2.1 Literature Review preamble

The successes achieved by organisations that implement the strategic supply chain management approach will certainly have a positive impact on the popularity of the approach and a trend towards implementing the supply chain management approach by increasingly more organisations is to be expected. This trend will undoubtedly influence small and medium-sized businesses (SMEs).

Management concepts that businesses adapt in their endeavour to implement the supply chain management approach include business process re-engineering resulting in optimal asset utilisation, total cost of ownership, total quality management, just-in-time, electronic data interchange, e-business, global sourcing, multi-functional and multi-organisational purchasing teams and strategic partnerships.

Emerging trends indicate intense global competition and that in turn demands businesses to be quick, agile and flexible. New technology is available to any business willing to adopt it. More advanced and dynamic are the customer expectations.

Globally, companies such as Wal-Mart, Proctor & Gamble, and Hewlett-Packard have saved millions of dollars in costs and decreased inventories while improving efficiency and customer satisfaction.\(^9\)

Increasingly larger businesses in India have begun working towards implementing the strategic supply chain management approach and a realisation has

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taken place that strategic supply chain management practices will result in cost savings of crores of rupees. SMEs who are vital cog in the wheel of corporates’ success will also benefit.

2.2 The relevance of SME

The rationale for the promotion of SMEs emanates from the socio-economic benefits, which accrue to the national economy. These enterprises are characterised by:

1. low capital investment
2. generate opportunities for employment
3. can be located in remote and far flung areas
4. use local natural resources and local skills
5. meet local needs of a "limited market" for consumer goods and services
6. enterprising spirit of the populace always gets nurtured by the scale of economy

Moreover, from a social perspective SMEs help reducing migration from interior and rural areas to urban centers. This contributes to fewer urban slums and the consequences.

Besides, with the increase in population and inability of the agriculture sector to absorb a growing population, all governments, whether of developed or developing countries, have adopted consciously well articulated policies for promotion of SMEs in view of the need to create employment opportunities, whether
for oneself or otherwise in this sector. These enterprises already form a significant part of the overall industrial structure of United States, Europe, Japan and the developing worlds of Asia and Africa.

Despite these unique advantages, the growth of the small enterprise beyond a critical point is not possible. Generally, the competitiveness in a global market seems to be beyond their reach. This is where the concepts and practice of supply chain management techniques come handy for such enterprises to move ahead from a nascent state of existence to a mature firm; the clients of these SMEs can see how to develop a partnership to nurture and aid the growth of these SMEs.

SMEs must fully understand the supply chain management approach and their role. Large organisations on their part also must realise that despite their size, SME suppliers are important partners who can contribute substantially to savings in the supply chain. Approaches pertaining to supply chain management vary substantially from organisation to organisation and even from one manager to another.¹⁰

They further studied the various definitions of the concept of supply chain management in depth. They concluded that to successfully implement supply chain management, businesses must possess the following characteristics:

- They must be relentlessly customer centric.
- They must be driven to improve asset efficiency.
- They must recognise inter-business collaboration as critical.
- They must focus on processes rather than functions.

They must view open communication as a must.

They must factor people into every decision.

They must invest in information technology as an enabler.

They must be obsessed with performance measurement.

It is therefore important to define the concepts of supply chain and supply chain management environment for application of SCM in an industry cluster especially from SME perspectives and to see what literatures have to offer from the point of view of supply chain performance in an industrial cluster to highlight the angle taken on these concepts in this research work.

2.3.1 Defining a supply chain

A supply chain encompasses all activities associated with the flow and transformation of goods from the raw material stage (extraction), through to the end users, as well as the associated information flows both up and down the supply chain\(^\text{11}\).

It has a physical element (the strategic partnering of various market focussed responsive organisations involved in the transformation of specific goods) and the information element (controlled sharing of business data and processes). These activities include systems management, operation and assembly, purchasing, production scheduling, order processing, inventory management, transportation, warehousing and customer service.

\(^{11}\) Robert B Handfield, Robert M Monczka, Larry C Giunipero, James L Patterson “Sourcing and Supply Chain Management”, International 5e, South Western Publishers
Organisations in the supply chain focus on their core activities and outsource the remaining operations to other business partners. This results in strategic partnering or alliance formation of various segments of business. This is achieved via the implementation of an efficient and effective information flow system - for the organisation and its business partners\(^\text{12}\) also supply chains consist of companies that build portals linking buyers and suppliers - providing a platform to exchange information about products, inventory, capacity, shipment and payment.

Christiaanse and Kumar (2000) are of the opinion that in order to compete successfully, a supply chain needs to be responsive to the customer's demands, provide mass and individualised products or services at the lowest cost and response time at an acceptable level of quality\(^\text{13}\).

Supply chains are series of linked suppliers and customers - every customer is in turn a supplier to the next downstream organisation until a finished product reaches the ultimate end user. There is a need to work on the facets of efficient and responsive supply chains\(^\text{14}\). Management of the supply chain has evolved over the last two decades from an emphasis on integrating logistics and lowering costs to providing better products and services to customers, quickly and cheaply\(^\text{15}\).

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\(^{14}\) Sunil Chopra, Peter Meindl, Supply Chain Management, 2/E, 2004, Prentice Hall

\(^{15}\) John Gattorna, Strategic Supply Chain Alignment - Best Practice in Supply Chain Management (1998), Gower
Supply chain management is a dynamic enabler for organisations to realise the challenge of getting products to consumers when, where, how and in the quantity required in a cost effective manner.\footnote{Robert B. Handfield, Ernest L. Nichols, Jr., \textit{Introduction to Supply Chain Management}, 1998, Prentice Hall}

Supply chain management focuses on control of the entire supply chain - placing strategic emphasis on value-added activities and total cost savings.\footnote{David J Pooler, Victor H Pooler, \textit{Purchasing and supply management}, 1997, Springer} Gattorna (1998) takes it a step further by suggesting that corporate and supply chain goals should be united, to improve profitability and growth - thereby increasing shareholder value.

Supply chain management therefore enables organisations to identify formal processes to integrate all activities associated with the flow of goods from extraction to the final consumer by strategically establishing inter business collaboration and information sharing, with the emphasis on value-added activities and total cost savings. Supply chain management provides a method of addressing the competitive challenges facing business today.

SMEs also therefore can benefit from the best supply chain management practices. SMEs can also benefit from global competition. Small businesses are already vital links in the supply chains in which they participate. By virtue of their size, flexibility and expertise they possess advantages that they can use to benefit their supply chain and strengthen their own businesses. Technology is increasingly affordable and available to help SMEs take advantage of competitive supply chain
strategies. Moreover various business functions are usually performed by one or a few persons working together.

SMEs can take advantage of the supply chain management strategy\textsuperscript{18} for:

- SMEs are critical links in many supply chains.
- SMEs are very flexible.

