Chapter 2: Review of Literature

In this chapter the author presents relevant theories in the areas of competitive advantage and how it has evolved over the past. The specific areas covered includes the evolving drivers of competitive advantage in managing supply chain and the emerging areas of competitive advantage in this new digital world. Overall, this chapter gives a fundamental presentation of the key theories that helps identifying gaps in the literature, establish a case for this research and forms the basis of the research objectives.

2.1 Evolving Drivers of Competitive Advantage in Managing Supply Chains

The world economy has always been competitive and businesses have been experimenting and innovating new means to survive and remain profitable. It all starts for businesses with building an effective and efficient supply chains within their organization and with their partners.

In an ever-competitive environment, Supply Chain Management (SCM) undertakes a significant importance and calls for serious research attention, as companies are being constantly challenged with finding ways to meet ever-rising customer expectations at a manageable cost. To do so, businesses must explore their supply-chain process that are not competitive, understand the unmet customer needs, establish improvement goals, and rapidly work on necessary improvements. SCM is the necessary foundation of competitive strategy, increased market share and shareholders’ value for an organization and it is a central concept that has evolved to enable organizations improve their efficiencies and effectiveness in this global, highly competitive environment. Organizations adopt various methodologies to improve the business performance. With the help of structured literature review we will try to project how supply chain management forms the central nervous system for businesses to achieve their goals.

2.1.1 SCM Thinking

Supply Chain Management (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” (Christopher, 1998, p.18). While Christopher’s (1998) definition of SCM is focused more towards customer, Lambert et al’s (1998) definition emphasises on business activities: “Supply chain management is the integration of key business processes
from end users to original suppliers that provides products, services and information that add value for customers and other stakeholders.”. Another definition as per Mentzer et al., (2001) describes supply chain management as means of improving performance of individual companies and supply chain by means of scientific and systematic coordination of the traditional business functions.

The term "supply chain management" first appeared in 1982 (Oliver & Webber). Around 1990, academics first described SCM from a theoretical point of view to clarify the difference from more traditional approaches and names (such as logistics), to managing material flow and the associated information flow (Cooper et al., 1997).

There are multiple definitions of SCM in the literature. Simchi-Levi and Kaminsky (2000) have defined SCM as “the integration of key business processes among a network of interdependent suppliers, manufacturers, distribution centres, and retailers to improve the flow of goods, services, and information from original suppliers to final customers, with the objectives of reducing system-wide costs while maintaining required service levels”. SCM is the “strategic and systematic coordination of the traditional business functions and the tactics across these business functions within a particular firm and across businesses within a supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole” (Mentzer et al, 2001).

While there are several definitions of SCM this section touches upon a few key author’s definitions and brings out their thinking perspectives.

Battaglia (1994) first developed a model that demonstrated the way supply chain management has progressed from its main fragmented essential functions to a present day integrated model. For decades, the organization’s activities like purchasing, production, planning and warehousing were managed in isolation and in a fragmented manner but as time progressed, these activities were integrated across the organization’s functional and departmental boundaries.

Lambert et al. (1998) presented eight key supply chain processes in which customer relationship management and supplier relationship management form the crucial link through which the other six processes were coordinated. The authors further emphasize three essential components to coordinate these processes: the supply chain network structure, the supply chain business processes and the management component.

Supply chain management (SCM) involves many organizations in the integration of raw materials, the transformation of goods and the delivery of final products to customers to support all sections of the industry to create an efficient supply chain channel (Stonebraker and
Lummus and Vokurka (1999, p.11) described SCM as: “all the activities involved in delivering a product from raw material through to the customer including sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, delivery to the customer, and the information systems necessary to monitor all of these activities”.

The whole supply channel includes the participants, such as the suppliers, manufacturers, distributors, and customers, linked together so they can fulfil the multifunctions which provide low-cost, high-quality, and rapid delivery to the marketplace in order to offer the customers product or service satisfaction. Serve et al. (2002, p.246) defined supply chain management (SCM) as “a technique for linking a manufacturer’s operations with those of all of its strategic suppliers and its key intermediaries and customers” and “By establishing these supply based links, companies can build bridges and establish partnerships with suppliers, customers and carriers to more effectively reduce operating cost, improve customer service and expand into markets”. In addition to this, “Most successful supply chains have devised approaches for the participants in the supply chain to work together in a partnering environment”. From this observation, it is possible to establish how the participants engage in the activities of the supply chain.

Other researchers have expressed similar ideas on integrating full participation in SCM. For example, Harrison and van Hoek (2002, p.6) said that “The alignment of upstream and downstream capabilities of supply chain partners to deliver superior value to the end customer at less cost to the supply chain as a whole”. In other words, the point of the supply chain as a whole is the alignment between supply chain members, of which the end customer is very significant. SCM is concerned with managing the entire process of raw materials, manufacture, packaging and distribution to the customer (Harrison and van Hoek, 2002). Then the final customers will get lower cost products and good services as they are the focus of all supply chain partners. From this analysis, SCM has been defined as giving more thought to the final customer.

From this analysis, SCM has been defined as giving more thought to the final customer. Furthermore, as per Svensson (2003, p.305) after reviewing definitions, he indicated the “SCM might be seen as a management philosophy that strives to integrate the dependent activities, actors, and resources into marketing channels between the point-of-origin and the point-of-final consumption. This means that SCM comprises different kinds of dependencies in, between and across companies in marketing channels”. From his summary of SCM, he gives an example from Zailani and Rajagopal (2005, p.380) who state that “A supply chain is a network
that includes vendors of raw materials, plants that transform those materials into useful products, and distribution centres to get those products to customers”. The addresses the issue on how does the network operations within supply chain management works. Every firm want to get benefits from the supply chain channel but who can they trust to work with to obtain satisfaction for their customers. The criticism is that it is vital to focus not only on what customers want but also their requirements, and then create more value for them. From this point, Lambert et al. (1998) said that the challenge of managing the supply chain is multifaceted work and involves logistics to deliver the product and information from the key suppliers to their key customer.

In other words, the supply chain operations need to co-ordinate the whole channel members’ activities and respond to the customers. That is a spirit of co-operation within supply chain management to make the whole supply chain more effective. The theme is to integrate the whole supply chain members from logistics to supply chain to confirm every step in the operation to act in response to the customer, to achieve the supply chain management.

The following table 2.1, presents a synopsis of SCM definitions, and tries to demonstrate the fundamental elements and key aspects, which can be found in research literature. Although many definitions of SCM exist, the objective was to show different points of view and not to select the best and latest definition. Researchers have proposed several definitions of SCM, as follows.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tan et al. (1998)</td>
<td>‘SCM encompasses materials/supply management from the supply of basic raw materials to final product (and possible recycling and re-use). SCM focusses on how firms utilize their supplier’s processes, technology and capability to enhance competitive advantage. It is a management philosophy that extends traditional intra-enterprise activities by bringing trading partners together with the common goal of optimization and efficiency.’</td>
</tr>
<tr>
<td>Jones and Riley (1985)</td>
<td>‘An integrative approach to dealing with the planning and control of the materials flow from the suppliers to end-users.’</td>
</tr>
<tr>
<td>Saunders (1995)</td>
<td>‘External Chain is the total chain of exchange from original source of raw material, through the various firms involved in the</td>
</tr>
<tr>
<td>Authors</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ellram (1991)</td>
<td>‘A network of firms interacting to deliver product or service to the end customer linking flows from raw material supply to final delivery’</td>
</tr>
<tr>
<td>Christopher (1992)</td>
<td>‘Network of organization that are involved, through upstream and downstream linkage, in the different processes and activities that produce value in the form of products and services in the hands of ultimate customer.’</td>
</tr>
<tr>
<td>Lee and Billington (1992)</td>
<td>‘Networks of manufacturing and distribution sites that procure raw materials, transform them into intermediate and finished products, and distribute the finished products to customers.’</td>
</tr>
<tr>
<td>Kopczak (1997)</td>
<td>‘The set of entities, including suppliers, logistics service provider, manufacturers, distributors and resellers, through which materials, products and information flow.’</td>
</tr>
<tr>
<td>Lee and Ng (1997)</td>
<td>‘A network of entities that starts with suppliers’ supplier and ends with customers’ custom production and delivery of goods and services.’</td>
</tr>
</tbody>
</table>

All the above definitions communicate the importance of integration, communication and coordination between functions and organizations that work in synergy to create value for the end customer.

Modern day SCM is both multidisciplinary and multifunctional and thus the domain of SCM is described through different theories that range from transactional view of business process management to relationship-oriented perspectives. The Council of Supply Chain Management Professionals (CSCMP) (2004) defines SCM as: ‘SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities, including coordination and collaboration with suppliers, intermediaries, third-party service providers, and customers’.

SCM gives a concrete form to the so called “business ecosystem idea” and provides a framework of processes for firms to engage in co-existence rather than competition (Bechtel &
Jayaram, 1997). Consultants proposed the term and educators proposed the structure and theory for executing SCM.

The concept of SCM has received increasing attention from academicians, consultants, and business manager’s alike (Feldmann & Müller, 2003, Tan, Lyman & Wisner, 2002). Traditionally most companies have viewed themselves as entities that exist independently from others, and indeed need to compete with them, to survive. The challenge of supply chain management lies in the integration and coordination of the flow of materials from a multitude of suppliers, often offshore, and similarly managing the distribution of the finished product by way of multiple intermediaries (Christopher, 1998:15). SCM has been considered from different points of view in different bodies of literature (Croom et al., 2000) such as purchasing and supply management, logistics and transportation, operations management, marketing, organizational theory, and management information systems. One of the most relevant evolutions of modern business management is that companies compete as networks of partners, rather than as single autonomous companies. Table 2.2 shows the various schools of thoughts in SCM based on the works of Bechtel and Jayaram (1997), Croom et al. (2000) and Halldórsson et al. (2008).

