Chapter 2
Key Issues in Logistics and Supply Chain

The main concept of SCM (supply chain management) used in this book refers to the means by which companies are engaged in producing, distributing and selling products. As well, this includes coordination and cooperation efforts among all supply chain partners to achieve high market intelligence by more exact market information sharing, product development, product design, product research and value analysis of the whole system. In today's competitive environment, businesses have more cost pressure from the consumer side. Companies are trying to make customers delighted through fast delivery of products, low cost and higher quality. To achieve these objectives several companies are using outsourcing, 3PL or 4PL services, and companies focus much more on their core competencies. According to the APCIS–CSCP-BOOK (2013), competition between companies has shifted towards supply chain *vs.* supply chain. Keeping the above discussion in mind: what the main supply network capabilities are required to make customers delighted and control or minimize cost pressure as well; how we can integrate capabilities through agreements, contracts, portfolios, relationships, etc. These major problems of strategic and tactical SC (supply chain) will be discussed in this chapter.

There are long lists of supply chain management issues and problems to be found in published and unpublished literature. Researchers Chandra and Grabis (2007) mentioned the list of problems and issues identified in Table 2.1 below. However, Chandra and Grabis also suggested problem-solving approaches for all these issues and related problems of supply chain.

2.1 Network Configuration and Competition

Researchers Rice and Hoppe (2001) analysed how SCs may compete with each other. Three different situations have been considered, since no single situation gives a common and valid characterization of competition:

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Table 2.1 SCM issues and suggested problem-solving approaches

S. no	SCM issues and related problems	Problems-solving approaches
1.	Distribution network configuration	Network flow optimization
2.	Supply contracts	Global optimization
3.	Supply chain integration and strategic partnering	CPFR (Collaborative Planning, Forecasting and Replenishment)
4.	Inventory control	Forecasting and inventory management
5.	Distribution strategies	Warehousing and transportation cost management
6.	IT and decision support system	ERP implementation and Decision support system
7.	Outsourcing and procurement strategies	Managing risk, payoff / trade-off with outsourcing *vs.* buying
8.	Customer value	SPC (statistical process control), TQM , and service level maximization

1. Competing as supply chain *vs.* supply chain literally. Competition among different firms across the network of supply competing as a single entity, formally or informally. This competition applies when the conditions given below exist.*
   *Note: These conditions can implement only one of the competitors.
   - When the supply chain is a vertically integrated firm competing with another similar company (vertically integrated)
   - When the network of supply is in a greatly integrated firm without common suppliers
   - When the network of supply is composed of enterprises that have solve-source associations
   - When the industry is fragmented in such a way that there are no common strategic suppliers shown in more than one supply network, and most strategic suppliers are committed to one supply network
2. Competing on capabilities of supply network. Competition among individual firms on their internal capabilities of supply network, essentially and especially over the efficiency, responsiveness and effectiveness of the network as well as the design of network used (for example, introducing new distribution channels).
3. Competing capabilities of a supply network led through a "Channel Master". Mostly influential and powerful firms in a supply network denoted as the channel master. In today's marketplace, this situation is normal.

These above-mentioned three situations are not mutually exclusive; researchers Rice and Hoppe (2001) illustrated cases of vertically integrated firms (ZARA) competing against "Channel Master" (The Limited) and against other parts of interconnected network of supply, competing on the basis of their capabilities of network (The GAP).

Figure 2.1 illustrates disconnected network of supply, competing with each other without overlaps at any tier (for instance, in the 1970s, manufacturing of automobile supply chains in the countries of Germany, Japan and the United States).