Because of the competitive pressures facing small businesses it is critical for them to use supply chain perspectives and associated strategies to create synergies with supply chain partners in order to succeed in the global competitive environment. Despite the optimism of Chapman et al (2000) there is reason to doubt the general implementation of the supply chain management approach and willingness and ability to implement the approach by small businesses.

Many SMEs are still in infant stage and it is much easier for them to re-engineer existing business processes and adopt a supply chain management approach than for a larger organisation with a longstanding structure, repute and culture.

A supply chain can therefore be viewed as the formation of a value chain network consisting of individual functional entities committed to the controlled sharing of business data and processes in a strategic alliance. The increasing importance of supply chain management is forcing businesses to adopt the new management approach.

\textsuperscript{18} Chapman, S., L.P. Ettkin & M.M.Helms (2000, August), \textit{Do small businesses need supply chain management?} \textit{IIE Solutions}, 31-36
2.3.2 Supply chain environment

The key concept is that a supply chain is a network. It is a network of companies that are linked to produce value in the form of products and services for the final consumer. Thus for example, an apparel producer/manufacturer is part of a supply chain that extends upstream to yarn producers and downstream through distributors and retailers to the final consumer. Management of this chain, as opposed to the company in isolation, is increasingly being recognised as fundamental to business success. In practice, supply chain management seeks to break down the barriers that exist between each of the links in the supply chain, in order to achieve higher levels of service and substantial cost savings. Thus companies are beginning to realise that they no longer exist independently from others.

Reducing costs through passing them onto another node in the supply chain member does not make a company competitive. Ultimately all the costs make their way and get reflected in the price paid by the end user. However, reducing costs by taking them out of the chain or eliminating the non-value add activities in the chain makes the chain more competitive and allows cost reductions to be passed onto the final consumer.

We can see the benefits where in the cement industry clinkers are kept in the front end in the market rather than the cement itself. Same is the case in the paint industry where final colours are made at the market based on the choice of the ultimate customer. This is principle of postponement. Wastage reduction in the chain, improved
material handling and inventory control at different nodes in the supply chain can lead to cost reduction which can be passed on to the final customer.

The importance of SMEs in any economy cannot be overlooked as they form a major chunk in the economic activity of nations. In India SSI sector accounts for around 95% of the industrial units, 40% of the manufacturing sector output, 36% of exports and provides direct employment to 18 million persons in around 3.2 million registered SSI units. The SSI sector in India contributes to about 7% of India's GDP. A number of issues and business practices of global players and markets are to be observed, learned and adapted for ensuring competitiveness of Indian SMEs. Among the crucial factors are funding or financial strategies along with the cost effective cooperative/networked environmental management systems.

As the knowledge economy gains ascendence over the traditional brick-and-mortar economy, far better opportunities are emerging for the Indian small units in the service sector. As the Competition increases among Indian SMEs, there is also increase in competition from the global players as a result of liberalisation and globalisation of the Indian Economy. Hence, it is becoming crucial to look into the effectiveness and competitiveness of Indian SMEs.

2.3.3 SCM for competitiveness

Today's global market is characterised by excess production capacity, intense competition, mobile factor resources, an educated workforce, sophisticated transportation and computer networks and near instant communications. In this environment the most successful companies will not simply be those that are able to
design, produce and promote a stream of high quality, innovative, and competitively priced products but will be those that are able to do these things, plus get product and materials, together with detailed information, delivered through extended, fragmented, and often inefficient global pipelines, precisely when, where, how and in the quantities ordered.

Over the past couple of decades companies have worked hard to take time, cost and risk out of their supply chains. Many industrial countries have benefited significantly from these efforts. For example, in the U.S., logistics costs, a major cost component of the supply chain, are now about 8.5 % of GDP, down from 16% in 1980.

Their success of supply chain largely came from mutual trust, alliance, co-operation, information sharing and harmonious relationships with all the supply chain partners. In the international setting, Mc Donald's "supply- logistics" is an interesting case system of various functions in the areas of material, operations, distributions, marketing and services after sales with a customer focus in perspective so as to synergise various processes in the organization with a view to offering best customer service in a cost- effective manner. Besides operating the system in their own organisations, they have developed a large base of SME ancillaries / vendors and successfully inculcated in them the use of ICT based supply chain systems. The enterprises could gain a competitive edge in the global market by placing due emphasis on their value addition capabilities19.

19 Using ICT and Knowledge Management to Facilitate SMEs Participation in Regional and Global Supply Chains with focus on Bangladesh, Bhutan, Mongolia and Timor-Leste – An Outline by Sailendra Narain
Here the value chain depicts both forward and backward movements of goods, inventory, cash, value and information for greater market dominance and core competency.

Review of literature reveals that the concept and practice of global supply chain stems from the fact that improvements in ICT usage have resulted in two-front benefits; (i) efficiency improvements, essentially driven by better information flows translating into better material management, which resulted into the implementation of technologies such as, electronic data interchange (EDI) and (ii) effectiveness improvements, driven by better information flows which resulted into re-engineering of entire supply chain.

However, the lessons drawn from practice have also shown that SME suppliers have suffered during the recession and due to other adverse factors, which are often regulated by MNCs.

Unlike large industries, SMEs have yet to perceive the resultant advantages of these modern techniques and practices in full measures. Initially the concept of inter-organisational systems\textsuperscript{20} (IOS) propounded that to coordinate data outside of organization limits requires significant management effort.

When each company system functions within a still larger "total system," inefficiencies will be apparent if this holistic system is not managed as such. Here, IOS has been mentioned to broaden the concepts of EDI and electronic supply chain links, to encompass issues of governance and supply chain design that are relevant

\textsuperscript{20} Kaufmann, F. “Data system that cross company boundaries”, Harvard Business Review, 1966, Jan-Feb, 141-145
in the context. In doing so, the prudence demands to separate the drivers and inhibitors to the adoption of electronic supply chain links from objectives and designs. Adoption of the supply chain drivers though could result in a slew of benefits would eventually put pressure on the company to allocate resources to its supply chain. This needs focused attention.

The present study looks at this aspect from the point of view of asset utilisation for the SMEs.

Global supply chain network is central to the operational strategy of any company and therefore effective supply chain management has been recognized to have significant impact on overall business performance\(^\text{21}\). Traditionally, supply chain has been efficiency-driven, aiming to pass the product through the chain in the shortest time with the lowest cost. Effectiveness and competitive advantage are now at the center of many supply chain improvement initiatives. Managing their supply chain helps companies achieve a variety of benefits, including reduced transaction costs, improved customer service and increased customer retention.

Although large organisations have invested significant amounts of money to integrate their supply chains, the development of supply chain integration among Small to Medium Sized Enterprises (SMEs) is slow-moving. For SMEs, ‘integration’ is a significant problem due to high costs and technology requirements. Hence, they follow different approach to integrate their supply chains.