Table 2.2: Schools of thought in SCM

<table>
<thead>
<tr>
<th>Supply Chain Definition</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chain Awareness School</strong>- Deals with the material flow through functional areas of purchasing, manufacturing and distribution, i.e. from suppliers through end users.</td>
<td></td>
</tr>
<tr>
<td>“Supply Chain Management deals with the total flow of materials from the supplier through end users”</td>
<td>Jones and Riley (1985)</td>
</tr>
<tr>
<td>“Supply Chain Management covers the flow of goods from supplier through manufacturing and distribution chains to the end user”</td>
<td>Houlihan (1985)</td>
</tr>
<tr>
<td>“Controls the flow of material from suppliers, through the value-adding (production) processes and distribution channels to customers”</td>
<td>Stevens (1989)</td>
</tr>
<tr>
<td>“Network of manufacturing and distribution sites that procure raw materials, transform them into intermediate and finished products, and distribute the finished products to consumers”</td>
<td>Lee and Billington (1992)</td>
</tr>
<tr>
<td><strong>Linkage School</strong>- Examines how linkages in the functional areas can be exploited for competitive advantage.</td>
<td></td>
</tr>
<tr>
<td>Supply Chain Definition</td>
<td>Author</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>“..supply chain is used to refer to the chain linking each element of the production and supply chain process from raw material through to the end customer.”</td>
<td>Scott and Westbrook (1991)</td>
</tr>
<tr>
<td>“..technique that looks at all the link in the chain from raw materials, suppliers through various levels of manufacturing to warehousing and distribution to the final customer”</td>
<td>Turner (1993)</td>
</tr>
</tbody>
</table>

**Information School**- Underscores the flow of information between the members of supply chain as the mainstay for effective SCM. Bidirectional information flow enables feedback on customers perceive their performance.

| Supply Chain Management is really an operations approach to procurement. It requires all participants of the supply chain to be properly informed. With SCM, the linkage and information flow between various members of the supply chain are critical to the overall performance.” | Johannson (1994) |
| “A supply chain is a system that constitutes parts of which include material, suppliers, production facilities, distribution services, customer linked together via feed forward of material and feedback flow of information.” | Towill (1997) |
| “Production and information flow encompassing all parties beginning with the supplier’s suppliers and ending with customers or consumers/end users... flows are bidirectional.” | Harrington (1995) |

**Integration School**- Here, the emphasis is on integration supply chain processes that strive to form a single system. The philosophy behind this school of thought is system thinking, i.e., one holistic view of supply chain and that adds value to the customer.

| “An integrative philosophy to manage the total flow of a distribution channel from the supplier to the end user” | Ellram and Cooper (1990) |
| “Supply chain management is an integrative approach to using information to manage the material flows from the suppliers to the end-user to achieve improved customer service at reduced overall costs. SCM represents a network of firms interacting to deliver a product or service to the end customer”. | Ellram (1991) |
This thesis covers and expands mainly on the integration/process school and information literature on supply chain management, which examines value creation throughout an integrated supply network using information with an emphasis on improving firm’s performance and gaining competitive advantage moving away from local optimization in the supply chain. The supporting philosophy in the integration/process school is systems thinking which moves away from local optimization in the supply chain to a holistic view of the entire supply chain (Bechtel & Jayaram 1997). Systems thinking is well suited also for studying the supply chain as a complex system and managing its complexity, since it focuses on the interconnections and interactions between the elements of the system. Furthermore, it acknowledges humans (e.g. decision-makers) as a part of the system. Systems thinking enables us to see how decisions made at a point in the chain affect other points in the supply chain (Davis, 1993). In other words, adapting systems thinking approach means whenever a decision is made in a supply chain, the interaction and reflections of this decision on the other parties (e.g., actors, processes, functions) will be considered.

The modern definitions of SCM widen the research attention from operational to a more strategic perspective. Over time the emphasis has shifted from internal SCM processes to external SCM that focusses more on the concepts of partners, strategic alliances, and risk and reward sharing between partners.

The goal of SCM is to integrate both information and material flows seamlessly across the supply chain as an effective competitive weapon (Childhouse, 2003).

In a nutshell, SCM encompasses the movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption. This covers planning, manufacturing and operations management necessary to bring a product to the marketplace, i.e. sourcing of materials to the delivery of the completed product. In other words, SCM involves efficient and effective management of resources viz., material, money, men, and information within and across the supply chain to maximize customer satisfaction and to get

<table>
<thead>
<tr>
<th>Supply Chain Definition</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Supply chain integration is only a natural result of redesigned business processes not realignment of existing functional organization”</td>
<td>Hewitt (1994)</td>
</tr>
</tbody>
</table>

(Source: Adapted from Bechtel and Jayaram (1997); Croom et al. (2000); and Halldórsson et al. (2008))
an edge over competitors. Therefore, supply chain management has a significant role in firm's performance and has attracted serious research attention over the last few years.

2.1.2 SCM and Firm’s Performance

**Definition and Goals of Performance Measurement in SCM**

As we have seen in the earlier section, in the recent years, to help enterprises survive with continuous pressures and achieve their goals, SCM has gained a tremendous amount of attention from business managers, practitioners, academics and consultants, as an effective business philosophy (Wong and Wong, 2007). The basic objective of any performance measurement system is to help set objectives, assess performance against the set objectives, and shaping the future paths of actions (Gunasekaran et al., 2004). The last decade has seen SCM research evolving, that has led to a wide steady stream of research papers dealing with SC performance measurement getting published. It is proven in research that performance measurement is an essential management tool and an enabler to reach success. Performance measurement enables supply chain to strategically manage and continuously control achieving objectives by providing opportunities for performance improvement in pursuit of supply chain excellence.

In this section of literature review, key theories in measuring performance of a firm in SCM, are presented and towards the end of this section, we summarize the key contributions in this area and subsequently move towards competitive advantage literature.

The traditional objective of Supply Chain Management per Shapiro (2001) is to minimize the total Supply Chain Cost and to meet the given demand. Cutting costs in the Supply chain most likely affect the performance like for example delivery precision and lead-time. It is easier to get a short lead-time by having buffers, but buffers cost and therefore the Supply Chain Cost is increasing. Segerstedt (1999) writes profitability is achieved by the difficult balancing of facility utilisation (high), capital and inventory investments (low) and market services (high). The challenge for a company is to combine the **cost** (establish high facility utilization, low capital investments) and **performance** (short delivery times, high delivery precision, satisfied customers, short lead times, short days of inventory) and optimise both to get the best result for the company. Schary and Skøjtt-

Larsen (2001) describe the Supply Chain Triangle, which is showing the conflict between cost and performance. The main objective for a company is to provide service to the final customer, but at the same time minimize the cost. Despite the supply chain management's
goal being straightforward, decision making to design, plan, and operate a supply chain in an efficient manner remains challenging. One main concern is that centralized decision settings in a supply chain, such as the ones presented in the above examples, are not always present in supply networks.

Indeed, often, supply chains are composed of a network of companies with equal rights and power (Reiner, 2005). If allocation policies, such as revenue-sharing contracts, are valuable enough to strengthen the incentive of centralized decisions, these are difficult to achieve in practice. Therefore, traditional supply chains in which each echelon manages its production and its inventory without considering the situation at its up-or downstream supply chain partners remain widely represented (Holweg et al., 2005).

Conventionally, performance measurement is defined as the process of quantifying the effectiveness and efficiency of action (Neely et al. 1995). Further to this Neely et al. (2002) defined Performance Measurement System (PMS) as a balanced and dynamic system that enables support of decision-making processes by gathering, elaborating and analysing information. Taticchi et al. (2010) extended this definition by explaining the meaning of the terms ‘balance’ and ‘dynamicity’. In his research (Taticchi et al., 2010), the term ‘balance’ refers to the need of using different measures and perspectives that tied together give a holistic view of the organization and the term ‘dynamicity’ refers to the need of developing a system that continuously monitors the internal and external context and reviews objectives and priorities. A performance measurement system therefore entails a set of metrics that are used for the quantification of the efficiency and effectiveness of actions (Kennerley and Neely, 2000).

Traditionally, organizations focused on financial measures alone for performance measurement. But over the years of research, by late 80s, studies had already established that historic financial data does not meet the performance management needs in the rapidly changing economy with increasing complexity of organizations and the markets in which companies compete (Kennerley, Neely 2002). This was supported by the argument that financial reports are now less indicative of shareholder value. Cumby and Conrod (2001), pointed out that sustainable shareholder value is driven by non-financial factors, such as customer loyalty, employee satisfaction, internal processes, and an organization's innovation and not by financial reports.

Therefore, in modern business management, performance measurement goes much beyond merely quantification and accounting. For a manager, performance measurement provides the necessary information for feedback about a process or an action and aids decision
making. Therefore, it plays a pivotal role in monitoring performance, enhancing motivation, improves communication and helps diagnose problems Waggoner et al. (1999) and Rolstands (1995). The fact that ‘what gets measured gets done’ is implicit in the above definitions (Drucker, 2004) of performance measurement systems.

By the 1980s, traditional accounting measures were being criticized as inappropriate for managing businesses of the day. The mid-1980 was a turning point in the performance measurement literature, as it marked the beginning of the second phase. This phase was associated with the growth of global business activities and the changes brought about by such growth. In the late 1980s, some frameworks, which attempted to present a broader view of performance measurement started to appear (Gomes et al., 2004). They underscored the need for the alignment of financial and non-financial measures to be in accordance with business strategy. The emphasis was on the development of better integrated performance measurement systems. The structure of the business organization also evolved during this period. The early 19th century saw the birth of systematic large organizations. During the 1980’s the business organizations became global and 1990’s was significant with automation of business processes. The 2000’s saw the emergence of e-commerce and borderless business activities. PMS also changed with this evolution of business organization from cost accounting system (before 1980s), mixed financial and non-financial systems (1990’s) to balanced integrated approach (2000’s). Table 2.3 summarizes the evolution of Supply Chain Performance Measurement (SCPM) in an organizational context.

**Table 2.3: Evolution of Performance Management System (PMS) in an organizational context**  
(Gomes et al., 2004 and Morgan, 2007)

<table>
<thead>
<tr>
<th>Time-Period</th>
<th>Characteristics of the Business</th>
<th>Characteristics of PMS</th>
</tr>
</thead>
</table>
(ii) Retroactive approach and results used to promote organizational efficiency, facilitate budgeting and attract capital from external entities |
<table>
<thead>
<tr>
<th>Time-Period</th>
<th>Characteristics of the Business</th>
<th>Characteristics of PMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 - 1990</td>
<td>Business organizations became global</td>
<td>(i) Cost Accounting orientation (ii) Retroactive approach and results used to promote organizational efficiency. (iii) Enhanced to include operations and value adding perspectives</td>
</tr>
<tr>
<td>1990 – 2000</td>
<td>Automation of business processes</td>
<td>(i) A mixed financial and non-financial orientation. (ii) A mixed retroactive and proactive approach. (iii) Results are used to manage the entire organization. (iv) PMS enhanced to include process, quality &amp; customer focus</td>
</tr>
<tr>
<td>2000 - 2010</td>
<td>E-Commerce and borderless business activities</td>
<td>(i) A balanced and integrated orientation. (ii) A more proactive approach. (iii) Results are used to enhance organizational responsiveness. (iv) Performance measurement enhanced to</td>
</tr>
<tr>
<td>Time-Period</td>
<td>Characteristics of the Business</td>
<td>Characteristics of PMS</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>give a balanced view of the organization and included the SC &amp; inter-process activities.</td>
</tr>
</tbody>
</table>

There are various performance metrics in place for measuring effectiveness of SC and several studies have been conducted in this area, but generally the studies can be divide into the following groups:

a) Studies that investigate one or some parts or key processes in supply chains and those that look at the supply chain.

b) Studies that investigates different perspectives of SCM viz., cost and non-cost; strategic, tactical or operational focus (Gunasekaran et al., 2001); business process perspective and financial perspective (Beamon, 1999).

An effective SCM comes with associated advantages that includes increased customer value, increased profitability, reduced cycle times and average inventory levels and even better product design (William et al., 2007). The objective of a performance measurement therefore must enable and drive the efficiency and effectiveness in SCM. It should act as a vehicle for an organization wide change. The individualistic decisions made by companies in a decentralized network are often suboptimal for the system and lead to complex relationships. Consequently, a relevant issue in supply chain management is the complicated dynamics of the network. The interactions among partners and their related consequences imply complex cause-and-effect mechanisms with potential counterintuitive outcomes. Meadows (1982) highlighted that well-intentioned efforts to answer a problem are often delayed, blurred, or cancelled by unforeseen reactions of partners or by system constraints.