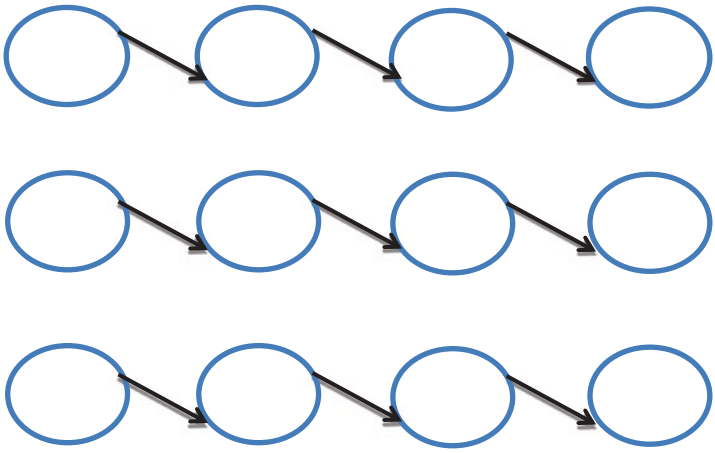

Fig. 2.1 Totally disconnected network of supply (Rice and Hoppe 2001)

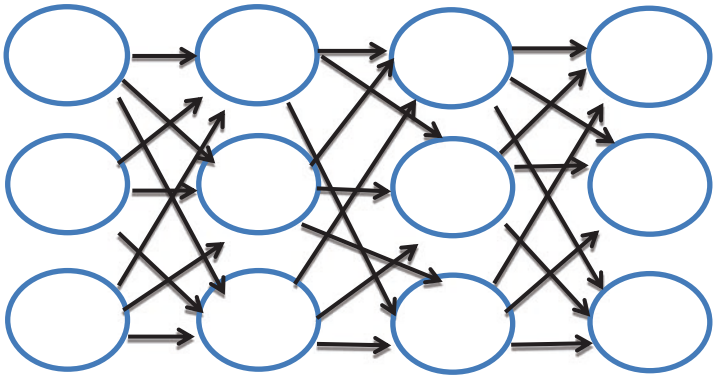

Fig. 2.2 Totally connected and overlapped network of supply (Rice and Hoppe 2001)

Figure 2.2, each of the three supply networks overlaps with every other one, and each firm at every layer sells its goods to every layer $(n + 1)$ firm.

In Fig. 2.3, competition in the industry of high-tech is, as in various other industries, somewhere mid of these two extremes (Figs. 2.1 and 2.2) with some overlaps and some totally disconnected layers within the networks.

Usually it is very common that the commodity-type products procured efficiently from many members in the open market have overlaps to some extent. For example, HP and Dell (and also Compaq before the merger with HP) compete in modular item architecture, and they have a fragmented supplier base building significant overlap.

According to the researchers Rice and Hoppe (2001), in many cases several of the potential connections or links are eliminated due to closer associations with some firms, depending on the product's nature, capacity of the supply network and also price; for example, two supply chains (high-tech) can overlap partially to memory, engine and software.

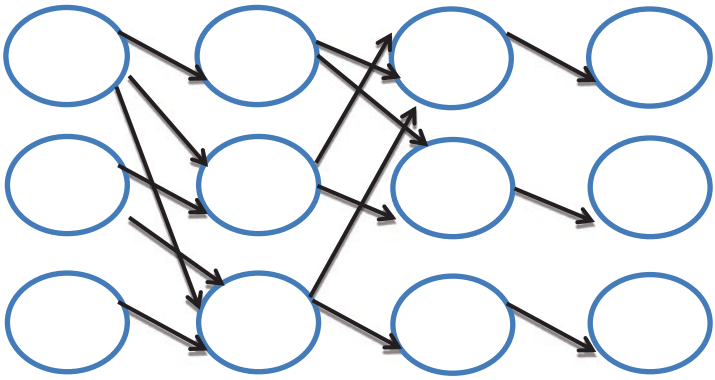

Fig. 2.3 Semi-overlapped network of supply (Rice and Hoppe 2001)

Once capabilities that will be developed and/or improved are decided, we must make plan of actions and implement them into work. In this phase, we also need to understand that it is not really an easy task to build/create the strengths of network while fulfilling customer requirements (needs and wants). And understanding customer requirements requires deeper levels of analysis, coordination, cooperation and information sharing among all the SC partners to ensure that some exclusive value for customers is created.