Nowadays, the use of technologies help the organisations to better manage their supply chains, as supply chain management applications built on technology platforms have enhanced the ability of organisations to integrate their processes through collaborative information sharing and planning\textsuperscript{22,23}. For example, the uses of integration technologies like EAI and Web Service to support the integration of supply chains. With supply chain integration that companies anticipate customers' desires and meet their demands.

Sound Financial interventions should ultimately rest on three basic issues namely Sustainability (improvements in margin, asset utilisation), Outreach (buyer relationships/targeting) and Accountability (quality initiatives and ethical practices from top management). Provisions of these are crucial for SMEs to achieve competitiveness.

Through supply chain, companies improve the integration and operation of the complete materials management and thereby achieving better customer service and resource utilization. Supply chain technique is gradually adopting outsourcing as potential tool for competitiveness.

We have thus far discussed and defined ‘supply chain management’ from the study point of view. We will now analyse various developments with respect to industrial clusters, their relevance and how supply chain performance is relevant to these clusters.

\textsuperscript{23} Ravi Kalakota, Marcia Robinson, e-Business 2.0: Roadmap for Success, 2nd Edition 2000 Addison-Wesley Professional
2.4.1 Cluster Concept

Alfred Marshall, the English economist, is supposed to have propounded the cluster concept in 1910. He examined the industrial districts found in Europe and explained that main reasons of localization of industry are physical conditions such as climate and availability of raw materials.

These factors resulted in benefits of externalities for firms within them such as technology availability, access to a skilled labour, access to inputs and marketing advantages. These externalities provided competitive advantage both domestically and internationally. Firms located in industrial districts are highly competitive in the neoclassical sense, and in many cases there is little product differentiation. The major advantages of industrial clusters arise from simple propinquity of firms, which allows easier recruitment of skilled labour and rapid exchanges of commercial and technical information through informal channels.

It can be inferred that when economies of scale are limited to optimum, competitive capitalism is at its most efficient and the transaction costs are reduced to a practical minimum. The preferred locations for new entrepreneurs are those where demand is large or supply of inputs is more convenient and these are places where other producers of similar goods are already located. The competition that exists between firms located in a cluster drives productivity and innovation creating new resource endowments such as skilled staff and technological know-how. Human capital has also been identified by some as the main engine of growth.
It is now generally acknowledged that clustering of enterprises can contribute to regional and urban economic growth in developing countries. They can in particular facilitate private sector development among broad strata of the population, resulting in more employment, higher incomes and more generally, dynamic development in the concerned regions or cities.

2.4.2 Cluster Definitions

- “Clusters are a geographically proximate group of interconnected companies and associated institutions in a particular field linked by commonalities and complementarities. Clusters encompass an array of linked industries and other entities important to competition … including governmental and other institutions – such as universities, standard setting agencies, think tanks, vocational training providers and trade associations” Porter (1998)

- “..geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue, that share specialized infrastructure, labour markets and services, and that are faced with common opportunities and threats.” Rosenfeld (1997)

- “..Regional clustering has been used to describe industrial districts of small crafts firms, high technology centers, agglomerations of financial and business service firms in cities, company towns, and large branch plants and their supply

24 Source: OECD 2007
chains.” “...clusters at least must be characterized along relevant dimensions if appropriate policies are to be devised ... (these include) ...density...breadth...depth...activity base...growth potential...innovative capacity.” *Enright* (1998).

- “...clusters are relatively dense networks of enterprises and organizations, the value chains of which are connected but not necessarily through what we usually understand by economic transactions.” *(cf. Steiner 1998)*

**UNIDO cluster definition:** Cluster can be defined as concentration of micro, small and medium enterprises in a given geographical location producing same or a similar type of products or services and these enterprises face similar type of opportunities and threats. The cluster is known by the name of the product being produced by principal firms and the place they are located in.

Two general findings stand out which should be underlined from the outset, namely that one can find clusters everywhere, and they form 'spontaneously'. From this follows that in order to understand what happens in clusters in the developing countries today it is useful to know what has happened in clusters elsewhere and earlier. However, attempts to transfer and impose 'models' are as unlikely to succeed in this case as in others.

The main point, however, is that support to clustering per se is not called for, except in a few local cases, perhaps, and research needs to be formulated accordingly. The issue is not whether clusters exist (they manifestly do) or whether they somehow influence enterprise operation (this has been shown convincingly in a large number of cases).
The clusters are an intermediate level between the enterprise level on the one hand and regional and national economies on the other hand.\(^{26}\)

In the developing countries they shape in particular what we have elsewhere called local economies.\(^{27}\) However, they can also be embedded in global production chains and they are generally traversed by input and output linkages, the scope of which can be strictly local, regional, national or global. Hence, while focusing on clusters and clustering it is important to realise that they operate in a dynamic environment where in they have multifarious connections with economic activities elsewhere.

Industry cluster is composed of support institutions and similar firms with a specialized division of labor or related enterprises on the value chain; On the other hand, industry clusters have vertical specialization and horizontal scale in the value chain.

Small and Medium Enterprises as the supply chain node constitute the entity in the industry cluster. In accordance with the strategic thinking of supply chain management these enterprises form a functional linkage of network chain and a coordinated operation and collaboration under an overall management is possible. These node enterprises can also be the integral entity of industrial clusters because of inert firm relations.


\(^{27}\) Meine Pieter Van Dijk and Arni Sverrisson, *Enterprise clusters in developing countries: mechanisms of transition and stagnation*, *Entrepreneurship and Regional Development*, 15, July-Sep 2003, 183-206
While defining a cluster, it is to be seen that too wide a product range will make product group meaningless because the common opportunities and threats cannot be said to exist for a wider range. Too large a geographical area will not allow the firms in the cluster to take benefit of development through proactive joint action. Also, defining product too narrowly will make the cluster mapping process meaningless. It is pertinent to mention that conglomeration of firms does not necessarily imply a ‘cluster’.

In that sense, industry cluster is a selected set of a group of chains, and accordingly the node enterprises on the supply chain are also integral entities of industrial clusters. Industry cluster is the geographical concentration of the supply chain. If supply chain is spread in a number of spatial locations, it is possible that supply chain superposition can occur in one or more spaces. In a sense, it could be considered that industry cluster is a local concentration of one or more supply chains in the certain space, and the local concentration of the supply chain includes the fact that supply chain concentrate in the local area, as well as the concentration of a part of supply chain in a certain space; in fact, it is very difficult to find out a supply chain concentrate entirely on a spatial location. For example, an apparel making unit depending on the market they serve could be both in the domestic supply chain as well as the export supply chain. Again a further and finer differentiation can be done depending on whether they directly deal with the ultimate customer or whether they are supplying to another node in the chain who deals with the ultimate customer.
From the above discussions it can be concluded that the industry clusters are characterised by:

1. geographically agglomeration
2. mere geographic agglomeration does not guarantee SC performance
3. conglomerations of firms may not result in cluster
4. both product ranges and geography in the cluster should not be too wide
5. such clusters are known by the principal product
6. have similar opportunities, competition and threats
7. firms in the cluster are generally small and medium
8. complementarity can result in collaboration

Tirupur textile cluster which has all the above characteristics does qualify to explore further how the adaptation of supply chain concepts to improve their performance. The present study focuses on Tirupur (geography) and garment units (part of the textile value chain) further to identify factors that influence the supply chain performance and to get deeper insights into how the SMEs in this subsect of larger textile chain perform in the limited geography.