Objectives of organisations is achieved through a sequence of actions. And unless these actions are measured, they cannot be managed in such a way that they result in either planned results or at least provide an opportunity for learning when the planned results are not achieved. As mentioned earlier in this section, before the 1980, measurement of business performance was predominantly financial in nature. Neely (2005) however indicates that research has demonstrated that financial measures alone are beset by a barrage of shortcomings. Citing various scholars, he stated that financial measures encourage short-termism, and thus may
delay capital investments (Kennerley and Neely, 2000), are historically focused (Dixon, Nanni and Vollmann, 1990), lack strategic focus and fail to provide data on quality, responsiveness and flexibility (Kennerley and Neely, 2000).

In addition, he asserts that they encourage managers to minimise the variances from standard rather than seek to improve continually and fail to provide information on what customers want and how competitors are performing (Kaplan and Norton, 1992). Performance measurement literature from 1990 advocated a balanced portfolio of measures (Kaplan and Norton, 1992; EFQM, 1999; Neely, Adams and Kennerley, 2002). This measures set is a combination of both financial and nonfinancial measures. Increasingly, research evidence is demonstrating that companies that use balanced performance measures outperform and have superior stock prices than those not measure-managed (Neely et al., 2002)

Figure 2.1: Measures and metrics at four basic links in a Supply Chain
(Source: Gunasekaran et al., 2001)

Figure 2.1 shows measures and metrics at four basic links in a SC: plan, source, production (make/assemble), deliver and service. Many authors have classified PMS in different ways and have recommended various frameworks. However, per Bourne et al. (2003), frameworks on their own are not a complete solution. Frameworks provide different perspectives for categorising performance measures, allowing one to consider the balance between the demands on the business. Per Beamon (1999), a supply chain measurement system must place emphasis on three separate types of performance measures: 1. Resource measures (generally costs); 2. Output measures (generally customer responsiveness); and 3. Flexibility measures (Ability to respond to a changing environment). Each of these three types of performance measures has different goals and purpose. Resource measures include: inventory
levels, personnel requirements, equipment utilization, energy usage, and cost. Output measures include: customer responsiveness, quality, and the quantity of final product produced. Flexibility measure a system's ability to accommodate volume and schedule fluctuations from suppliers, manufacturers, and customers (Beamon, 1999).

Table 2.4 below summarizes the classification of PMS models (Kurien and Qureshi, 2011, Cagnazzo et al., 2010) consists of grouping PMS models into: 1. Balanced models; 2. Quality models; 3. Questionnaire-based models; 4. Hierarchical models; and 5. Support models.

**Table 2.4: Classification of PMS models**
(Kurien and Qureshi, (2011), Cagnazzo et al., (2010))

<table>
<thead>
<tr>
<th>PMS Models Classification</th>
<th>Existing models</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Balanced Model</td>
<td>Balanced models consider the presence of both financial and non-financial indicators. In these models, several separate performance measures which correspond to diverse perspectives (financial, customer, etc.) are considered independently. Some of the important existing models are (i) Performance Measurement Matrix; (ii) Balanced Scorecard (BSC); and (iii) Performance Prism.</td>
</tr>
<tr>
<td>Quality Models</td>
<td>These are frameworks in which a great importance is attributed to Quality. An example of quality model is the Business Excellence Model (EFQM-Model) (EFQM, 1999).</td>
</tr>
<tr>
<td>Questionnaire-based Models:</td>
<td>These are frameworks based on questionnaire. The Performance Measurement Questionnaire (PMQ) and TOPP System (a research program studying productivity issues in Norwegian manufacturing industry) (Rolstadås, 1998) are examples.</td>
</tr>
</tbody>
</table>
PMS Models Classification | Existing models
--- | ---
Hierarchical Models | SCPM models that are strictly hierarchical (or strictly vertical), characterised by cost and non-cost performance on different levels of aggregation are classified as hierarchical models. Frameworks where there is a clear hierarchy of indicators are: (i) Performance Pyramid; (ii) Advanced Manufacturing Business Implementation Tool for Europe (AMBITE); (iii) The European Network for Advanced Performance Study (ENAPS) approach; and (iv) Integrated Dynamic Performance Measurement System (IDPMS).
Support Models | Frameworks that do not build a performance measurement system but help in the identification of the factors that influence performance indicator are classified as support models. These models are: (i) Quantitative Model for Performance Measurement System (QMPMS); and (ii) Model for Predictive Performance Measurement System (MPPMS) (Cagnazzo et al., 2010)

Based on several scholars’ opinion, a PMS can be defined as a balanced and dynamic system which offers a concise overview of financial and non-financial performance through sets of performance indicators to guide and support the organization's decision-making processes, improvement of strategy deployment and alignment of critical business processes (Neely et al., 2002; Franco-Santos et al., 2007; Gimbert et al., 2010; Taylor and Taylor, 2013; Garengo and Sharma, 2014).

According to Wong and Wong (2007), effective management of an organization’s supply chains is an essential corner stone for the organization to develop a sustainable
competitive advantage and to remain at the forefront of excellence in a competitive market. To achieve an efficient supply chain, performance evaluation of the entire supply chain is extremely important.

The goal of performance measurement was to assist management in measuring business performance, analyse and uncover opportunities for improvement and enable better decision-making (Tangen, 2005). It facilitates inter-understanding and integration among the supply chain entities. Undoubtedly, an effective performance measurement system provides indispensable contribution to decision making in SCM, particularly in re-designing business goals and strategies, and re-engineering processes (Charan et al., 2008), deeming an important aspect of a successful supply chain management.

Many organizations have begun to recognize that SCM is the key to building sustainable competitive edge for their products and/or services in an increasingly crowded marketplace (Jones, 1998). Although there is substantial empirical evidence reported in literature that the effective execution of SCM leads to improvements in firms ‘performance, yet firms have not succeeded in implementing and mastering SCM (Chen and Paulraj, 2004; Stock and Boyer, 2009). Leenders et al. (2002) claim that successful implementation of SCM has been just a talking point more than accomplishment, excepting a few large companies.

While there is a widespread agreement that research and theory development in this field has been industry led with theory principally following practice (Voss et al., 2002), a wide gap still exists between the theory and practice of supply chain management. Questions such as “How can a firm and its management prepare to embrace (i.e. adopt) and implement (i.e. execute) SCM if it doesn’t already do so?” and “How can processes and alignment between processes be improved?” have been raised time and again in journal publications, academic conferences and boardroom meetings and have not been satisfactorily addressed in SCM research (Kotzbab et al., 2011). As a solution to this, adoption of business information systems has been suggested by theory for improving supply chain coordination and performance.

In summary, the relevance of effective performance measures in achieving sustained business growth in this age of dynamically changing markets cannot be understated. Re-iterating the famous maxim “What you measure is what you get” highlights the importance of performance measurement system.

With this as the base, a significant amount of work has been carried out in the field of performance measurement in SCM in the last two decades. Literature does indicate the existence of wide variety of measures and frameworks. Lot of research has gone into building theoretical models with little information on the strength and pragmatism of these measures
and metrics. While researchers kept arguing about merits and demerits of various performance measures, with changing times and evolving business practices, changes in market demand and customer expectations, there was no stopping to the research on supply chain performance measurement and it kept evolving.

To summarize this section, SCM is undoubtedly a source of performance improvement and competitive advantage for the members of the chain. Research has shown that supply chain orientation has the potential to shift mindsets from internal-focused operations to more diverse and collaborative schemes that result in a higher profit margin (Mentzer et al., 2001). Thereby companies can work towards cost optimization and profit maximisation efforts to the entire supply chain (Croom et al., 2000) and contribute towards supply chain excellence.

Achieving the performance advantage of SCM outlined above demands organisational commitment and contribution. For example, top management’s support is a widely-recognised factor that enables effective SCM by engaging functional managers in supply chain decision making and supporting relevant initiatives (Chen & Paulraj, 2004; Halldórsson et al., 2008). Other enabling factors discussed in the literature include an integrated information system (Fawcett & Magnan, 2002), a flat organisational structure (Cooper, Lambert & Pagh, 1997) and a cross-functional driven reward system (Lee & Whang, 2000). These factors make streamlined operation of the supply chain more attainable.

Organisations that do not actively incorporate SCM performance measures might face challenges when executing their SCM activities. For instance, lack of top management support or unwillingness to share risks and rewards (such as giving penalties for unacceptable performance) can potentially hinder the success of SCM programmes. This can also be caused by issues such as lack of trust among supply chain partners (Fawcett, et al., 2008), resistance to change (Fawcett et al., 2008), ineffective collaboration and a defensive organisational culture and attitude (Gimenez, 2004).

Theory establishes that even well-conceived performance measurement system and competitive strategies cannot increase organizational success unless they are effectively implemented. But will merely implementing an effective performance measurement system lead a firm to success and give that competitive edge, in this digital age? What does it take to get that edge over competitors and sustain profits today? The next few sections of literature discusses important research on evolving drives of competitive advantage through the last two decades and discusses this subject in the current context of digital economy as well.
But before the competitive advantage literature is discussed, it is important to give an overview of the consumer goods distribution network in India and understand its challenges, as this thesis focusses on the consumer products industry.

2.1.3 An Overview of Indian Consumer Goods Distribution Channels in India

The distribution channel structure in India is largely traditional and quite unique. The major channel components are the retail network, wholesale network, and the logistics infrastructure. The retail network in India consists of over nine million outlets (Mulky, 2013). These include traditional outlets like paan shops; grocers or kirana stores; general stores; specialised shops for footwear, clothing, jewellery, watches, mobile phones, and consumer durables; newer formats like supermarkets, hypermarkets, and online stores; and service outlets like fast food outlets, beauty parlours, fitness centres, coaching centres, and so on.

Mulky (2013, 181) in his research has stated, 'Traditional outlets are spread across urban and rural India but the newer formats are mostly located in urban areas. The penetration of organised retail in India which is less than 8% is quite low even in comparison to other emerging markets. The average retail outlet in India is very small in terms of area, number of employees, and number of stock keeping units (SKUs) stocked. Traditional retail in India offers consumers several advantages like convenience, home delivery, credit, and personalised service. On the other hand, modern retail offers periodic promotional offers, lower prices, wider assortment, a better ambience, and higher quality brands. The continued existence of traditional retail in India has been based on factors such as lower rentals, lower labour costs, credit from suppliers, low or no liability on taxes, and a legal framework which prevented foreign direct investment (FDI) in retailing until quite recently.'

Further, Mulky (2013) has done a thorough analysis of retail formats in India and developed countries and states, 'Large format stores are unlikely to be successful in India because of constraints of transport, lack of storage space at home, and lower income levels. Format choice is likely to be an important decision in the Indian market and research findings in this area will be useful for retailers who want to enter the Indian market. The e-retailing format has made significant strides in developed markets especially in categories such as books, ‘durables, phones, and apparel’. Many brick and mortar retailers have started e-retail operations in response to the growth of stand-alone e-tailers. Internet penetration in India was traditionally considered too low to support e-retailing but the rapid growth in the smart phone category allows mobile phone owners to access the Internet easily. This may have implications
for growth in e-retailing in India. Wholesalers have always been an important part of the distribution channel in India. Wholesalers purchase products from manufacturers and sell to retailers. They perform services like storage, bulk breaking, credit provision, and information provision for manufacturers.’

Figure 2.2: The India Retail Landscape.
Source: Mulky (2013)

Figure 2.2 above shows the retail landscape in India that is classified as traditional trade and modern trade. A distribution channel is conventionally envisioned as a series of intermediaries, who pass the product down the chain to the next entity until it finally reaches the consumer or end user (Mulky, 2013). Most distribution models in India involves many intermediaries between companies and their retail customers and have varying costs and benefits (Bhalla et al., 2007).