2.2 Information Sharing

Information technology and latest communications devices play a significant role to increase the information sharing, coordination and communication among the companies and supply chain partners. According to many researchers and practitioners, sharing critical real-time information has been used to minimize the inventory in all stages of SC, to make demand forecast more realistic and accurate, and to promote the overall performance of SCM.

According to one researcher (Shore 2001), the development of IT and communication in SCM (supply chain management) can be divided into four phases:

- In the first phase, inter-organizational info exchanges travelled by fax and/or postal system
- In the second phase, management focuses on the automation of info flows and elimination of various human intensive data entry as well as re-entry processes between suppliers and retailers
- In the third phase, the focus was on a more integrative strategy through executing Enterprise Resource Planning (ERP) systems
- In the fourth and last phase, a SC is characterized through strategic alliances of suppliers with extensive mutual information sharing flows

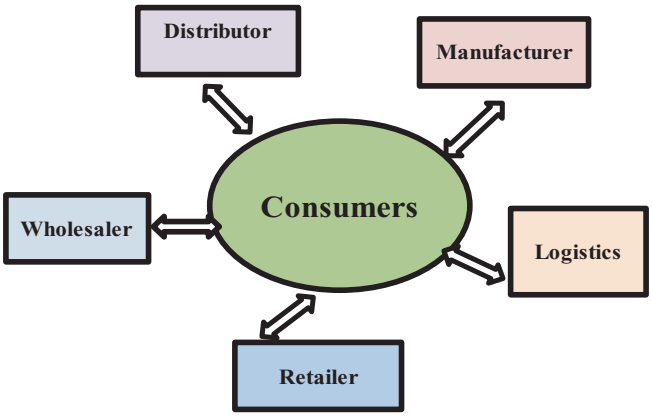

Fig. 2.4 Information sharing

Collaboration and information sharing have joined the automation ranks and integration as hallmarks of competitive edge in the whole supply chain network (Fig. 2.4). Gartner (1999) defines information sharing as obtaining "…dynamic collaboration among business partners, customers, and employees throughout a trading community/market…". The capacity for companies/businesses to morph/transform into whatever the requirements and needs of the market are involves more than only the business transactions (buy, sell and auction events).

Definitely, the e-commerce's advantages are almost the same as those obtained through concurrent engineering in the 1980s (increase market share, minimize time to market and quick responses, etc.). The main differences between in-house concurrent engineering and e-commerce are pervasive info sharing, integrated processes, trust building and cooperation among all supply chain partner companies (across-the-board).

The main possibilities for the sharing of information with supply chain partner companies include sales data, inventory, forecast and demand, production, product planning, order status, transportation, etc., and can be consolidated into three main categories:

- Product Information: Original exchange and sharing of product-related information with SC members was implemented through fax, catalogue, some kind of paperwork, etc. The basic issue caused by such exchanges included miscommunication, higher chances of error (due to extensive human intervention) and delays in sharing information with the trading partners. As per several researchers and practitioners, usually the exchange of data between the upstream (supplier) and downstream (retailer) doesn't tally/match because of the convoluted processes and inefficiencies of manual entry. In addition, only using the latest technology without changing the business processes and proper training of employees, the system will work as "Garbage-in-garbage-out".

- Transaction Information and Customer Demand: Transaction information and customer demand serve as critical sources of information about future expected business, and such information is also used in demand forecasting, transportation planning, production scheduling, etc.
- Information of Inventory: Inventory information includes level (quantity) of inventory, inventory decision models and inventory requirements, all information directly affecting the order placed to the supplier. On the other hand, it seems that information related to inventory is more sensitive than transaction information and customer demand, and the trading partner usually is almost unwilling to disclose it to other supply chain partners. For instance, producers may be unwilling to disclose their real level of inventory/inventory status and/or may share false information of inventory data and sales data to discourage competitors from manufacturing excess products or adding capacities in their system, and suppliers also may use sales and inventory data to achieve better negotiation leverage. In fact, information sharing about inventory has been implemented in many forms. Continuous Replenishment Programs (CRP) and Vendor-Managed Inventory (VMI) are practices usually adopted by two neighbouring supply chain partners. In a typical relationship of CRP, the buyer shares his inventory data with the vendor and asks its vendor to adjust his inventory within a guideline. As per the findings of Lee and Whang (1998) and Gill and Abend (1997), Apple-Fritz Supplier Hub and Wal-Mart's Retail Link Program are excellent examples of sharing inventory information. Vendor Managed Inventory system allows the producer to maintain retailers' inventory levels. The producer has full access to retailers' inventory system, and generating POs (purchase orders) is the responsibility of producer, not retailer, the fundamental difference between regular information sharing and Vendor Managed Inventory (VMI).