2.4.3 Policy Framework for Cluster Development in India

Abid Hussain Committee on Small Scale Industry set up by the then Ministry of Small Scale Industry in its report in 1997 was the first to recommend to adopt the cluster approach for support to small and medium enterprises. Subsequently, in several Budget speeches the emphasis was made on adoption of cluster based
approach to increase the productivity and competitiveness of small and medium enterprises.

The Government of India announced on 10th August 2005 a policy package where cluster development was made the plank for making Indian SMEs globally competitive. The earlier scheme of Industrial Infrastructure Development (IID) was subsumed in the new scheme of Small Industry Cluster Development Programme.

In the budget speech of 2006-07 in the parliament, then Finance Minister said that “The Cluster Development model can be usefully adopted not only to promote manufacturing but also to renew industrial towns and build new industrial townships. The model is now being implemented, in one form or other, in nine sectors falling under different Ministries. The sectors include Khadi and village industries, handlooms, handicrafts, textiles, agricultural products and medicinal plants. It would be advantageous to empower a group to oversee cluster development and monitor progress. Hence, the Prime Minister has decided to constitute an Empowered Group of Ministers who lay down the policy for cluster development and oversee the implementation.” Thereafter an Empowered Group of Ministers (EGoM) under the chairmanship of the External Affairs Minister was constituted to lay down the comprehensive policy for cluster development and oversee its implementation by different ministries of the Government of India. State Governments of Gujarat, Madhya Pradesh, Andhra Pradesh, Kerala, Tamilnadu etc. in their Industrial Policy made the cluster development approach as a means to support, develop and enhance productivity of SMEs and make them globally competitive.
The cluster development is one of the thrust areas of the Ministry of Micro Small & Medium Enterprises for the 11th Five Year Plan. Thus cluster development became the buzz word.

Although clusters are the result of a spontaneous tendency for SMEs of the same or similar sub-sector to locate close to each other, there are also organized efforts to set up clusters from scratch, mainly through science parks or technical incubators – the grouping together of “start-ups” of small businesses usually based on more advanced technologies. Often situated close to universities or research institutes, they benefit from the technological advice and help of faculty members as well as from the more practical administrative support services of the incubator and, in many cases, the interchange with other scientifically or technically minded entrepreneurs. The limitations of such forms of constructed spatial agglomerations, however, are that they often lack effective mechanisms to stimulate networking among the firms artificially clustered, are poorly managed and, even more importantly, contribute little to the growth of the local economy, because of their isolation.

Hence it is imperative that cluster whether formed naturally or otherwise will have to mesh well the local environment, needs and the scale of economy.

2.4.4 Typologies of Clusters

It is estimated that there are 6400 clusters in India. A total number of 3811 clusters have been mapped. These clusters are spread all over India.
These 3811 clusters have been in the following typology:

(i) SME clusters - 630
(ii) Handloom clusters - 307
(iii) Handicraft clusters - 2874

Total - 3811

The State of Uttar Pradesh has the largest number of 419 clusters of all types followed by 299 clusters in West Bengal and 298 in Maharashtra. It may be observed that top 7 States of Uttar Pradesh, West Bengal, Maharashtra, Orissa, Andhra Pradesh, Gujarat and Tamil Nadu account for 54% of all types of clusters in India.

With regard to zonal spread of clusters, it will be observed that East Zone accounts for 1077 (28%), West Zone 957 (25%), South Zone 931 (25%) and North Zone 846 (22%).

2.4.5 Advantages of clustering

Industrial cluster provides quality environment for the sound development of the supply chain. What’s the most intuitive about industrial cluster is reflected in the fact that a large number of companies concentrate in a certain geographical location, but this concentration is based on specialised division of labor and socialised collaboration. Big, medium-sized and small enterprises co-exist in the cluster, and different types of enterprises exist in a symbiotic way, thus constituting an ecological enterprise group. In this eco-group, all enterprises collaborate in terms of the logistics, information flow, and capital flow. Upstream and downstream support
firms can share industrial infrastructure, human resources, intellectual property rights, and managerial knowledge so that they can be organically combined together so as to exist in a symbiotic way.

This offers a good operational environment for the supply chain in the industry cluster, directly resulting in the increase in overall performance of supply chain.

Industrial cluster increase collaboration and shared effects between enterprises as each node of supply chain. In the process of the protracted and localized competition and cooperation, what’s formed within an industrial cluster are unique network of relationships, knowledge and cultural atmosphere, and regional information exchange platform. Enterprises in the cluster unite closely and share interests, which is a substantial boost to collaboration between enterprises as supply chain nodes.

Because of geographical proximity, close ties between the leaders, and the fact that the operating mechanism of industrial clusters is based on such human factors as trust and commitment, the businesses within the cluster form a common formal or informal code of conduct and practice, and establish a close cooperative relations among one another, thus reducing the opportunistic tendency and minimising the risk and cost of cooperation.

Such cooperation will bring together suppliers, customers and even competitors in the supply chain to share skills and resources, enhancing inter-

\[28\text{ www.unctad.org/meetings}\]
enterprise sharing effects of supply chain. Industrial clusters reduce inter-enterprise transaction costs and improve operational efficiency of supply chain.

Industry cluster is an institutional arrangement to reduce transaction costs between businesses in the supply chain. This is due to the fact that formation of industrial clusters makes related industries constitute a virtual entity.

Low-cost operations by businesses in the supply chain will eventually bring about the rise in overall level of profits and competitive capabilities. The sound development of supply chain leads to an increase in the overall level of cluster efficiency or economic performance. In order for the enterprise as horizontal nodes of the value chain to gain a foothold in the competition, the competition between them is inevitable. A certain degree of competition will lead to the occurrence of innovation; however, cooperation is not without necessity. Because innovation is often a project of consuming a great deal of manpower, material and financial resources, it’s difficult for individual enterprises to make successful innovation in an independent manner.

In the face of attractive market opportunities as well as their limited technology and resources, it’s one of the best options to be cooperative. Enterprises in a vertical relationship of the value chain can also achieve common development because of the fact that they can share with each other and learn from each other in cooperation.