The major disadvantage of traditional channels is that information flow across channels is highly filtered and it is not possible for the manufacturer of the consumer good to gauge the market perception on a real-time basis. To counter this challenge, the manufacturer of the consumer good are trying to find a feasible direct-to-consumer option. While the manufacturers continue to sell their products through traditional and modern trade networks, e-commerce has emerged as a channel of convenience for most consumers in India. Consumers now have online retail channels as another option for purchasing consumer goods. According to a CII-Report (2016, April), the consumers in India are increasingly shopping in online channels as illustrated in figure 2.3 below, and the projected increase in those numbers are exponential.
Another set of industry reports as shown in figures 2.4 and 2.5 present the growth of e-commerce in India and product category wise distribution of sales in e-commerce. While e-commerce-driven sales are promising for businesses in India, traditional trade still dominates followed by modern trade in the consumer products segment. In such a scenario, it is interesting to investigate where do consumer products businesses in India stand against their information driven competitors.
2.1.4 Competitive Advantage in SCM

**Competitive Advantage Defined**

To be a successful firm in this global economy, there are several theories presented in the literature. Per Stalk et al. (1992), successful firms are those that accurately anticipate market trends and quickly respond to changing customer needs. Towill and Christopher (2002) in their research attribute the success or failure of supply chains to end customer in the marketplace. They state “getting the right product, at the right price, at the right time to the consumer is not only the linchpin to competitive success but also the key to survival” (p. 299). Companies are forced to find flexible ways to meet customer demand in this global era, argue, Chase et al. (2001).

Research has presented several models that have been developed to explain ways to achieve competitive advantage. It was Porter (1979, 1980) who was the first to introduce the concept of competitive advantage in the late 1970s. The leading paradigm in this field during 1980s was the competitive forces model developed by Porter (1980). This model depicts the crux of competitive strategy formulation as relating a firm to its industrial environment in which it competes. In this model, five industry-level forces, Porter (1980) presents a useful tool that assists in assessing the competition in the industry and determining the inherent profit

Figure 2.5: Commodity distribution in e-tailing India
Source: PWC report (2014, August)
potential. Porter states that to do an industry analysis a firm must analyse five competitive forces (Baltzan and Phillips 2010, p. 17):

- Rivalry of competitors within its industry.
- Threat of new entrants into an industry and its markets.
- Threat posed by substitute products which might capture market share.
- Bargaining power of customers.
- Bargaining power of suppliers.

The basic premise behind the concept of competitive advantage is how firms can develop a differential advantage over their competitors. Barney (1991, p. 102), in his research, defines competitive advantage as a ‘value creating’ strategy. Putting together succinctly, competitive advantage is achieved by creation of superior competencies that are leveraged to create customer value and achieve cost and/or differentiation advantages, resulting increased market share and profitability (Barney, 1991; Coyne, 1986; Day & Wensley, 1988; Prahalad & Hamel, 1990).

Followed by that, Shapiro (1989) proposed the strategic conflict model that uses game theory and views competitive outcomes because of strategic organization actions of manipulating the market environment, and is closely related to competitive forces model in terms of the focus on product market imperfections, entry deterrence, and strategic interaction.

**In pursuit of sustainable competitive advantage**

There exist multiple definitions of competitive advantage in the literature. In this dynamically changing global economy, it has become even more important than ever before for every firm to constantly work towards new ways of achieving competitive advantage, else they will be outdone and wiped off from the market by the competitors.

The objective of achieving competitive advantage should be embedded in the firm’s strategy with the outcome getting translated as above-average returns for the firm (Barney 1991; Grant 1991; Porter 1985). Therefore, competitive advantage is the edge that one firm has over its competitors in each market, strategic group or industry (Kay, 1993). Fahey (1989) adds to this definition of competitive advantage as any strategy or action that favourably differentiates a firm or its products from those of its competitors, from its customer or end user’s standpoints. But how can an organization sustain its competitive position? The focus here is not merely on the issue of firm’s competitive advantage, but to understand its sustainability over time.
When seeking a competitive advantage position, it is assumed that the desired outcomes, such as superior performance, is sustainable and will not be easily eroded (Peteraf, 1993). Slater (1996) argued that if the foundation of competitive advantage gets easily eroded, then the source of competitive advantage is not an advantage at all or at best is only for a short duration, thereby limiting its benefit.

Therefore, for firms to sustain profitability, the competitive advantage must be sustainable (Barney 1991; Slater 1996). In this context of competitive advantage, McGrath et al., (1995) state that neither sustainability refers to a calendar period, nor does it imply that advantages persist indefinitely, it in fact depends on the possibility and extent of replicating the competitive advantage. Plausibly possessing competitive advantage should not be the only objective of a firm, but sustaining it is of paramount importance.

This way, the competitive advantage theory got further extended by the term ‘sustainable competitive advantage(SCA)’ that describes a superior performer’s attributes and resources that are difficult to be duplicated or mimicked by its current or potential competitors in the industry (Baumol et al., 1982) for an extended period (Jacobsen, 1988; Porter, 1985). Therefore, sustainability of the competitive advantage of a firm totally relies on the possibility of replicating the actions of competitive advantage (Barney, 1991).

Over the last two decades, the theory of (SCA) has emerged as one of the most promising theoretical frameworks in the management literature. Many researches have focused on the broad range of issues pertaining to SCA. (Alderson, 1965; Hall, 1992; Bharadwaj et al., 1993; South, 1981; Barney, 1991; Coyne, 1986; Day et al., 1988; Porter, 1980 and 1985; Walley and Thwaites, 1996; and Foss and Knudsen, 2003 etc.), and some of them have applied the SCA concept in their research (Mazzarol and Soutar, 1999; Smart and Wolfe, 2000).

Hoffman (2000) in research has summarized the concepts and development of concepts of SCA from early 1965 until 1999. A tabular compilation of his research summary on SCA literature is presented in table 2.5 below.

<table>
<thead>
<tr>
<th>Author</th>
<th>Key Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alderson (1965)</td>
<td>Precursor to SCA; proposes three bases for <strong>differential advantage</strong>: technological, legal, and geographical; four strategies for achieving differential advantage: segmentation, selective appeals, transaction, and differentiation.</td>
</tr>
<tr>
<td>Author</td>
<td>Key Contribution</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hall (1980)</td>
<td>Successful companies will achieve either the <strong>lowest cost or the most differentiated position</strong>.</td>
</tr>
<tr>
<td>Henderson (1983)</td>
<td>Continues discussion of those <strong>unique advantage(s)</strong> of one firm has over competitors; those who can adapt the best or the fastest gain an advantage over competitors.</td>
</tr>
<tr>
<td>Porter (1985)</td>
<td>Introduces idea of the &quot;<strong>value chain</strong>&quot; as the basic tool for analysing the sources of Competitive Advantage.</td>
</tr>
<tr>
<td>Coyne (1986)</td>
<td>Explains of the conditions needed for an SCA to exist; idea of <strong>capability gaps</strong>.</td>
</tr>
<tr>
<td>Ghemawat (1986)</td>
<td>Discusses the advantages that tend to be sustainable: size in the targeted market, superior access to <strong>resources or customers</strong>, and restrictions on competitors’ options.</td>
</tr>
<tr>
<td>Day and Wensley (1988)</td>
<td>Potential sources of advantage are <strong>superior skills and superior resources</strong>; in assessing ways to achieve SCA, both competitor and customer perspectives should be considered.</td>
</tr>
<tr>
<td>Dierickx and Cool (1989)</td>
<td>Sustainability of a firm’s <strong>assets</strong> position is based on how easily assets can be <strong>substituted or imitated</strong>.</td>
</tr>
<tr>
<td>Hamel and Prahalad (1989)</td>
<td>A firm should not search for an SCA, it should learn how to <strong>create new advantages</strong> to achieve global leadership.</td>
</tr>
<tr>
<td>Prahalad and Hamel (1990)</td>
<td>SCA results from core competencies; firms should <strong>consolidate resources and skills</strong> into competencies that allow them to adapt quickly to changing opportunities.</td>
</tr>
<tr>
<td>Barney (1991)</td>
<td>Discusses four indicators of the potential of firm resources to generate SCA: <strong>value, rareness, inability to be imitated, and imperfect substitution</strong>.</td>
</tr>
<tr>
<td>Conner (1991)</td>
<td>With a <strong>resource-based view</strong>, to achieve above-average returns, a firm product must be distinctive in the eyes of buyers, or the firm selling an identical product in comparison to competitors must have a low-cost position.</td>
</tr>
<tr>
<td>Peteraf (1993)</td>
<td>Discusses four conditions, which must be met for SCA: <strong>superior resources</strong> (heterogeneity within an industry), <strong>ex</strong></td>
</tr>
<tr>
<td>Author</td>
<td>Key Contribution</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bharadwaj, Varadarajan, and Fahy (1993)</td>
<td>Evaluates SCA in a <strong>services marketing</strong> context; an SCA exists only if it is <strong>recognized by customers</strong>.</td>
</tr>
<tr>
<td>Hall (1993)</td>
<td>Identifies various intangible resources (including assets and competencies) that allow firms to possess relevant capability differentials which result in SCA.</td>
</tr>
<tr>
<td>Day and Nedungadi (1994)</td>
<td>A firm’s use of strategy and reaction to the environment depends on its orientation (customer-oriented versus competitor-oriented); CA is based on this orientation.</td>
</tr>
<tr>
<td>Hunt and Morgan (1995)</td>
<td>Compares neoclassical theory and comparative advantage theory of the firm; <strong>comparative advantage in resources</strong> can translate into a competitive advantage in the marketplace; offers categorization of resources.</td>
</tr>
<tr>
<td>Oliver (1997)</td>
<td>Proposes a model of <strong>firm heterogeneity</strong>, which suggests that both <strong>resource capital and institutional capital</strong> are indispensable to sustainable competitive advantage.</td>
</tr>
<tr>
<td>Thompson and Coe (1997)</td>
<td>Proposes an approach to value pricing that can be used to seize and drive competitive advantage, and which yields a price that minimizes the risk that buyers will not perceive value at least equivalent to that provided by a reference product. At the same time, the risk to sellers of not achieving minimum margins is controlled</td>
</tr>
<tr>
<td>Srivastava, Shervani, and Fahey (1998)</td>
<td>Delineates market-based <strong>assets</strong> into two primary types: relational and intellectual. Largely intangible, these assets may be leveraged to achieve SCA if they can add unique value for customers.</td>
</tr>
<tr>
<td>Hoffman (2000)</td>
<td>Discuss concept of sustainable competitive advantage to other concepts in the concepts of strategy such as market orientation, customer value, relationship marketing, and networks.</td>
</tr>
<tr>
<td>Author</td>
<td>Key Contribution</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Burden and Proctor (2000)</td>
<td>Examines how customer needs are represented within the training evaluation framework of an organisation. Meeting customer needs on time, every time, is a route to achieving and sustaining competitive advantage, and training is a tool that organisations should use to succeed at this.</td>
</tr>
<tr>
<td>Sadri and Lees (2001)</td>
<td><strong>Positive culture</strong> can be a significant competitive advantage over organizations with which a firm competes.</td>
</tr>
<tr>
<td>Coates and McDermott (2002)</td>
<td>There are different categories of competence and <strong>technology competencies</strong> are important source of competitive advantage.</td>
</tr>
<tr>
<td>Adam and Lamont (2003)</td>
<td>Organisational innovation, with specific emphasis placed on the role and effectiveness of knowledge management systems as a determinant of innovation practices, which may then contribute to the development of sustainable competitive advantage.</td>
</tr>
<tr>
<td>Sharkie (2003)</td>
<td>The development of sustainable competitive advantage is a vital management function and an important requirement is the nurturing of a knowledge creating environment to enable the organization to exploit and develop resources better than rivals and to create sufficient knowledge to address the industry’s future success factors.</td>
</tr>
<tr>
<td>Weerawardena and O’Cass (2004)</td>
<td>Entrepreneurship is an important factor in sustained competitive advantage and while market-focused learning capability leads to higher degrees of innovation, marketing capability enables sustainable competitive advantage.</td>
</tr>
<tr>
<td>Kotelnikov (2004)</td>
<td>Proposes a model of synergy of distinctive capabilities and reproducible capabilities as sources of sustainable competitive advantage.</td>
</tr>
<tr>
<td>Khandekar and Sharma (2005)</td>
<td>Contributes to the existing theory about the strategic importance of human capital for organisational performance and sustainable competitive advantage from resource-based view of the firm in the Indian context. The findings of the study reveal that human resource capabilities are positively</td>
</tr>
</tbody>
</table>
correlated to organisational performance. Furthermore, human resource capability is found to be a significant predictor of sustainable competitive advantage.