2.3 Developing Collaborative Planning Activities

The information sharing systems are very important to managing end-to-end supply chain and there is complete consensus on the idea that it is necessary to integrate information systems (Ellram and Cooper 1990) for successful supply chain management.

According to several researchers, including Houlihan (1985), Stevens (1989), Ellram and Cooper (1990) and Ellram (1991a, b), a significant effort is needed to achieve both effectiveness and efficiency of the information management along the whole SC.

In a traditional culture of supply chain management, flow of demands goes upstream in the chain, and products move in the downstream side (see Fig. 2.5). Distorted demand signals, delay times, and poor or limited visibility of exception situations lead to serious and critical information gaps, and misinformation, which, in turn, creates mistrust over the entire information sharing system mechanism, etc. For instance, when supply chain partners lose their trust in the demand forecast they receive, then typically they start to build up inventory (extra buffer/safety-stock) to protect and deal with demand fluctuation. Finally, these disruptions create bigger

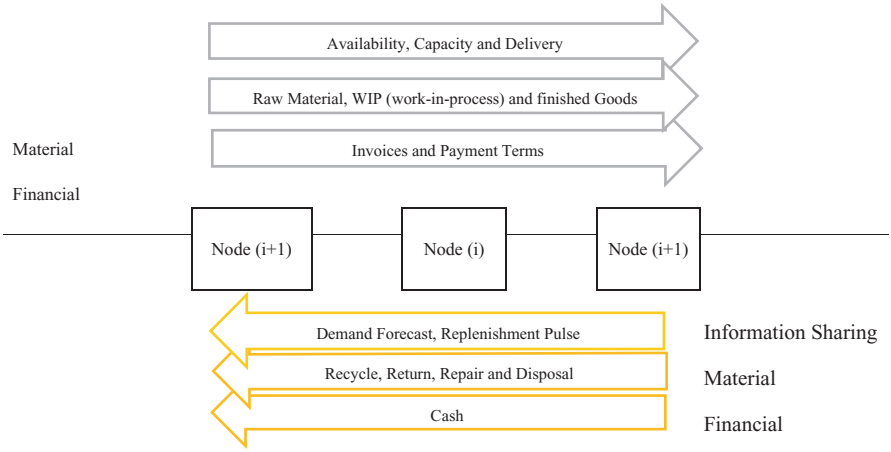

Fig. 2.5 Supply chain flows

changes in forecast demand as they travel upstream in supply chain management (Chen et al. 1999). These disruptions collectively are called "bullwhip effect" and are the result of the inefficiencies in the whole chain of supply.

It is the opinion of many researchers and authors that the advantages of reducing information gaps to form collaborative and productive partnerships is much more valuable than the risk (financial analysts maintain/observe that collaborative planning may minimize up to 50% of inventory for each of the supply chain partners).

According to researchers Gartner (1999), Raghunathan (1999) and Bauknight (2000), the latest collaborative technology enables the supply chain partners to share their business information in SC operations in an organized, stable, agile (real time) and leveraged way. While the synchronization and collaboration of all supply chain members, both outside a firm and within the firm, is now feasible, such integration of SC requires to be carefully studied so as to improve its execution.

From multiple and distinctive perspectives, problems and issues involving the improvement of the integration of supply chains have been studied in existing research literature. The reader, for example, is referred to the given examples below:

Certain research (Chen et al. 1999) studied the significance of having access to demand information for the supply chain upstream partners.