However, competitions between them still exist, because the high or low ability to innovate and the strong or weak advantage directly determine their
profitability and status of the supply chain. This regulation function of the supply chain can ensure the maintenance of a high level of cooperative relations and a simultaneous participation in competition in a proper way, thereby leading to a rise in the overall competitiveness of industrial clusters. In addition, the supply chain also carries an important significance for the industrial cluster, namely the integration by the supply chain of enterprises in industry clusters, as well as the transfer function of the value chain.

The operation concept of the supply chain is combining enterprises located in different geographical locations and possessing relevant core technologies to form them into an industrial cluster on the basis of information technology and through business outsourcing, virtual operations, and so on. According to the division of labor and cooperation, firms jointly conduct activities of creating value, and commercialize the advantages of industrial clusters in the form of support objects.

The competitive advantage of clustered companies derives from two main sources: the extent to which the knowledge base of these companies deepens and broadens to include design, quality control and information related to markets and marketing, and the establishment of linkages to a wider set of technology inputs and actors.  

The success of the cluster model is due to the fact that it is an example of endogenous development based on SMEs, which is strongly rooted in the local communities and often combines competitiveness and social stability. It is also due

to the fact that areas with consolidated systems of specialized small firms are generally more likely to create the conditions that increase efficiency and productivity on a long-term basis.

2.5 Competitive advantages of SME Clusters

The competitive advantages of SMEs grouped in clusters are based on three aspects: specialisation, cooperation and flexibility. When firms are located in clusters, small size is less of a limit because of access to subcontractors, parts and services available outside their own walls. Firm specialisation is crucial to the success of districts or clusters in that it allows small firms to focus their resources (which are often extremely limited) on what they do best (core competencies). Specialisation may also help curb problems of quality control - if a firm does only one thing but it has to do it well. However, specialisation does not occur automatically.

Certainly, small firms everywhere attempt to concentrate their efforts in areas in which they excel. One firm may be specialised in a certain phase of the production process if it operates near other firms specialised in complementary phases. The advantage of specialisation is related to individual firms, but also to the cluster as a whole. The development of the cluster is accompanied by increasing specialisation of technical and market competencies of local human resources. Local workers, technicians, managers and consultants often move from firm to firm; in this way the advantage of specialisation belongs to the local system, rather than to a single firm. Furthermore, local infrastructure and training institutions become increasingly specialised in the cluster activity. The know-how accumulated in the
local context becomes the main location factor for productive activities, even by external investors.

A cluster of firms working together in a productive system characterised by a division of labor among the members is obviously based on a high degree of inter-firm cooperation. Through a reliance on cooperation with other firms, small firms may accentuate their specialisation and compensate for any weaknesses.

Inter-firm cooperation is important in terms of the availability of resources and also in terms of firm flexibility. Cooperative inter-firm relations help firms be more flexible in terms of amount of production since firms may outsource more work when there is increased demand, and less when there is a decrease.

Cooperation among firms also helps firms be flexible in terms of type of production in that products can be made to order by grouping different contractors together according to the specialties required. This type of inter-firm cooperation requires coordination. In districts, there is often a strong presence of some form of intermediate governance structure. Governance is used here to mean the "institutional organization of economic activity". Italian case studies demonstrate that such intermediate governance structures play a key role in facilitating cooperative activities among firms and between firms and institutions. Such a presence of collaborating firms with different specialisations within a reasonable geography, facilitates looking at supply chain performance from industry cluster point of view even though there could clusters with in clusters. The study limits itself to looking

geography, facilitates looking at supply chain performance from industry cluster point of view even though there could clusters with in clusters. The study limits itself to looking into clusters involved in the production in the final stages and does not look at the linkages at the back end though in the present case, clusters could also exist at that level.

In the present times, industrial clusters have become the new mantra for economic development. It is now over a decade since SME clusters, that are regional concentrations of small and medium-scale enterprises involved in similar kinds of economic activities, have ceased to be a popular topic of academic research and have become areas of great attention for policy makers and practitioners in the field of economic development.

Industrial clusters have re-emerged popular fields for research and policy analysis. “The benefits of industry clustering were identified early by Sir Alfred Marshall in the year of 1919. According to Marshall these arise from localization economies; namely the availability of common buyers and suppliers, the formation of specialized and skilled labor pool and the informal transfer of knowledge.

Cluster development is attributable to several factors, including technology transfer, knowledge transfer, development of a skilled work force in related industries, the benefits of agglomeration economies, and social infrastructure. Porter attributes cluster development and growth to competition, and focuses on how these key factors drive competition.
An example might be a localised knitwear and garment industry, which includes within a small geographical area knitting firms, cloth-finishing, dyeing and printing units, garment producers, merchant buyers and exporters, and also producers of specialized inputs such as threads, buttons, up to textile machine suppliers.

The development of SSI cluster in India has hugely contributed to the phase of broad and extended industrialisation in all states\(^{31}\). It has been contributing immensely to the Indian economy, in terms of employment, production and exports. These clusters have been in existence in India for several decades and sometimes even for centuries. The SSI clusters have tremendous potential for generating sustainable employment at comparatively low costs.

In aggregate SSIs contribute 40 percent to the country's industrial output and 35 percent to direct exports. A large number (Estimated number of units: 3.57 Million) of clusters of various industries exist in all states of India. A study carried out by UNIDO has listed 350 SSI clusters covering 18 types of industries in 16 states.

Some of these Indian SSI clusters are huge in size which contributes up to 90 percents of India's total production output in selected products. For example, the knitwear clusters of Ludhiana produce 95 percent of the country's woolen knitwear, 85 percent of the country's sewing machines and 60 percent of the nation's bicycle and bicycle parts. Another famous industrial cluster of India is Tirupur (Tamil Nadu) which contributes 80 percent of the country's cotton hosiery exports.

\(^{31}\) http://web5.laghu-udyog.com/clusters
On the other hand, in spite of success and long heritage, SSIs in India have been facing failures as well. The big number of Indian clusters is not fulfilling its actual potential. In many cases the firms are surviving on the basis of low costs of labor. They do not participate in supportive production chains involving effective collaboration between firms and service institutions neither do they compete on the basis of improvements in their products, technologies, and skills etc.

Industry cluster policies have been intensive tools of economic development program. Cluster policies, on the other hand, are basically dependant on the relations that industries are connected in both direct and indirect ways.

Industry cluster policies have received significant attention in current literature. The literature in case studies shows different types of clusters. Examples of industrial clusters range from a hosiery cluster in Tirupur from a southern State, Tamil Nadu, or the apparel and woolen clothes cluster in Ludhiana, to second most acclaimed Silicon Valley of the world, Bangalore, a developed region of high technology engineering, telecommunications, machine tools, computers and related electronics firms.

