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**Impact of Technological Factors That Influence the Operational Flexibility in  
FMCG Sector of Pakistan**



**By:**

**Maqsood Shah**

**Enrollment 01-220182-012**

**Supervisor**

**Raja Khalid Hafeez**

**Department of Business Studies**

**Bahria University Islamabad**

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## **Abstract**

The main purpose of this research is to find the impact of technological factors that influence the operational flexibility in of FMCG sector in Pakistan, this research was conducted on the city of Rawalpindi and Islamabad Pakistan, this research was conducted to check and get the idea whether the factors of the information technology like Barcoding, EDI, RFID, ERP and MRP impact on the operational flexibility. There are four independent variables and one dependent variable chosen for this study. For this research have used the quantitative research method of study and the data was gathered with the help of a questionnaire. To conduct this research, the questionnaire was filled out by the different employees of the supply chain of the 5 major grocery stores of the FMCG sector. The number of respondents to conduct this research was 152, after getting them to fill out the questionnaire the analysis was done through SPSS software. The table and their analysis were used in descriptive analysis and the regression method has been used in inferential analysis so that hypothesis can be tested easily, these methods were used to know deep about the nature of the topic and to check the authenticity of the research. The finding of this research is to find the impact of technological factors that influence the operational flexibility in of FMCG sector in Pakistan and the result of this research is that it has technological factors have a positive impact on the organization and it is a good return on investment. The businesses dealing in FMCG goods should invest in this technology. This research can be significant for the businesses dealing in the FMCG sector, it tells the factors and ways through the implementation of which can increase the operational flexibility of the FMCG sector.

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# Chapter 1

## Introduction

### 1.1 Background Study

In the past companies who wanted to stand out amongst the competition and to win amongst them was the factor of low cost, so the trend of large scale production and economies of scale to lower the cost began to speed up to minimize the cost and to ultimately stabilize the economy, however, the dynamics of the market changed in the next 2 decades and they all started to increase the focus on quality because it became the main reason if the companies wanted to stand ahead in the competition. (Rondeau & Literal, 2018). The main thing that mattered at that time was to check the ability of producers and suppliers to produce quality goods timely and at the right time to meet the wants of customers. (McKenna, 2016).

A vibrant and dynamic Information Technology (IT) will not only increase growth in the company but also can increase results quite drastically; however bad and vibrant IT system can have pretty bad effects on the performance of the organization, for example, the organization that resists change can prove to be quite detrimental for the organization (Allen and Boynton & Biloslavo et al., 2013). The flexibility in IT is not modern or pretty new; however, it is considered as one of the forefathers to one kind of company or supply chain capabilities such as agility in the supply chain (Tafti et al. & Lioukas et al., 2016).

The variability of IT literature is influenced based on infrastructure variability of IT which is also reinforced by the strong research of ours and by the work of renowned researchers (Kumar and Stylianou, 2014) Observed from a different point of view this whole view of research which seems to destroy the role of IT variability to enable the firms to get benefit and recapture or reconfigure the whole assets being used to perform different business activities to increase the gains through a different way of IT operations. (Duncon, et al., 2014) The different flow of research with limited articles and research work finds out the new role of IT variability for the organizations to adopt new ways and different ways of offerings to the customers of the firm for the profits and strategic gains with the attention towards new IT technologies and executions of operations (Cheng et al., 2014).

The understanding is very clear in this literature that the ambidexterity is very important to stand ahead in the competition; For instance- the joined capability of new exploration and ambidexterity makes sure the viability in future as well as in current period, the joint use of new exploration and ambidexterity makes sure the surviving of the firm in long terms with the help of better money performance, innovative ideas and learning from the others ideas (Tushman, & Yang et al., 2014). However, the adjustment amongst ambidexterity and exploration has not yet been informed by instant variability in the literature of IT. Apart from that the ambidexterity in IT variability does not require to reside only in a single organization,

rather it resides all over the supply chain. Variable links between information can allow an organization to manipulate its current cross-company operations.