Gavirneni et al. (1997) examined and analysed the advantages of the integration of information flows for a capacitated SC (two-echelon).

Researchers Wikner et al. (1991), Chen et al. (1999) and Towill et al. (1992) have studied the advantages of integrating the supply chain and shrinking, minifying the demand fluctuation transmission along the supply chains (the bullwhip effect).

Several researchers, including Jones and Riley (1985), argue that, supply chain activities of planning and control are required to be taken into consideration for appropriate supply chain integration, because planning and control activities significantly impact the efficiency and effectiveness of the whole SC.

When considering SC activities of planning and control, the SC integration effectiveness can depend on the tools and processes that are used for the integration. This matter deserved attention in the research literature. For example, researcher Stevens (1989) illustrated a model of integration with four phases, which are given below:

- Baseline
- Internal functional integration
- Integrating of demand and supply along the firm's own chain
- Full integration of SC described in order to reach a customer-driven SC instead of a product-driven SC

Hewitt (1994) developed the Stevens' model with a 5th phase which would be dedicated to better re-engineering and administration of the business (global) processes, and pursuing the total efficiency and effectiveness of those processes.

The research of Bowersox (1997) discusses the concept of two different types of integration:

- External integration
- Internal integration

Bowersox summarizes that the firms require an advance level of internal integration to be qualified candidates for external integration (extensive) under SCM. Under the perspective of integrated SC, by reviewing the latest trends and practices in the industry, he found two generic types of integration schemes:

- *The basic integration scheme*, where the supply chain management has made a set of agreements and initiatives to make better relationships with suppliers and customers. With this scheme, advantages are achieved by the sharing of information, planning and common forecasts. Such agreements have been executed several times by establishing new venture firms or specific contracts with distinctive supply chain members.
- *The advanced integration scheme.* Mainly, the concept is to integrate the value creation processes with a total terminal-customer-driven orientation. The objective is collaboration so as to develop and enhance competitiveness by a coordinated effort which is feasible even in a lean environment (it leads to a minimization of the total number of supply chain resources). This integration is usually executed by profound long-term agreements and by contracts between firms, and positions the SC as an effective and efficient competitive unit. Lastly, researcher Bowersox (1997) suggested that the creation of location advantages and time benefits needs information sharing to permit appropriate business contracts related with that objective, and likewise needs an appropriate environment to secure financial transactions.

Another integrated SC model is shown by Scott and Westbrook (1991), recommending the following phases:

- *Study phase,* consider all the things related to lead-times, analyse level of inventory for improvements

- *Positioning phase,* recognize opportunities emerging as significant collaborative activities among the supply chain partners
- *Action phase,* implement former plans

The research of Towill et al. (1992) shows an integration supply chain approach which is somehow similar to that illustrated by Scott and Westbrook (1991). As in the research of Scott and Westbrook (1991), the researcher Towill and his colleagues use the principles of operation management to minimize the amplification of the demand signal along the chain of supply, as the integration is generated.

The research of Ellram and Cooper (1990) recognized some characteristics which would affect a firm's decision to be a member of an integrated SC. However, these characteristics are in connection with the current level of internal process and desired levels of competition with other supply chains. For that reason, the significance of those characteristics may vary during the whole supply chain integration process.

2.4 Supplier Management

In technological-related industries and other industries with innovative products (due to unpredictable demand and short life cycle span), companies build flexible strategies for procurement to cope with demand uncertainty related issues.

To fulfil the requirement and need of flexibility, it is very critical to have the large numbers of suppliers and a wide range of tiered structures of contracts at hand. In some industries, given the demand of a commodity's technology life cycle, global capacity for certain parts can be limited. There is no doubt that global supply chain is very dynamic, vulnerable due to the various causes such as natural disasters (earthquake, flood, etc.), economic disasters, terrorism/terrorist attacks, etc. All these factors play a significant role to create scarcity of material, components, etc.