Piore and Sabel, claimed a "second industrial divide," arguing that the saturation of mass markets for relatively standardized goods was giving way to consumer preference for greater variety and quality (Piore and Sabel, 1984). Their studies of Italian industrial districts showed that Cluster of small, craft-oriented industrial firms were profitable in the global market by producing distinctive, high-quality products in a diverse area, as for example furniture to textiles and apparel.
These industrial clusters or so called industrial districts achieved their success through flexible specialization and adjust themselves to respond as per market demand and to fill market with a quality and controlled quantity of products.

As mentioned by various economists in cluster related case studies there are two types of integrations found in industrial cluster, they are horizontal and vertical integration. Increased vertical integration occurs as the division of labor gets more specialized, and new firms are able to fill the new niche markets. For example, BPO and Call centre industries in various cities in India have shown vertical integration. Horizontal clustering occurs as the new technology and labor skills are applied to related industries in different sectors.

Holmstorm’s study on city of Bangalore Cluster shows as an example how it has spurred the horizontal clustering process where all factors are equally responsible and integrated to bring a boom in Bangalore based SSIs clusters. It should be noticed that Bangalore is not only a world famous information technology (IT) cluster, as mentioned in Holmstorm’s study also, but has also been a centre of other big industries such as machine tools, defense industry, telecom industry along with a large number of educational centers.

It means the enterprise of one creates a foothold for the other\(^{32}\). In brief, “It is a process in which enterprises creates for each other often unwillingly, some time intentionally” – like Bangalore computer industry that gave rise to global players but, started as a cluster of small firms. Clustering tends to attract traders but it does

not ensure effective trade links to larger markets. In Indian clusters, trade networks have not been highly developed although, prevalence of effective trade networks attracts new traders, e.g. the newly opened service of BPO in central and south India attracts US and European MNC to handle their customer.

Michael Porter (1990) says that “competition is a driving force behind cluster development. Clustering is a dynamic process, and as one competitive firm grows, it makes demand for other related industries. As the cluster develops it becomes a mutually reinforcing system where benefits flow backwards and forwards throughout the industries in the cluster”. The mobilisation and utilisation of physical capital, human capital and expected output of resources breaks down the investment in small, but risky steps.

Where trusts are missing, a production system requiring deepening specialisation and independence of formally independent firms is likely to develop. Lack of trust also produce obstacle in learning process\(^{33}\). Distrust between producers and traders, due to existing socio-cultural barriers can hamper the process of local learning and retard a cluster's technological development.

India has been a good example of such liberalisation for the last one decade. In 1991, Govt. of India has made more liberal to its economy by making more flexible to EXIM, FDI and industrial policy. “Local producers accustomed to an easy domestic market have suddenly started facing more exacting global markets.

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The early 1990s were characterised by disappearance of India's traditional low quality export market in the Soviet Union alongside the growing demand for high quality product in a domestic market”. In India, multilateral co-operation seems to be little in case of Agra cluster and conspicuously absent in the Ludhiana cluster.

In the Brazilian cluster, a strategic multilateral upgrading initiative was launched but it failed in the end due to the lack of support from large and influential manufacturers

Nadvi found that in the Mexican and Pakistani clusters large and medium sized firms improved their performance more than small one. But, in the Indian cases the distinction as not so much (Nadvi, 1999). All clusters can’t be similar in many ways as for example not all major software developments areas in India can be not exactly become Bangalore IT cluster.

There is a fairly close association between the export performance of Tirupur and the technological support received from South Indian Textile Research Association (SITRA). As stated by Ganguli the impact of SITRA institution on performance of Tirupur clusters in India is considerable. Certainly this institution appears to be valued by many other industrial research organizations in India (Ganguli, 1996). The forms of economic activity at a point in time play an important role.

Krugman (1991) writes that “small accidental events start a cumulative process in which the presence of a large number of firms and workers act as an incentive for still more firms and workers to congregate at a particular location. The resulting pattern may be determined by underlying resources and technology at some
very aggregate level; but at ground level there is a striking role for history and accident.”

A general review of the many attempts to establish clusters as engines of regional development suggests failure in more than half the cases; only as few as 10% are significantly successful (Johnston, 2003).

In a large size market enabled suppliers to provide specialized products. As Porter (1990) mentioned, the benefits to supplier location in clusters run both ways. Suppliers gain from the nearby market for their output, while client firms in the cluster gain from easy access to a range of services. The interaction between buyers and suppliers can trigger quicker and more effective responses to technical problems or demand changes, helping all the firms in the cluster.

This character found in all knowledge and high technology based Indian industrial clusters, they all are efficient to meet up their needs at their location as per example Noida (New Okhla Industrial development Area), Delhi in Capital of India is rising as one of knowledge, automobiles clusters cause, its fully able to meet up highly qualified skilled workforce at cheap rate. And near by area of NCR (national capital region) are centre for production of skilled workforce due to cluster of established educational institutions.

Michael Porter came in 1990s with a revolutionary theory of competitiveness with his book The Competitive Advantage of Nations (1990). In The Competitive Advantage of Nations, Porter describes industry clusters as the outcome of four factors, factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry.
Porter’s work shows, how a company’s location affects its strategy and performance. "The cluster is the manifestation of the diamond at work. Proximity, arising from the co-location of companies, customers, suppliers, and other institutions, amplifies all of the pressures to innovate and upgrade” (Porter, 2000)

The advantages at clusters include, an endogenous growth factor, growing from similar social roots, a common history, a strong sense of identity and cultural belonging. They are sometimes difficult to re-orient industrially, due to technological path dependency (Nadvi, 1999).

Many of social relationships are localized as per region. People are not simply workers or managers; they are also consumers, citizens, church-goers, kin, and community members. Different economic systems support and give rise to different social arrangements. Different social arrangements, in turn, support different economies.

As the social and institutional perspective on economic life emphasizes, economic systems are embedded in social systems, not separate from them. Therefore, it is often difficult to describe economic systems separately from the social systems to which they belong.34

These above can be easily find at some of South Indian clusters such as Tirupur Textile Cluster, that have good geographical conditions for textile products and also, artist, technician and local labourers are attached with this business since years ago.

Knowledge generations and flow is quite associated with institutional set up of a cluster. In a global economy with a high developed communication network and links to knowledge in other places is an important. “One objection to this localised model of information flows is that it may insulate firms potentially valuable information generated in other places and lead to an inbred thinking and a lock in that produces economic decline\textsuperscript{35}.”

Knowledge flows are a combination of local buzz and global pipelines. Firms rely on the knowledge strengths of their local cluster and also maintain external connections. It is indeed true that in a cluster there is enough scope to share one another’s strengths willingly when it matters and choice for the customers to establish contacts is wide open.