In this way, the usage of Information technology in the practices of businesses can present new businesses for organizations to stand ahead and compete in the high competition in the global market (Oghazi, 2019). The infrastructure of IT allows the firms to manipulate their competitive advantage and contribute in the performance in market positively. (Hartono & Bardhan et al., 2016) In this regard, enterprise systems are regarded as one of the most important kinds of Information technology from the last two decades (Cotteleer, M.J., & Bendoly, E., 2016). ESs are made up of hardware and software and they aim to do the standardization also the incorporation of all the processes in the businesses and all of the data which these infrastructures have collected for the betterment of the organization (Davenport, 2018). Organizations use the ESs for achieving maximum efficiency (Oghazi, 2019). There is also the chance that they would use ESs because of any pressure from the external market (Oghazi, 2019). In this way, since the 20th century, State firms are investing heavily in the organizations for the implementation of ES. (Oghazi, 2019).

The technology which integrates all of the departments in the organization, and which is quite popular these days is the implementation of Enterprise Resource Planning (ERP) systems. ERP is a software that has many working areas, for instance, Marketing and Sale (M/S), Accounting & Finance (AF), Supply Chain Management (SCM), and Human Resources (HR). The ERP application is quite helpful for companies who are dealing at the small or medium level because it is an Open-source software, for instance-Odoo, Open bravo and Compiere, (R & J, 2015) The ERP is an important tool for organizations to control the flow of both the internal and external firm processes and the processes happening out of the firms. To satisfy the cooperation amongst all the departments and contractors of the organizations, the ERP software gives immense control of material and information by using the different methods and its important modules which include production, management of warehouses, quality, and managing the supply. (Parry, G. & Graves, A., 2008) As per the resource-based view (RBV), the bundling of resources with the combination of tangible and intangible resources gives more benefits than the resource is used singly. (Hult, Ketchen, Adams, & Mena, J, 2018).

To achieve better customer service, it needs the working of all the departments of the organization to integrate into one platform and work together, which in turn will provide better customer service in the supply chain's domain of marketing and transportation. (A.E. Ellinger, 2017).



## **1.2 Supply Chain in FMCG Sector**

Fast Moving consumer goods are one of the biggest industries around the globe. FMCG sector contains a lot of stuff that we use in our daily lives like our shampoo, dry fruits, snacks, etc. With the new technology the consumer preferences are also changing, with the internet in the world and globalization in the world the consumers demand more perfect goods mean customer demands are more than the goods prevailing in the current market. One research has shown that the world is changing faster than ever before because of the sudden boom in the internet sector from past two decades and with the change in the market the sector dynamics are also changing, and consumers are getting more inclined towards purchasing through the internet than purchasing physically or through brick-and-mortar shops.

To make the supply chain more effective the FMCG sector will have to make the supply chain more engaged with the information technology the use of different software like Radio-frequency identification RFID software, Enterpriser Resource Planning ERP, Material Requirement Planning MRP, and many other data-driven and cloud-based Information technology software of electronic data interchange EDI can help out the businesses to achieve their long term benefits because the traditional way of the supply chain is obsoleting with time and the new age requires a new way to achieve the goals of businesses.

Massive industrialization and an efficient supply chain have proved to be very much beneficial for industries, consumers, and countries but it also proved to be equally damaging for the environment and to do something for the environment the companies will have to make the supply chain, transport, and logistics of FMCG goods more sustainable and environmentally friendly.

## **1.3 FMCG Sector of Pakistan**

Pakistan is one of the unique countries in the world the main reason for its uniqueness is because of its supply and demand forces. In this developing nation, reducing the cost of business is more important as compared to its quality factors, apart from that integration in the supply chain management is also one of the problems, however, how this process affects the working performance in the integration at low level is yet to be seen, this part gives the analysis of FMCG sector of Pakistan to check its working performance from time to time. One of the fastest biggest growing sectors of Pakistan is the FMCG sector and it is attracting more investment than in other

sectors. With the globalization in the world, it has proved to be many difficulties for many companies operating in Pakistan because of many complexities in this process making it hard for them to survive. The management of logistics is one of the major problems for companies that are growing rapidly. However, there are many limited opportunities available in the market to gain experience. The market size of Pakistan's FMCG sector as of 2018-2021 is \$152 billion that is expected to grow 8.2% per year in the coming years (Haq, 2018).