When products are strategically significant for the organizations, multiple sourcing (for strategic components or parts) is used to decrease exposure to possible loss, but firms are now also consolidating supplier contract types to assure the availability of supply (as well as lowest cost), and these roles are also creating the trend of "tiered contract structures" (Scott, 1987).

Strategic parts or components play very crucial roles in the success of products. As noted by Clark and Fujimoto (1991), firms need to develop functional specialization for purchasing strategic parts/components and this specialization can also be shared between various projects. However, it is also very essential for a better and effective structural design of the firm. In simple words, it is significantly important to take into account functional specialization along external and internal integration.

The research of Giunipero and Brand (1996) developed a framework defining the phases of the evolution towards SCM and, in that framework, how procurement would change. They also defined four development levels of the purchasing role, which are given below:

- Traditional: emphasizing selection of vendor and low price
- Partnership: developing closer association with a supplier to minimize risk and total cost under the cover of trust
- Operational: coordinating material and information sharing to minimize overall cost, improve quality, etc.
- Strategic: applying flexible processes of business to certain circumstances and thereby accomplishing flexibility, competitive edge and velocity/speed in the market

As per Spekman (1989), competitive strategies of procurement focus on purchaser core bargaining power, which allows the purchaser to leverage purchasing on a global scale, improve competitive edge of the firm and reduce internal cost. In the perspective of Arnold (1989), global sourcing is a basic corporate strategy, the aim of which is to "take full benefit of world-wide material resources".

2.5 Approaching the Marketplace

In the last couple of decades, many firms have placed major emphasis on the re-engineering or improvement of their products and processes as well as tried to develop their technology through innovation. Unfortunately, this sometimes caused a poor strategy to retain customers or attract new customers, due to the lack of understanding with customers and external view of "what the customers' need and want". For another side, a good association with customers, customer feedback and marketing intelligence will help not only to improve the prediction precision of demand but also to capture new market share (especially in innovative products), sustain existing customers, promote upselling and attract new customers.

2.6 Key Issues and Challenges for Logistics

During the last couple of decades, the theory of supply chain has become very important, and new developments in structure, such as continuous improvements, collaboration and relationship, information sharing in supply chain integration and end-to-end supply chain. For another side, new challenges and hurdles in supply are also occurring, including cost and quality pressure from the consumer side, low profit margins (due to tough competition), inventory-related issues, environmental-related issues, etc. (Rushton et al. 2000; Zhang et al. 2018; and Khan et al. 2019). The author (Rushton et al. 2000) has divided all key issues into the following parts:

1. Supply
2. Distribution

3. External environment
4. Retail
5. Consumer

2.6.1 Supply

According to several researchers, including Rushton, in the last twenty years, major and crucial developments have arisen in supply chain and inbound logistics. There is no doubt most developments are due to technological innovations. With respect to raw material sourcing and manufacturing, developments are the following:

New supplier relationships, due to supplier development. Lean supply and single sourcing enables buyers and suppliers to work closely.

Manufacturing technology. Technology in the manufacturing area can accommodate more product variations and complicated production requirements.

Transnational sourcing. Companies are moving from local sourcing to global sourcing.

Postponement. Companies use this strategy to delay a product's final configuration until demand occurs (minimization of finished goods inventory in the SC).

Co-makership: partnership between the supplier and buyer to cut down the costs of the SC through information sharing and quality. This is a milestone development in the supply chain.

Co-location. The shared physical location (buyer and supplier) or supplier operations is near the customer manufacturing area/sites.

Related to all of the developments discussed above has been the significant impact of changes in product range such as product's short life cycles, the broad range of products (expected), and also significant increase in demand for sensitive products, e.g. fresh meat and foods. These changes can add some logistics problems under the cover of "speed/fast delivery, temperature control during inventory and transportation, etc."

2.6.2 Distribution

With reference to distribution, again, technology plays a vital role, especially in an operational context:

- Vehicle system (low pollution), demountable bodies
- Limited use of paper (almost paperless environment), especially in depots
- Cross-docking arrangements, operating by stockless depots
- Interactive routing

In many European and Asian countries, the 3PL (third party logistics) industry is in a boom. The main benefits of that outsourcing allow a firm to focus on its core business, without involving and engaging resources in noncore business activities.