Javalgi and Radulovich (2005) Internet firms can achieve SCA by developing Internet interactive capability. The use of the Internet’s interactive capability for customer relationship management improves customer targeting for greater effectiveness of marketing communications, increases customer share and retention, and enhances revenue potential. Internet firms’ competitive advantage is built upon a unique product value offering, trust in the source, and trust in the medium of exchange, and loyalty that is reinforced through fulfilled customer expectations.

When summarized, the development of SCA contributed research can be categorized into two major categories:

a) Cost, differential advantage and focus strategies – (focused on by a researcher from 1960s – early 1980s)

b) Resource based concept – (focused on by a group of researchers from mid 1980s)

c) Dynamic capability approach– (focused on by a group of researchers from mid 1990s)

**Cost Leadership, Differential Advantage and Focus Strategies**

Porter (1985, 1996) provided a framework in which firms can be classified in generic strategies. This model which is viewed in three different strategic groups namely differentiation, cost leadership, and focus strategies. Each of these three generic competitive strategies offers a completely different way of creating a sustainable competitive advantage. A firm must evaluate and therefore decide on opting the right approach between cost-leadership and differentiation or both strategies, else it may get stuck-in-the middle without a coherent strategy (Acquaah and Ardekani, 2006).

The description of the Porter’s Generic Strategies that comprises of: Leadership Strategy, Differentiation, and Focus, is shown in Figure No. 2.6 below.
Cost Leadership Strategy

The cost leadership strategy entails the sale of a “standard or no-frills” product (Porter, 1985: 13) which is combined with “aggressive pricing” strategy (Porter, 1980: 36). Consequently, this strategy involves making a “fairly standardized product and under-pricing everybody else” (Kiechel, 1981b: 181). Implementing a cost leadership strategy will involve integrating a set of actions to produce goods or services with features that are acceptable to customers at the lowest cost, relative to that of competitors (Ireland, et al., 2011). Japanese companies have successfully implemented cost leadership strategy. For example, at Toyota Motors - superior competitiveness in cost reduction, quality and delivery time, has provided the stimulus for a worldwide shift toward increasing efficiency through cost-cutting strategies (Schonberger, 1994).

In the early 80s, it was assumed that cost leadership strategy makes a lot of sense for commodities. The cost reduction efforts of cost leadership strategy can be classified into three main categories:

1. Reducing unit manufacturing costs through higher unit volume, efficient scale facilities, and experience curve;
2. Exercising strict cost control over engineered costs; and,
3. Minimizing discretionary costs like R&D (Research and Development), service, sales force, advertising, quality control, and so on.
But Levitt’s (1980) dictum, which is discussed in the next section, states that even a so-called commodity can be differentiated. In major consumer markets, such as automobiles, major appliances, and electronics, differentiation is in fact very critical. Therefore, firms started realizing that investing a big fortune in state-of-the-art equipment for cost efficiency, in the absence of some advantage in the market place meant putting too many eggs in the low-cost basket.

Differentiation Strategy- Cost Leaders cannot ignore differentiation

According to Porter (1985: 13), a cost leader cannot ignore differentiation. Levitt (1980) highlights in his research that everything can be differentiated—even a commodity. He says this is true not just for consumer products, but even for those who produce and deal in primary metals, grains, chemicals, plastics, and money. He elaborates that in consumer markets even simple products, or the so-called commodities such as, chicken, bananas, oranges, pineapples, potatoes, salt, oatmeal, and even ordinary bottled water, are now differentiated through branding (Levitt, 1980).

The generic differentiation strategy for some firm entails creating a market position that is perceived as being unique industry-wide and that is sustainable over the long run (Porter, 1980). Such differentiation can be based upon design or brand image, quality of service distribution, and so forth (Frambach et. al, 2003). Differentiator firms specifically create customer value by offering high-quality products supported by good service at premium prices (Walker & Ruekerts, 1987). How well a firm balances the product benefits and product costs for the customer relative to competitive offerings determines the effectiveness of the differentiation strategy (Slater & Olson, 2001). Companies following a differentiation strategy strive to create and market unique products for varied customer groups. Such firms aim to develop customer satisfaction and loyalty by delivering superior fulfilment of customer needs in one or several product attributes in order to develop customer satisfaction and loyalty, which can often in turn be used to charge a minimum price for the products (Morshett et al., 2006). A firm pursuing a differentiation strategy looks for creating perception in the minds of customers that their products or services possess superior characteristics that are unique from those of its competitors in terms of image and reputation, reliability, design features and quality (Dean & Evans, 1994; Sashi & Stern, 1995). This perception is developed by a firm by incorporating real qualitative difference in its products and services, by engaging in multiple techniques like advertising programs, marketing methods, and charging premium prices (Miller, 1986).
Some examples of differentiation strategy successfully implemented across the globe (i.e. in the developing, transition and developed economies) are as below (Vista, 2010):

- Differentiation by Brand: Harley Davidson, and Mercedes Benz
- Differentiation by Design: Titan watches with gold studded gems, diamonds and precious metals.
- Differentiation by Positioning: Domino Pizza “30 minutes delivery”.
- Differentiation by Technology and Innovation: Apple Computers.

The focus strategy calls for concentration on a niche or a narrow segment. But, according to Porter (1980), the success in this strategy can be achieved either via cost leadership or differentiation. Thus, the focus strategy is only existence in the segment, and can be implemented in the customers’ perception of being unique and or being low cost provider.

**Resource Based Concept of SCA**

Resource-based view has emerged in the last over a decade as a new approach to competitive advantage. The focus of this approach is on resources of an organization with the key emphasis of this view on resources that enable an organisation to perform specific strategies (Kalling, 1999). As per Barney (1991), firms can be conceptualised as bundles of resources (and capabilities) that are heterogeneously distributed among firms and are imperfectly mobile. The differences in resource endowments across firms over time, thereby allows for a resource-based competitive advantage. While RBV gained a lot of appreciation initially but it also received criticism as being conceptually vague and redundant, lacking consideration of market dynamism, and with limited attention to the mechanisms by which resources are converted to competitive advantage (Eisenhardt and Martin 2000; Mosakowski and McKelvey 1997; Priem and Butler 2001).

It is evident in research that organizations in every industry are in the pursuit of sustainable competitive advantage and in that quest, the “resource-based view” is popular in making a key contribution to developing and delivering competitive advantage (Collis and Montgomery, 1995; Prahalad and Hamel, 1990).

The resource-based view, however, limits organizations in understanding the full nature and dynamics of strategy (Chaharbaghi and Lynch, 1999). The reason being, “The resource-based view strives to identify and nurture those resources that enable organizations to develop competitive advantage. The primary focus of such an analysis, however, is on the existing resources, which are treated as being largely static and unchanging. The problem is that
dynamic environments ceaselessly call for a new generation of resources as the context constantly shifts” (Chaharbaghi and Lynch, 1999, p.45).

Chaharbaghi and Lynch’s (1999) argument is valid as the essence of sustainable competitive advantage is to focus on a firm’s capability in producing core competencies (the journey) and thus achieving superior performance. While various tactics in pursuit of SCA can be incorporated in strategy, it is always management who will make them effective. However, if the sources of creating core competencies are valuable, imitable, and substitutable, then the approach has problems and is incomplete.

**The Dynamic Capability Approach to SCA**

It is the dynamism of management together with their ability to formulate and implement effective resource-based strategies that are the ultimate sources of sustainable competitive advantage. To enhance the RBV and extend the knowledge on achieving sustainable competitive advantage in fast changing environment, Dynamic Capability Approach (DCA) has been developed (Eisenhardt and Martin 2000; Helfat and Peteraf 2003; Teece et al. 1997). DCA advocates have proposed that the mere existence of appropriate bundles of specific resources is insufficient to sustain competitive advantage in situations involving rapid and unpredictable market changes. The DCA proposes that the traditional elements of business success in previous models—maintaining incentive alignment, owning tangible assets, controlling costs, maintaining quality, optimising inventories—are necessary but not sufficient for sustained superior performance in changing environments (Helfat et al., 2007; Teece, 2007).

The real sources of a sustainable competitive advantage are dynamic capabilities, which ‘integrate, build, and reconfigure internal and external competencies to address rapidly changing environments’ (Teece et al., 1997). Thus, dynamic capabilities enable firms to continually maintain competitive advantage by adapting and refreshing their resource base, thereby helping firms avoid development of core rigidities that inhibit development and result in innovation inertia (Ambrosini and Bowman, 2009; Pitelis and Teece, 2009). It is noted in Collis (1994, p. 148) that ‘the capability that wins tomorrow is the capability to develop the capability to develop the capability that innovates faster (or better), and so on.’ Central to the survival and prosperity of firms under such environment is the ability to not only exploit existing assets and improve efficiency in a profit producing way, but also explore new technologies and markets; not only to deploy existing opportunities, but also to reconfigure
resources and prepare to address and adapt to emerging threats and opportunities (O’Reilly and Tushman, 2007).

Authors (Hamel & Green, 2007; Collinson, 2005) agree that the 21st century is based on knowledge, information and innovative economy. Organisations’ success depends on employees’ knowledge, experience, creative activity and qualification and emphasis is placed on continuous learning and research and development.

Already in 1986 Tushman & Nadler stressed that “organisations can gain competitive advantage only by managing effectively for today while simultaneously creating innovation for tomorrow” and suggested that “there is perhaps no more pressing managerial problem than the sustained management of innovation”.