Often membership in a cluster provides the entry to global contacts\textsuperscript{36}. This in a way keeps the firms in the cluster on their toes but at the same time can also foster rivalry and competition. The challenges within the new business dynamics put higher expectations on visibility, velocity, accessibility and connectivity on supply chain partners\textsuperscript{37,38}.

\textsuperscript{35} Simmie, J. \textit{Innovation and clustering in the globalised international economy}, \textit{Urban Studies}, 2004, 41(5-6), 1095-1112
\textsuperscript{36} Bathelt Herald, Malmberg Andersand, and Maskell Peter, \textit{Clusters and Knowledge Local Buzz, Global Pipelines and the Process of Knowledge Creation}, 2002, IDEAS
Nowadays, business organizations are facing with a global economic environment in which quick responses should be made to rapidly-changing customer requirements and the market environment (Yan et al., 2010), with an increasing levels of technological innovation and shrinkage of buying points in many markets\(^3\).

Such a need for flexibility has brought together independent enterprises and has increased the importance of supply chains to provide products or services in a more effective and flexible manner.

Since these enterprises originate from various geographical locations, belonging to organizations with different interests, the coordination and integration of business processes involving all these independent enterprises becomes increasingly crucial to improve product and service quality to satisfy customers (Yan et al., 2001).

As competition moves beyond a single firm to the supply chain, QM (Quality Management) in the context of supply chain has started to attract more and more attention from researchers. As the focus is shifting from internal practices to the integration and assurance of processes spanning customers and suppliers, the integration of QM and supply chain topics has received additional importance for future competitiveness (Flynn & Flynn, 2005; Foster & Ogden, 2008; Kaynak & Hartley, 2008; Matthews, 2006; Robinson & Malhotra, 2005; Soltani et al., 2011).

In this respect, the need for closer cooperation both internally (between functions) and externally (among partners), as well as new longer-term relationships have been considered as the key features in modern quality management by Williams et al., (2006).

Kaynak & Hartley (2008) also provide empirical support for the relationships among QM practices and performance measures, basing their premises on the confirmed relationships by Kaynak (2003) among the following constructs:

- Supplier quality management
- Process management
- Quality performance
- Financial and market performance
- Management leadership
- Employee relations
- Product service design

As the idea of “enterprise” evolves into the idea of “extended enterprise”, traditional improvements within the enterprise proved to be insufficient in meet the challenges of the new era (Shao et al., 2006).

In this context, information-sharing on product and processes quality within the supply chain framework is becoming a critical factor for quality improvement and competitiveness. In their review of literature for quality management and SCM, Robinson & Malhotra (2005) clearly argue that quality practice should advance from traditional firm-centric, product-based mindset to an inter-organisational supply
chain orientation involving customers, suppliers and other partners, while considering internal QM implementation as the prerequisite to supply chain quality.

According to Yan et al., (2010) “satisfying customers can only take place when product quality, service and value are coupled at every node in the supply chain” and “quality management functions and activities should be taken beyond enterprise boundaries“. Similar ideas have also been mentioned by Flynn & Flynn (2005); Lee et al., (2006); and Wiliams et al., (2006); clearly indicating that the new concept of quality needs to be broad, supply-centric and encompassing.

Supply chain collaboration is often defined as “two or more chain members working together to create a competitive advantage through sharing information, making joint decisions, and sharing benefits which result from greater profitability of satisfying end customer needs than acting alone“\(^{40,41}\).

Identified benefits of collaboration\(^{42,43}\) include: revenue enhancements, cost reductions, operational flexibility to cope with demand uncertainties (Simatupang et al., 2005); increased sales, improved forecasts, more accurate and timely information, reduced costs, reduced inventory, improved customer service\(^{44}\);


division of labor, exchanges of knowledge about products and processes and cost and/or problem avoidance.

Identified risks of collaboration include: difficulty of implementation, failure to differentiate with whom to collaborate (Sabath & Fontanella, 2002); and opportunism (Hoyt & Huq, 2000). Although the number of “potential” benefits cited in the literature outnumber the “potential” risks, several authors have indicated that efforts to collaborate between firms is not always successful (Simatupang & Sridharan, 2005; Whipple, 2007).

SCM is such a complex phenomenon and breaking it into individual components for further investigation is more pragmatic and effective. Moreover the known interdependency among the members in the supply chain requires a form of weighting technique for measurement of performance but the unknown relationship makes this process difficult.

2.6 **Supply Chain network performance in a cluster**

Many firms look to continuous improvement as a tool to enhance their core competitiveness using SCM. Many companies have not succeeded in maximizing their supply chain’s potential because they have often failed to develop the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency.

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Lee and Billington (1992) observed that the discrete sites in a supply chain do not maximize efficiency if each pursues goals independently. They point to incomplete performance measures existing among industries for assessment of the entire supply chain. Measurements should be understandable by all supply chain members and should offer minimum opportunity for manipulation (Schroeder et al., 1986).

Performance studies and models should be created so that organizational goals and achievement of those goals can be measured, thus allowing the effectiveness of the strategy or techniques employed to be accessed. Quite often companies have a large number of performance measures to which they continue to add based on suggestions from employees and consultants.

They fail to realise that performance assessment can be better addressed using a trivial few - they are not really trivial, but instead are those few areas most critical to success. The metrics that are used in performance measurement and improvement should be those that truly capture the essence of organizational performance. A measurement system should facilitate the assignment of metrics to where they would be most appropriate. For effective performance measurement and improvement, measurement goals must represent organisational goals and metrics selected should reflect a balance between financial and non-financial measures that can be related to strategic, tactical and operational levels of decision making and control.

Individual performance measures are usually non-inclusive so the goal for a performance management system should be to include more aspects.
Table 2.1: Framework for Performance Measurement (Beamon 1999)

<table>
<thead>
<tr>
<th>Performance measure type</th>
<th>Goal</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources</td>
<td>High level of efficiency</td>
<td>Efficient resource management is critical to profitability</td>
</tr>
<tr>
<td>Output</td>
<td>High level of customer service</td>
<td>Without acceptable output, customers will turn to other supply chains</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Ability to respond to a changing environment</td>
<td>In an uncertain environment, the supply chains must be able to respond to change</td>
</tr>
</tbody>
</table>

Figure 2.1: Framework Supply Chain Measurement System (Beamon 1999)

R: Resources, O: Output, F: Flexibility

Beamon suggests focusing on measures for resources (R), output (O) and flexibility (F) (see figure 1). Examples for resource measures are: total cost for capital machines, distribution cost, inventory cost. Output can be measured quantitatively as number of items produced or number of on-time deliveries or
profit; alternatively qualitative measures like customer satisfaction or quality can be used.

Flexibility is harder to measure (Table 2 below). Beamon details on a quantitative approach for measuring it, focusing on volume, delivery, mix and new product flexibility.