On the other hand, outsourcing (without proper analysis) can effect disaster over the whole company's performance. That is why the important question for organizations is "what to outsource".

2.6.3 External Environment

In latest developments of different economic unions, including ASEAN, NAFTA and EU, one of the main consequences is deregulation within these internal markets as well as specific impacts on firms' strategies of logistics. There have been important developments in the European Union (EU) as compared to other unions.

- The harmonization of legislation (across different countries)
- Tax harmonization
- Transport deregulation
- Minimization of traffic barriers
- Elimination of cross-border requirements of customs

Within logistics, many firms have been led to reassess their whole logistics strategy to a new non-national cross-border structure. (Many firms significantly minimized inventory cost, storage cost and depot numbers while improving customer service.)

Second, significant developments are increased importance of environmental issues and green logistics. This development has occurred by "activity of pressure groups and also public awareness" which includes:

- Promotion of rail-transport over road-transport
- Awareness of green products, reverse logistics (reuse, refill, recycling, remanufacturing and disposal)
- Design of environmental-friendly products or product design to facilitate recycling and repair, etc.

Road congestion: one of the external impacts, which creates negative effect on some of the latest concepts of logistics, including quick-response and just-in-time. In western countries, government and firms try to minimize congestion through lorry bans, combination of road tolls, time restrictions, taxes, etc., but, unfortunately, these all are not permanent solutions and also increase the logistics cost.

Scarcity of skilled labour: According to several researchers, including (Khan et al. 2019; Zhang et al. 2018), the latest knowledge of best practices was known to few logistics managers and some managers do not have relevant experience. There are a couple of reasons to hire low-skilled employees. One major reason is scarcity of skilled people in the market (Zhang et al. 2018). Secondly, sometimes firms hire both low-skilled and experienced employees due to limited budget or cost minimization/cost-cutting schemes.

2.6.4 Retail

Overall, there has been a growth in multiple chain stores such as hypermarkets and superstores. On the other hand, there has been a corresponding decline in independents or small stores. These changes have had an influence on strategies of operations and logistics. Perhaps the broad effect, however, has been from the consolidation of inventory minimization policies:

- Just-in-Time concepts and philosophies
- VMI (vendor managed inventory) policies
- Minimization of the number of stock-holding depots
- The maximization of retail selling space (at the expense of retail stock rooms)
- The minimization in depot inventory-holding due to policies of cost saving

Information technologies also have a significant role in the retail system such as POS (point-of-sale), which provides (information sharing) accurate and timely signal of stock replenishment requirements. The consequences are the minimization of buffer stocks and safety stock in favour of continuous product flow into the stores, increases in efficiency and fewer defects or errors (due to information sharing and usage of latest technology).

2.6.5 Consumer

In the last couple of years, the phenomena of "home shopping, mail-order catalogues and direct selling" dramatically have increased, especially in the USA, Europe and China. It now seems likely to break through and create important and significant in-roads into conventional retail shopping. Again, such change is taking place through the development of technology and consumer awareness (home computers, internet, online banking, self-service banking, etc.). Simply, any important and significant change will have an impact on logistics. Typical implications will be the following.

- Increase in direct-sell (home delivery)
- Shops become showrooms, where replenishment of stock is no longer an issue
- Traditional/existing delivery systems will grow, such as post-delivery
- Online order systems (more accurate and reliable information sharing between customer and manufacturer)
- A high rate of returns (no or limited involvement of intermediary)

Finally, the main change is that non-store shopping has economically turned the corner, with important and significant advances in the spread of "internet and computer technology".

Discussion Questions

1. Discuss the disconnected network, connected network and semi-overlapped network of supply.
2. Draw a diagram for disconnected and connected networks.
3. How can information sharing play a role in solving issues in complex supply chain?
4. Draw and discuss the supply chain flows.
5. What are the key issues and challenges for logistics? Discuss in detail.

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