In conclusion, the sources of sustainable competitive advantage in this global economy have become more tacit and intangible. Being innovative, be a learning organization, implement knowledge management, advanced management information system, globalization efforts, organization infrastructure, knowledge, intellectual capital, flexibility, quickness, innovation, positive organization culture, market focused learning, marketing capability and managing human resource capabilities are firms primary focus in this rapidly changing world, to achieve sustainable competitive advantage. Thus, to survive and succeed, a business must develop and implement strategies to effectively counter the above five competitive forces. O’Brien and Marakas (2011, p. 49) suggest that organisations not just need to follow one of five basic competitive strategies, which are based on Porter’s three generic strategies of broad cost leadership, broad differentiation, and focused strategy, but also constantly innovate and to survive and remain profitable. It is evident in research that continuous innovation efforts provide sustainable growth and competitive advantage. On top of these five basic strategies, companies can also adopt other competitive strategies facilitated by information systems to shape their competitive advantage. Another important and highly debated topic in innovation strategy management is when organizations should be early adopter of new technologies. Martín-de Castro et al. (2013) say that developing successful technological innovations is essential for creating and sustaining an organisation’s competitive advantage. Embracing technology and business information systems could be a critical enabler of these five competitive strategies. The next chapter discusses information systems and technology adoption is inevitable in this current context as a source of competitive advantage and further argues if merely implementing business information systems will suffice to survive in these times or does it takes something more than that?
2.2 Competitive Advantage in the Digital Era

The integration of information and communication technologies (ICT) and digitisation into organisations and their business practices has radically changed the dynamics of competition among firms. This has also meant that opportunities for enhancing firm competitiveness have increased in depth and scope, as have challenges and threats to the viability of incumbent businesses and tried-and-tested practices. The digital economy, spurred on by recent advances in the Internet and the web and the rapidly declining costs of computing, has brought disruptive forces and technologies to the fore. These, while presenting firms with new ways to create, deliver and capture value, have also wrong-footed many firms that have been slow to adapt. Business models are constantly being reinvented, while industries and standards are undergoing radical transformation. This section of literature covers the following areas: a) the role of business information systems for competitive advantage; b) the impact of Big Data and Analytics in transforming businesses towards data-driven decision making; c) an explanation on why businesses with web based trading platforms are the players in the Big Data game; and finally, d) how the online businesses make use of Big Data powered information asymmetry driven advantage.

2.2.1 Business Information Systems as a Source of Competitive Advantage

Here, we explore if the two most common business information systems viz, Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) have acted as a source of competitive advantage.

Information plays a great role in the enterprise. It is consistently a hot topic for information management, and all the time, evaluating its efficiency is a critical task (Kahraman, et al., 2011). For a corporation, there are thousands of pieces of vertical and horizontal information flows within it. The information management activities, in fact, can be regarded as the control on those flows (Li et al., 2003). In response to global competition, enterprises are increasingly employing information technology to conduct business electronically. Thus, various information systems, such as enterprise resource planning (ERP), supply chain management (SCM) and customer relationship management (CRM), are increasingly used to gather business transaction, supplier and customer data.

Enterprise Resource Planning (ERP) systems have been applied by many firms regardless of size around the world as a key part of the organizational infrastructure. ERP encompass a wide range of software products supporting day-to-day business operations and
decision-making (Gattiker and Goodhue, 2005). ERP systems are expected to provide seamless integration of processes across functional areas with improved workflow, standardization of various business practices, improved order management, accurate accounting of inventory, and better supply chain management (Mabert et al., 2003). However, these IT resources streamline and integrate internal business processes to improve efficiency only within firm’s boundaries (Davenport, 1999). In their idealised form, Enterprise Resource Planning (ERP) systems integrate all business processes into one enterprise-wide solution. This is accomplished by having a centralised database that all business functional areas have access to (O’Leary, 2002).

Customer Relationship Management (CRM) systems have exploded on the enterprise space in the past years, and some studies claim that they are the ultimate solution to the information exchange problem among firms (Gartner, Hype Cycles 2013; Extraprise, CRM Support Survey Report, 2008). In reviewing CRM literature and firm performance, CRM represents a system for creating value for both the firm and its customers through the appropriate use of technology, data and customer knowledge (Alshawi et al., 2011; Payne and Frow, 2006; Payne and Frow, 2005). Accordingly, with Day (2003), and Alshawi et al. (2011) CRM brings together people, other resources and organizational capabilities to ensure connectivity between the company, its customers and collaborating firms.

Competitive advantage and long-run business value depend more and more on a deep knowledge of and relationships with customers. Understanding the idiosyncrasies of heterogeneous customer preferences, valuations, and consumption behaviours, and determining customers’ lifetime value can improve marketing decisions and returns on marketing expenditures (e.g., Hogan et al. 2002). It is aimed to improve the relationship between firms and customers.

As more and more firms realize that they need to know deeply their customers to compete or survive, integrating CRM with ERP becomes a critical issue (Payne and Frow, 2005; and Ryals, 2005). Because of their lower cost and ease of implementation and its use, CRM hold the promise of enabling information made from the CRM to be consumed in ERP and across the extended enterprise. CRM extend the original value proposition of ERP, allowing firms to build interactive relationships with its customers and bring together their previously separated information at very low cost (Payne and Frow, 2006; Iriana and Buttle, 2006). Whereas CRM encompass the external part of the extended enterprise, and ERP encompass the internal part (Gartner Hype Cycles, 2013; Alshawi et al., 2011)

Since the early days of data processing, designers of information systems have been striving to satisfy the requirements of both operational and managerial users. Much debate has
centred on the ability of integrated information systems to satisfy both the operational requirements for managing basic resources and the managerial requirements for planning and control of these activities (Seethamraju, 2007).

Initially, Enterprise Resource Planning (ERP) systems started out as “back-office” systems that were capable of integrating and automating a wide range of transaction-intensive processes across functions like manufacturing, human resources and finance but with subsequent advancement in technology, ERP has widened its scope to cover a wide variety of additional processes such as performance management, planning and analysis, supply chain management, customer relationship management and product development (Davenport et al., 2004).

Over the last few decades, the critical question in information technology (IT) business value research is if IT investments cause increases in firm productivity and performance (Aral, et al., 2006). While information systems may be correlated with increased performance, determining causality is essential to understanding whether information system pays off or whether investment in information is simply a consequence of success stemming from other root causes, has been the point of debate in academia and industry experts (Brynjolfsson & Hitt, 2000).

Many researchers have highlighted the benefits of ERP implementation in supply chain management that include: 1) integration of transaction data across the organization to enable SCM process collaboration and its associated performance improvements; 2) automation of critical business processes; and 3) real-time access of information to stakeholders (Willis & Willis-Brown, 2002). As ERP represents an area of significant financial investment and business activity (Schubert & Williams, 2011), successful implementation requires a high degree of planning and commitment and rather than dealing with technology alone (Ganesh & Mehta, 2010). According to Davenport et al., (2004, p.25), “the leading large organizations usually take a three-pronged strategy to achieve value from their ERP: 1) integrate with the partners 2) optimize processes 3) and improve decision making. This can be made possible by using robust data access and analytic capabilities to transform enterprise-wide data into useful knowledge that can then be applied to an organization’s unique business problems.”

These systems can deliver great rewards, but the risks of failure that they carry are equally great as these systems have many limitations (Davenport, 1998). Extant research shows that ERP and implementation have very little impact on the business analysis and decision support areas that emphasize the need for sophisticated manipulation of information rather than a simple extraction and reporting of transactional data (Granlund & Malmi, 2002). This is
further validated by research findings of Granlund & Malmi (2002); Seethamraju (2007) that indicates that enhanced mass processing of transactions is done with limited decision support capability. To cover this gap, large organizations are increasingly making use of a decision support system on top of their existing ERP systems (Seethamraju, 2007).

ERPs were once looked upon as a business solution for only large enterprises but it is not the case anymore. In this changing economy, many firms across the world have realized the importance of an integrated business solution like ERP and CRM (Customer Relationship Management) systems. However, recent research shows that while companies are finding new and successful ways to derive value from enterprise wide data, they are not able to extract the benefits of ERP implementation fully. This could be due to their unique and inherent constraints (Addy et al., 1994; Hudson, et al., 2001, p.1105) as “1) personalized management (most often-owner driven), with little devolution of authority; 2) severe resource limitations in terms of management skills, trained manpower and finance; 3) reliance on a small number of customers, and operating in limited markets; 4) flat, flexible structures; and 5) reactive, fire-fighting mentality”.

Thus, ERP and similar business information systems represent several challenges, in specific relating to decision-making support. Various operational and transaction data that gets stored in the ERP and CRM systems can be transformed into information and then knowledge by using business intelligence (BI) tools. Enterprises decision makers make better business decisions (Wu, 2010). Decision making is one of the most important tasks for enterprise managers, and is generally based on various data sources derived from information systems.

In this age dominated by technology, information and knowledge represent the fundamental wealth of an organization. Enterprises try to utilize this wealth to gain competitive advantage when making important decisions (Ghazanfari, et al., 2011). Enterprise software and systems include Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and Supply Chain Management (SCM) systems. These systems convert and store the data in their databases; therefore, they can be used as a pool of data to support decisions and explore applicable knowledge (Alter, 2004; Power, 2008). With the potential to gain competitive advantage when making important decisions, it is vital to integrate decision support into the environment of their enterprise and work systems. Business Intelligence (BI) can be embedded in these enterprise systems to obtain this competitive advantage (Jalonen and Lonnqvist, 2009; Sharma, R.S. and Djaw, 2011). But literature proves while ERP and CRM systems are data rich, they fall short on decision support needs of Management.
The next section of literature takes forward the theory and cites examples from industry on information and data-driven decision making for competitive advantage.

2.2.2 The Rise of Big Data and Business Analytics- The next game changer

The last decade has seen a transformation in the way consumers and businesses transact. The age of Internet has led to the rise of e-commerce which has dramatically changed the way products are bought and sold. With the world getting connected with information systems, Internet and mobile devices, there is enormous amount of data flowing into this global economy. In the McKinsey report, (Manyika et.al 2011) state, “Companies have access to a large amounts transactional data about their customers, suppliers, and operations. Millions of networked sensors are being embedded in the physical world in devices such as mobile phones, smart energy meters, automobiles, and industrial machines that sense, create, and communicate data in the age of the Internet of Things.”

The amount of data in our world has been exploding. Companies capture trillions of bytes of information about their customers, suppliers, and operations, and millions of networked sensors are being embedded in the physical world in devices such as mobile phones and automobiles, sensing, creating, and communicating data. Multimedia and individuals with smartphones and on social network sites will continue to fuel exponential growth. Big Data—large pools of data that can be captured, communicated, aggregated, stored, and analysed—is now part of every sector and function of the global economy. Like other essential factors of production such as hard assets and human capital, it is increasingly the case that much of modern economic activity, innovation, and growth simply couldn’t take place without data.

There exist multiple definitions of Big Data, but the most widely accepted definition lies in terms of 3 characteristics that it displays, volume, velocity and variety also referred to as 3 V’s—Variety refers to the heterogeneous nature (made up of structured and unstructured datasets), Velocity depicts the speed at which data is captured, and Volume refers to the size of data (usually in Petabytes, Exabyte and Terabytes) (Laney, 2001). Traditionally, information travelled in organizations in their proprietary databases and analysed in reports that rises-up the management chain (Chiu et al, 2010). In what’s called the ‘Internet of Things’, the information traverses through digital chips and sensors embedded in physical devices like different kinds machines and mobile phones, has led to the physical world becoming a type of an information system in itself.
As mentioned above, Laney (2001) considers Big Data as data whose volume, velocity, and variety makes it difficult for an organization to manage, analyze and extract value by conventional methods and systems. The term Business Analytics (BA) is defined as the “process that extracts value from data through creating and distributing reports, building and deploying statistical and data-mining models, exploring and visualizing data, sense-making, and other related techniques. Data may be internal or external to the organization; processing may be real-time, near real-time, or batch; and any combination of these is possible” (Grossman and Siegel, 2014, p.20).

