Operations Management, Vol. 21*, pp. 613-27.

Tu, Q., Vonderembse, M.A., Ragu-Nathan, T.S. and Ragu-Nathan, B. (2004), "Measuring modularity-based manufacturing practices and their impact on mass customization capability: a customer-driven perspective", Decision Sciences, Vol. 35 No. 2, pp. 147-68.

Uta Ju¨ttner, (2005): Supply chain risk management: Understanding the business requirements from a practitioner perspective. *The International Journal of Logistics Management. Emerald Group Publishing Limited Vol. 16 No. 1*, pp. 120-141

van Hoek, R.I., 2001. The contribution of performance measurement to the expansion of third party logistics alliances in the supply chain. *International Journal of Operations & Production Management 21 (1/2)*, 15–29.

Van Hoek, R.I., Voss, R.I. and Commandeur, H.R. (1999), "Restructuring European supply chain by implementing postponement strategies", Long Range Planning, Vol. 32 No. 5, pp. 505-18.

Vrat, P. (1998), "Supply chain management in India: problems and challenges", in Sahay, B.S. (Ed.), Supply Chain Management for Global Competitiveness, Macmillan India, New Delhi, pp. 10-24.

Webster, M. (2002), "Supply system structure, management and performance: a conceptual model", *International Journal of Management Reviews, Vol. 4 No. 4*, pp. 353-69.

Weigand, R.E. (1968), "Why studying the purchasing agent is not enough", *Journal of Marketing, Vol. 32 No. 1*, pp. 41-5.

Womack, J. and Jones, D.T. (1996), Lean Thinking: Banish Waste and Create Wealth in Your Corporation, Simon and Schuster, London.

Womack, J. and Jones, D.T. (2005), Lean Solutions: How Companies and Customers can Create Value and Wealth Together, Simon and Schuster, London.

Wu, W., Chiag, C., Wu, Y. and Tu, H. (2004), "The influencing factors of commitment and business integration on supply chain management", Industrial Management & Data Systems, Vol. 104 No. 4, pp. 322-33.

Zheng, S., Yen, D.C. and Michael (2000), ''The new spectrum of cross enterprise solutions: the integration of supply chain management and enterprise resource planning systems'', *Journal of Computer Information Systems, Vol. 41 No. 2,* pp. 84-93.

Zokaei, K. and Simons, D.W. (2006a), "Value chain analysis in improvement of customer focus: a case study of UK red meat industry", *International Journal of Logistics Management. Vol. 17 No. 2.*