**Table 2.2: Different Aspects of Flexibility (Beamon 1999)**

<table>
<thead>
<tr>
<th>Flexibility Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume flexibility</td>
<td>The ability to change the output level of products produced</td>
</tr>
<tr>
<td>Delivery flexibility</td>
<td>The ability to change planned delivery dates</td>
</tr>
<tr>
<td>Mix flexibility</td>
<td>The ability to change the variety of products produced</td>
</tr>
<tr>
<td>New product flexibility</td>
<td>The ability to introduce and produce new products, including the modification of existing products</td>
</tr>
</tbody>
</table>

Traditional measures of supply chain performance included lead times, inventory turns, weeks of stock, defect rates, and service levels” (Ramdas & Spekman, 2000). These traditional measures focus on reducing costs for transactions, or improving efficiency. However, they do not measure the advantages related to end-customer satisfaction (Ramdas et al., 2000). Simatupang and Sridharan (2005) build from Ramdas et al. (2000) and suggest that supply chain performance criteria should include fulfillment, inventory measures and responsiveness measures. A supply chain performance measurement that focuses only on operational items or only on finance items is not sufficient (Chen et al., 2004b).
Chen and Paulraj (2004a) indicate supply chain performance may be measured based on supplier operational performance, buyer operational performance, and buyer financial performance.

The need to be competitive, flexible and efficient has forced companies to enter into collaborative relationships with suppliers and customers (Cousins, 1999; Hines, Lammings et al., 2000; Carr & Smeltzer, 1999). This has been necessitated by today’s competitive situations where true competitive battles are fought along a network of cooperating companies. These competitive battles are fought along supply chains, implying that a company is as strong as its weakest supply chain partner (Best, 1990; Veludo, Macbeth & Purchase, 2004).

This aspect again reinforces that the base on which the study has embarked, namely quality and environmental concerns as factors for competitiveness, buyer relationship to indicate collaborative relationship and efficiency indicated by margin and asset utilisation.

This competition between supply chains has started to take over enterprise-enterprise competition, although in less developed economies, enterprise-enterprise competition still exists on a widespread scale. The forward-looking enterprises today are dynamic; they collaborate with suppliers, customers and even with competitors; share information and knowledge aiming to create a collaborative supply chain that is capable of competing if not leading the particular industry. Hence, gaining competitive edge under such a cut-throat environment becomes increasingly difficult, if not impossible.
Researchers highlight a range of limitations of existing measurement systems for manufacturing as mentioned below:

(1) they encourage short term goal,
(2) they lack strategic focus (the measurement system is not aligned correctly with strategic goals, organization culture or reward systems),
(3) they encourage local optimization by forcing managers to minimize the variances from standard, rather than seek to improve continually and
(4) they fail to provide adequate information on what competitors are doing through benchmarking.

These and other studies have highlighted how the majority of the limitations cited by Neely et al (1995) remain salient in the case of performance measurement systems for supply chains.

In the past, researchers have done some work in the following domains:
(1) Factors influencing the successful implementation of performance measurement systems (Bourne et al.2002), (2) forces which shape the evolution of performance measurement systems (Kennerley et al, 2002 and Waggoner et al., 1999), and
(3) how to maintain performance measurement systems over time so that they remain aligned with dynamic environments and changing strategies (Kennerley et al., 2003).

All of these issues are pertinent to performance measurement in supply chains. Yet, performance measurement has received limited attention in the
literature. Companies that do have supply chain performance measurement metrics often do not monitor supply chain performance regularly.

Theoretical assumptions on the economic impacts of clusters are mainly positive. It is assumed that the combination of different agglomeration advantages, distinct competition processes and the interaction of the cluster agents in co-operations and networks lead to cost, factor, knowledge and information advantages. These again according to Porter (1998) bring about an increase in the efficiency and productivity of companies, an improvement in the innovation capacity and activity and the encouragement of new business formations. In summary the theoretical literature highlights that clusters foster knowledge-spillovers and competition which both promote innovation and regional development. The impacts should be measurable at the firm, cluster or regional level alike and translate into productivity and performance gains as well as economic growth and new business venturing.

In short, the intrinsic relationship between the supply chain and industry cluster makes it possible for both of them to co-exist in a symbiotic way and seek common development. This relationship can solve such issues as insufficient resources existing in the operations of traditional enterprises and development of regional economy, as well as paradoxes between dispersed operation and diversity from market demands.

The production of supply chain and the emergence of industrial clusters are in the background of economic globalization, and are under the guidelines of integrated thinking based on value chain. Although both form and content have different characteristics, the starting point is to maximise the advantages of
individuals among the system, so as to enhance the industry competitiveness on the basis of collaboration and integration.

To conclude, the literatures have looked at the supply chain performance from both financial and non-financial parameters but have hardly had a combination where quality aspects, partnership and collaborative aspects, utilisation of resources and also safety and environmental aspects together is built into the framework for a comprehensive measure of performance.

Therefore looking at the supply chain performance in an industry cluster as a combination of effects of ‘customer relationship, quality initiatives, improvements in margin, proactive management emphasising workforce safety and health with a concern for environment and asset utilisation’ seems to be a potential aspect that has not been much explored in this manner. The significant aspect is the application of these to an industry cluster comprising SMEs.

Reviewing the above literature, the researcher further infers that:

- SMEs form a vital cog in the industrial development in a region and thus also contributing to the economic growth in the region and employment opportunities.
- SME clusters evolving in a natural manner stand a better chance to contribute to the supply chain performance than those that were created because clusters that were created require grate support from outside and effort to sustain.
- SMEs in a cluster enjoy the advantages of both being an SME and that of a member in a cluster.
SMEs adapting to supply chain concepts while in a cluster can optimise their individual performance while also improving their own competitiveness and that of the chain they are a node.

Measurement of the SC performance of SMEs in a cluster requires careful understanding of the scale of economy, responsiveness and competitiveness of the SMEs in that cluster in an integrated manner.

Adapting to SCM concepts can be financially prohibitive for the SMEs.

The larger players in the field have to handhold the SMEs in their process of adaptation of SCM concepts.

SMEs adapting to SCM concepts can improve their relationship with the customers and improve their ‘quality’ consciousness.

SMEs adapting to SCM concepts cannot be a ‘one off’ occurrence but requires the top management’s support (in their case the entrepreneur and a few key persons) in a continuous and consistent manner.

Such a support from their top management will enable the SME to be responsive to changing trend in the market and help them refine their goals periodically.

Developing metrics for measuring the SC performance of an SME in a specific cluster could give interesting insights for the measurement at present while paving way for future research.

We have reviewed the literature to have an understanding of the trend, the theoretical construct will be discussed in the next chapter and the macro analysis of the segment and its performance will be reviewed subsequently in the chapters focusing on measurement of SC performance of SMEs in Tirupur textile cluster.