Every industry segment of the economy viz. retail, e-commerce, manufacturing, healthcare and banking have realized the potential of Big Data. With the advent of business analytics, large companies are already in the path to gaining competitive advantage using Big Data. In the next sections of literature, the thesis presents application of business analytics on Big Data by large players.

To get that edge over competition, Davenport (2006, p.1), strongly recommends, “…wringing every drop of value from all the business processes using data analysis and transforming oneself into an analytics competitor.” Several researches in the recent past have gone into studying the impact of Big Data and analytics on business performance and there is now substantial evidence that data speaks better than experts and is widely considered to be a driver of better decision making and improved profitability (Waller & Fawcett, 2013).

But the fact remains that while data exists in abundance, the decision makers put far too much faith in their intuition and gut than on numbers (Ayres, 2008). In present times, most executives are computer-literate but not many are information-literate (McAfee & Brynjolfsson, 2012). Therefore, decisions more-often are taken on human intuition and not supported by data (Ayres, 2008) and there exists a lack of perspective and skills to get actionable data insights (Drucker, 1992). Many, even in the big data community have observed that companies often make most of their important decisions by relying on “HiPPO”—the highest-paid person’s opinion (McAfee & Brynjolfsson, 2012, p.65).

According to Williams & Williams (2007), to reap benefits from Business Analytics and Big Data, the organizations need to envision opportunities to use information in new ways and Business Analytics is not just about a product, a technology or a methodology. It is the right mix and combination of all the three that has the potential to answer various business problems and derive actionable insights leading to improved performance (Williams & Williams, 2007). Govindan et al. (2013); Xu et al. (2012) have also written about useful data mining techniques like clustering, classification etc. Emblemsvåg (2004), provides his
perspective on whether business analytics should be performed or not, and particularly, how does one avoid the common pitfall of paralysis by analysis and more importantly, how does one get the most insight out of the numbers. While this problem of separating signal (meaningful insight) from the noise (large volumes of data) can be resolved by making use of right analytical techniques, the literature is still limited on role and impact of business analytics on supply chain performances (Trkman et al., 2010) as it requires extensive knowledge and expertise.

Thus, the minimum investment components and skills required for ‘meaning making’ are: 1) knowledge of domain or business; 2) knowledge of statistics and 3) analytical tools (Figure 2.7). These components are interlinked and integrated to create a complete business solution.

![Figure 2.7: Minimum required investment components for BA](Adapted from “what is data science”)

The literature recommends use of a critical mass of expert data scientists for large organisations to: “identify relevant data (both internal and external), manage the data required for analytics, build the needed analytics models, and deploy the models that are built into products, services, and internal systems for large organizations” (Grossman and Siegel, 2014, p.23)

Big Data represents a fundamental shift in business decision-making. Organisations are accustomed to analysing internal data – sales, shipments, and inventory. Now they are increasingly analysing external data too, gaining new insights into customers, markets, supply chains and operations: which can be called the “outside-in view”. Research proves that it is Big Data and the outside-in view that will generate the biggest opportunities for differentiation over the next five to ten years.

---

1 [https://datajobs.com/what-is-data-science](https://datajobs.com/what-is-data-science)
Becoming an Analytics Competitor

In the last five years, there have been substantial efforts to understand the implications of Data Science and Big Data on the way supply chains are designed and managed. What differentiates companies in today’s highly competitive markets is their ability to make accurate, timely, and effective decisions at all levels – operational, tactical, and strategic – to address their customers’ preferences and priorities (Bose, 2009). Increasingly, companies in virtually every industry around the globe have started using advanced (also known as predictive) analytics to analyse their data (both structured and unstructured), combining information on past circumstances, present events, and projected future actions. By incorporating advanced analytics into their daily operations, these organizations gain control over the decisions they make every day, so that they can successfully meet their business goals (Apte et al., 2003).

The everlasting list challenges that companies face have been, increasing competition, expanding markets, and rising customer expectations. This led increased pressure on them to lower total costs in the entire supply chain, shorten throughput times, drastically reduce inventories, expand product choice, provide more reliable delivery dates and better customer service, improve quality, and efficiently coordinate global demand, supply, and production. Information processing of data that firms generate in its business has gradually become the basis for achieving competitive advantage (Guarda et al., 2013)

Powerful transaction-oriented information systems like ERP (Enterprise Resource Planning) are now commonplace in every industry, effectively levelling the playing field for organizations around the world. With evolving times, to remain competitive, companies now require analytically oriented systems, called Business Intelligence (BI) tools that can turn the information that they already own into actionable insights (Ranjan, 2009).

Davenport (2006) writes about becoming an analytics competitor, at a time when firms in many industries offer similar products and use comparable technologies, business processes are among the last remaining points of differentiation, and he recommends the use of sophisticated data-collection technology and analysis to wring every drop of value from all the business processes. Some of the areas that business analytics are being applied by companies on their existing data are: a) Demand Forecasting and Supply Planning; b) Segmented sales and marketing; c) Pricing; d) Research and Development and Product Design; e) Customer Service; f) Up-selling and Cross-selling; g) Reduction in Production Defects and Quality Improvement and so on.
Analytics can be classified into Descriptive, Predictive and Prescriptive Analytics. The figure 2.8 shown below explains the three-different classification of analytics.

![Classification of Data Analytics](Adapted from: IBM report on Big Data Analytics, 2013)

Descriptive Analytics involves data visualization, that uses images to represent information, is only now becoming properly appreciated for the benefits it can bring to business. It provides a powerful means both to make sense of data and to then communicate what we’ve discovered to others. Despite their potential, the benefits of data visualization are undermined today by a general lack of understanding. (Few, 2007)

The person who introduced the power of data visualization as a means of exploring and making sense of data was the statistics professor John Tukey of Princeton, who in 1977 developed a predominantly visual approach to exploring and analyzing data called exploratory data analysis. Data visualization helps answer the questions like what and when did an event happen, how much is impacted and how often does it happen and what is the problem? (IBM report, 2013).

Predictive analytics is an area that has been growing in popularity in recent years. Data mining, in simple terms, is finding useful patterns in the data. Being a buzzword, there are a wide variety of definitions and criteria for data mining. Data mining is also referred to as knowledge discovery, machine learning, and predictive analytics (Kotu and Deshpande, 2015).

<table>
<thead>
<tr>
<th>Descriptive Analytics (Business Intelligence)</th>
<th>Predictive Analytics</th>
<th>Prescriptive Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>o What and when did it happen?</td>
<td>o What is likely to happen next?</td>
<td>o What is the best answer?</td>
</tr>
<tr>
<td>o How much is impacted and how often does it happen?</td>
<td>o What if these trends continue?</td>
<td>o What is the best outcome given uncertainty?</td>
</tr>
<tr>
<td>o What is the problem?</td>
<td>o What if?</td>
<td>o What are significantly differing and better choices?</td>
</tr>
</tbody>
</table>

Statistics
- Data Mining
- Predictive Modeling
- Machine Learning
- Forecasting
- Simulation
- Constraint-based optimization
- Multiobjective optimization
- Global optimization

**Figure 2.8: Classification of Data Analytics**
(Adapted from: IBM report on Big Data Analytics, 2013)
Machine learning systems automatically learn programs from data. This is often a very attractive alternative to manually constructing them, and in the last decade the use of machine learning has spread rapidly throughout computer science and beyond. Machine learning is used in Web search, spam filters, recommender systems, ad placement, credit scoring, fraud detection, stock trading, drug design, and many other applications. A recent report from the McKinsey Global Institute asserts that machine learning (a.k.a. data mining or predictive analytics) will be the driver of the next big wave of innovation (Manyika et al., 2011). So, who uses predictive analytics and data mining today? Who are the biggest consumers? A third of the applications are centred on marketing (Rexer, 2013). This involves activities such as customer segmentation and profiling, customer acquisition, customer churn, and customer lifetime value management.

The table 2.6 shown below provides a summary of data mining tasks with commonly used algorithmic techniques and their examples.

**Table 2.6: Machine Learning and Data Mining Tasks and Examples**

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Description</th>
<th>Algorithms</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Predict if a data point belongs to one of the predefined classes. The prediction will be based on learning from a known data set.</td>
<td>Decision trees, neural networks, Bayesian models, induction rules, k-nearest neighbors</td>
<td>Assigning voters into known buckets by political parties, e.g., soccer moms</td>
</tr>
<tr>
<td>Regression</td>
<td>Predict the numeric target label of a data point. The prediction will be based on learning from a known data set.</td>
<td>Linear regression, logistic regression</td>
<td>Predicting unemployment rate for next year</td>
</tr>
<tr>
<td>Anomaly detection</td>
<td>Predict if a data point is an outlier compared to other data points in the data set.</td>
<td>Distance based, density based, local outlier factor (LOF)</td>
<td>Estimating insurance premium</td>
</tr>
<tr>
<td>Time series</td>
<td>Predict the value of the target variable for a future time frame based on historical values.</td>
<td>Exponential smoothing, autoregressive integrated moving average (ARIMA), regression</td>
<td>Fraud transaction detection in credit cards</td>
</tr>
<tr>
<td>Clustering</td>
<td>Identify natural clusters within the data set based on inherent properties within the data set.</td>
<td>k-means, density-based clustering (e.g., density-based spatial clustering of applications with noise (DBSCAN))</td>
<td>Network intrusion detection</td>
</tr>
<tr>
<td>Association analysis</td>
<td>Identify relationships within an item set based on transaction data.</td>
<td>Frequent Pattern Growth (FP-Growth) algorithm, Apriori algorithm</td>
<td>Sales forecasting, production forecasting, virtually any growth phenomenon that needs to be extrapolated</td>
</tr>
</tbody>
</table>

Source: Kotu and Deshpande (2015)

Now if everyone competes on analytics, then how can an organization create a competitive advantage from data? What should be done to stay ahead of the curve? In the Indian traditional consumer goods businesses context, there is research yet to be done on how far they have reached on their analytics journey in terms of exploiting data to their benefit. But both the questions mentioned here remains valid for them as well, if not now, soon.
Many firms believe that the concept of making the right offer to the right consumer will be the way of the future (Ghose et al., 2002). But what can enable the firms in tailoring their offers to individual customers? In the next sections of literature, the importance of getting to the granular details on customer preferences, behaviour and product sales, and how players in the industries like retail and e-commerce are exploiting it to their advantage are presented.
2.2.3 Who are the players in the Big Data Game?

As presented in section 2.1.3, traditional trade in India involves multiple tiers in its distribution network before the product reaches the end consumer. What about access to information down their value chain? The previous section of literature clearly highlights information as the fuel to competitive advantage in this technology dominated world. We further explore in this section, who has access to how much information on consumers?

**Online Intermediaries and E-Commerce**

A supply chain involves several trading partners that are interconnected through the flow of materials and information, and in today’s times, due to product proliferation, multi-channel setups, global sourcing etc., supply chains are long and complex (Balasubramaniam and Tewary, 2005).

Before the end-product finally reaches the consumer in the supply chain, there exist multiple channels upstream and downstream. With technological advancements, information can flow from retail outlets to the trading partners upstream in the form of market forecasts and orders, and from suppliers/manufacturers to the trading partners downstream in the form of order status and shipment information. To meet consumer demand, suppliers and manufacturers must work together to manage the flow of material and information (Gangopadhyay and Zhensen Huang, 2014). Hence, the prime determinant of business success has been established as the ability to collaborate with your trading partners across the supply chain. There are exemplars in Wal-Mart and Cisco Systems, which have proved that effective supply chain collaboration translates directly into superior financial performance (Balasubramaniam and Tewary, 2005). Dell has worked towards providing excellent customer service by online information sharing and leveraging the logistics capability. Dell delivers finished product only when it has real demand from an end customer (Schonfeld, 1998).

In an Indian traditional businesses manufacturer’s context, the downstream supply chain involves multiple tiers like super-distributors, sub distributors and retailers before their products reach the end consumer, therefore, it gets important for the traditional businesses manufacturer to get access to secondary and tertiary sales information for quick response turnaround time to avoid the "bull-whip" effect on the supply chain (Lee at al 1997a; 1997b) in attempting to meet customer demand.

Past decade has seen e-commerce fundamentally changing the economy and the way business is conducted. E-commerce forces companies to find new ways to expand the
markets in which they compete, to attract and retain customers by tailoring products and services to their needs, and to restructure their business processes to deliver products and services more efficiently and effectively (Shin, 2001).

With the development of network economy, e-commerce platform has increasingly become a worldwide trading place of various kinds of products and services. This environment makes direct trading between producers and consumers through the Internet possible (Wei Ro, 2014). This has paved way for online intermediaries or e-marketplaces like Amazon, Flipkart etc. that provide an information driven platform for buyers and sellers to trade.

An early research by Bakos (2001) mentions how technology allows firms to identify and track individual consumers, because of digital transactions both within an online store and across different Websites that leads to the creation of consumer profiles through various collaborative and content filtering techniques. In the case of online retailing, every transaction like surfing, buying and selling, leaves a trail of digital “exhaust data”, created as a by-product of such activities (Manyika et al., 2011) that the e-commerce companies have access to. Such information is used by the Internet retailers for their competitive advantage that includes segmented and personalized offerings to customers (Cambini et al., 2011) and in addition deploying complex pricebots and algorithms, to determine prices to approach first degree price discrimination (Bailey 1998). The next section of literature covers the possible extent of exploitation of data by online businesses to gain competitive edge. Big Data has largely been the domain of ‘Big’ companies because of its scope and need for extensive technical, manpower and financial resources. The companies that have web facing businesses(e-commerce) undoubtedly have access to more information on customers. Extant research shows that most traditional businesses are intimidated by the level of expertise required to ‘manage Big Data’ and have, thus, become mute spectators in the digital revolution.

In the current context, the traditional businesses belonging to segments like apparel, consumer electronics and accessories, luxury products etc. that always sold their products through traditional channels and brick stores, are also selling their products through e-commerce now that helps them get access to a wider market segment. With growing e-retail popularity and success world-wide and in India, the traditional sales channels are facing fewer footfalls and hence lowered revenue.

While this paper presents the author’s views on the current state of information availability across their distribution channel, but from a competitive advantage perspective, in a sales transaction, what kind of informational advantage one wants from the data to position the right product and price it right to the customer? If we juxtapose conventional sales
channels against e-commerce and e-marketplaces, the opportunities to take advantage of data that the latter has due its sheer nature of business on the digital platform is worth examining. Is Information Asymmetry a source of competitive advantage?

2.2.4 Information Asymmetry – A Source of Competitive Advantage

Information asymmetry according to economics occurs when one party to a transaction has more or better information than the other party. Typically, it is the seller that knows more about the product than the buyer, however, reverse may also be true wherein the buyer is better informed compared to the seller.

The concept of asymmetric information was first introduced in George A. Akerlof’s 1970 paper *The Market for "Lemons": Quality Uncertainty and the Market Mechanism* (Akerlof, 1970). In the paper, Akerlof develops asymmetric information with the example case of automobile market. His basic argument is that in many markets the buyer uses some market statistic to measure the value of a class of goods. Thus, the buyer sees the average of the whole market while the seller has more intimate knowledge of a specific item. Akerlof (1970) argues that this *information asymmetry* gives the seller an incentive to sell goods of less than the average market quality. The implications of such an event is that the average quality of goods in the market will then reduce as will the market size.

Akerlof (1970) begins by assuming a model of the automobiles market where there are four kinds of cars; new cars and old cars, which both can be good or bad (the bad cars are commonly known as "lemons"). When buying a car, there is a probability $q$ that it is a good car and a probability $1-q$ that it will be a lemon. This is true for both new and old cars. After owning the car for some time the owner acquires more information about the condition of the car and can assign a new probability to the event of the car being a lemon. As this probability, can be assumed to be more accurate than the initial $q$, an information asymmetry between the owner and potential buyers has developed. The price of good cars and lemons stay the same as the potential buyers cannot tell them apart. Akerlof (1970) further argues that the price of a new car must be higher than an old car, because otherwise it would be possible to sell a lemon with the price of a new car and buy a new car with the lower probability $q$ of it being a lemon.

**Information Asymmetry as a source of market failure:**

Mainstream economists consider information asymmetry as a major source of market failures as it affects how individuals assess the quality of goods and services available on the
marketplace (Akerlof 1970) and/or how individuals anticipate on others' intentions and actions (Spence 1976).

**Information Asymmetry as a Source of Market Opportunities:**

Interestingly, some other economists, the tenants of the Austrian tradition in economics, consider that information asymmetry, far from being a source of market failures, is a condition for market opportunities to emerge. In this view, opportunities exist only because individuals do not possess substitutable information sets (either complete or incomplete) regarding market forces and technology. It follows that asymmetric information creates the conditions for entrepreneurs to search for new business opportunities, leading them to find ways to acquire ‘more and more accurate and complete mutual knowledge of potential demand and supply attitudes’ (Kirzner 1997, p. 62).

Information asymmetry has also been viewed as a major source of market opportunities (Shane and Venkataraman, 2000) and competitive advantage (Miller, 2003). The differences in individuals’ knowledge and cognitive abilities has been considered a major source of inter-individual differentiation that allows certain individuals (and organizations) to create, identify and seize business opportunities (Barbaroux, 2014).

This second view puts emphasis on information asymmetries resulting from differences in individuals' knowledge and cognitive abilities. Therein, asymmetrically distributed cognition is a major source of inter-individual differentiation that allows certain individuals (and organizations) to create, identify and seize business opportunities keeping most if not all the economic benefits of the market economy.

To understand this, we first need to get down to the basics of supply and demand, and how an open market price determination provides economic benefits to both the buyer and the seller. The gain, called the producer's surplus and the consumer's surplus occurs because of the way the final exchange price is determined by the intersection of the supply and demand curve. This is illustrated in the figure 2.9 below.
The consumer surplus is the gap between the price that the consumer is willing to pay for a good and the price that he pays. It is thus a measure of the benefit that buyers receive from a good as the buyers themselves perceive it. There is a similar explanation for a producer surplus. These surpluses together are what makes market efficient and contribute to its perceived beneficial aspect.

The economists have been telling us ever since the first book on economics was written that monopolies are bad, for it concentrates market power, and allows the monopolist firm to determine the final sale price by controlling the supply. But the economists’ objection to monopolies was not on the grounds of justice or fairness, but because they cause the so-called deadweight losses, the shrinking of the economic surplus comprising of the producers surplus and the consumer’s surplus. The economist does not care who gets the surplus provided somebody gets it. There is inefficiency if the size of the surplus shrinks.

Research has proven that e-commerce companies make use of Business Analytics to identify patterns in consumers’ shopping habit and hence can provide customized/democratized offers, advertisements and discounts to such consumer (Mosavi & Vaezipour, 2013).

**Search Discrimination and First Degree Price Discrimination**

\[^2\]https://en.wikipedia.org/wiki/Economic_surplus
The economic implication of personalization by online retailers which is price discrimination was observed in the research done by Mikians et.al (2012, 2013). According to them, e-commerce companies practice price discrimination by setting different prices of a given product for each customer individually according to his valuation for it, and this can be achieved from extensive information collected online on the customers, thus contributing to the profitability of electronic sales channels. Mikians et.al (2012, 2013) in addition observed another way that these companies also discriminate among their customers by ‘search discrimination’, meaning steering them towards different sets of products with their access to customer information.

Soon, firms will have the wherewithal to use the waves of personal profile and consumer and supplier activity data to set personalized prices for different consumers. Retailers using the Internet as a medium for commerce can gather a remarkable wealth of information about their existing and potential consumers and hence better estimate a consumer reservation price. As Bakos (2001) mentions, technology allows firms to identify and track individual consumers, both within an online store and across different Websites. This leads to the creation of consumer profiles through various collaborative and content filtering techniques. Based on such information, the Internet retailers’ Web server can deploy complex pricebots and algorithms to determine prices to approach first degree price discrimination (Bailey, 1998).

**Price Discrimination** is the practice of pricing the same product differently to different buyers, depending on the maximum price (reservation price) that each respective buyer is willing to pay. Large datasets on individual behaviour, popularly referred to as “Big Data”, are now readily available, and contain information potentially useful for person-specific pricing. For example, web browsing data may indicate psychographic profiles or direct interest in a related product, or reflect latent demographics such as sexual orientation, social phobia, and marital happiness - all information that can be used to form a hedonic estimate of willingness to pay.

Recent advancements in Big Data Analytics provides for the first time the possibility of targeting individual consumers. Literature clearly shows that the businesses that have an online presence can only get to this level of gaining competitive advantage.

**2.3 Summarizing the theoretical findings**

The goal of SCM is to integrate both information and material flows seamlessly across the supply chain as an effective competitive weapon (Childhouse, 2003). Supply chain
management has a significant role in firm's performance and has attracted serious research attention over the last few years. Organisations that do not actively incorporate SCM performance measures might face challenges when executing their SCM activities. Theory also establishes that even well-conceived performance measurement system and competitive strategies cannot increase organizational success unless they are effectively implemented.

In conclusion, the sources of sustainable competitive advantage in this global economy have become more tacit and intangible. Being innovative, be a learning organization, implement knowledge management, advanced management information system, globalization efforts, organization infrastructure, knowledge, intellectual capital, flexibility, quickness, innovation, positive organization culture, market focused learning, marketing capability and managing human resource capabilities are firms’ focus in this rapidly changing world, to achieve sustainable competitive advantage.

Even business information systems like ERP and CRM have become a commonplace and primarily play the role of data repository. They fall short on decision support capabilities and hence are necessary but not sufficient to survive in this age of cut-throat competition. In the past decade, Internet has revolutionized the way businesses and consumer transact and has led to a phenomenon called Big Data. Large organizations are utilizing Big Data using Business Analytics to gain insights on internal facing and external facing entities. Research asserts that knowing the customer to the core and personalizing offers to individual customer is the new definition of competitive advantage. This is the digital age, only Internet driven businesses have granular access to customer purchases, attitudinal and behavioural information and they exploit such an asymmetry to perform search and individual price discrimination.

In this context of digital economy, while literature explains that traditional businesses in India are not full-fledged operating in the online retailing space and continue selling their products through traditional distribution network and modern retail. But there is dearth of research on the extent of customer knowledge and analytics capabilities at traditional consumer products businesses in India. This gap in the literature was taken further as the broad area of research and formed the basis for research questions and themes that are defined in the upcoming sections.