Rasool and Rafique, 2016 argues that the FMCG market includes governing the turnover rates of consumers and governing large volumes. In Pakistan, it involves purchases in the high frequency, variability in the volumes, and the fixed development is particularly one sector. For that reason, it requires supply chain management which is quite variable. The services are designed to ensure the alerts reliably and to track the information that is important to make sure the good nice and systematic flow and supply of FMCG goods. However, sourcing it to the other organizations offers to track and monitor the whole supply chain whenever the company wants also because of vibrant information systems. (Auto, 2018.) has reported that the society of Pakistan is a highly consumption-oriented society that has a very low level of investment in large business practices and very few points of savings. Effectiveness in the performance of logistics is quite important for the growth and development of companies dealing in FMCG. Goods. The logistic Performance Index (LPI) is one of the important and vibrant methods of checking the logistics capabilities of a country. This indicator is also compiled by the World Bank. As per this measure, the logistic performance of Pakistan is quite better than the performance of logistics operating in the region (Mena L., 2019).

It has been found that information and logistics are very important measures for any management in the FMCG sector. For that reason, if these ways of doing work in the business are good then they can help to increase the results and improve the process and can help improve results.

## **1.4 Research Gap**

The FMCG sector is one of the biggest industries in Pakistan and it is massively neglected by our government. In the international market, the players of the FMCG sector are pretty much involved in the tools that can help them out to make the supply chain more vibrant and more efficient and effective, however; that is not the case in the case of Pakistan. Because of the old and traditional way of managing the supply chain the low-level retailers are suffering quite a lot

and because of that they face the problems of the bullwhip effect and many other bottlenecks in the supply chain resulting in lost sales and back-orders and hence reducing the profitability and effecting the economy ultimately.

So, considering all these difficulties faced by the local retailers and that; they can use the new tools of information technology like RFID, ERP, MRP, and EDI to mitigate the problems of demand and supply prevailing in our market because these are being used by many big players of Pakistani FMCG sector to mitigate the major bottlenecks of demand and supply.

### **1.5 Problem Statement**

This problem affects the retailers or businesses in the FMCG sector who still follow the traditional way of supply chain and procurement of materials, However, if the problem is not solved the problems of the bullwhip effect, lost sales and back-orders can generate which is pretty much fatal to any business; This problem is occurring in the FMCG sector and it is important to be fixed because it will avoid all the major bottlenecks in the company and will help in avoiding major discrepancy in the supply and demand of FMCG goods.

The goal of this study is to solve the major problems in a discrepancy of supply and demand of FMCG goods which are very hard to keep track of because of their nature of coming and going too fast; however, the main reason that information technology is not being used among retailers is that it requires investment and there is also the problem of lack of awareness amongst many MSMEs, despite these limitations the tools of information technology like ERP, MRP, EDI and RFID cannot only meet the cost of installation pretty quick but also can increase the profitability of a business and it can also reduce the major problems of lost sales and backorders ultimately leading to immense growth and revenue of the companies.

### **1.6 Research Question**

- 1) What is the impact of RFID on the operational flexibility of FMCG sector in Pakistan?
- 2) What is the impact of ERP on the operational flexibility of FMCG sector in Pakistan?
- 3) What is the impact of MRP on the operational flexibility of FMCG sector in Pakistan?
- 4) What is the impact of EDI on the operational flexibility of FMCG sector in Pakistan?

## **1.7 Research Objectives**

- 1) To find the impact of RFID on the operational flexibility of FMCG sector.
- 2) To find the impact of ERP on the operational flexibility of FMCG sector.
- 3) To find the impact of MRP on the operational flexibility of FMCG sector.
- 4) To find the impact of EDI on the operational flexibility of FMCG sector.

## **1.8 Significance of Research**

The supply chain of any organization is very complex and also one of the important departments of the organization, so the integration of strategic and tactical information is of vital importance to achieving maximum profits which is the motto and goal of all the networks associated with the supply chain. (Rai, Patnayakuni, & Seth, 2006) Therefore, IT tools can play a key role, Regarding the integration of departments on operational grounds RFID allows the production of goods and inventories to be tracked down across all the supply chain, however, ERP can transmit all of this information across all the departments of the supply chain, apart from the inventory the data of sales can also be transmitted to the suppliers with the help of IT tool ERP which can help in a great deal to eliminate transmitting of false information of demand to suppliers which can lead to a discrepancy in the demand and sales, ultimately avoiding the bullwhip effect. Therefore, the effective sharing of the information amongst all the departments of the supply chain for the smooth and parallel flow of better forecasting, integration amongst departments for the mutual understanding of goods to be produced to avoid all kinds of bottlenecks. (Rai & Seth, 2016). That is exactly why IT tools which also include RFID, ERP, EDI, MRP can facilitate effective information sharing amongst supply chain members.

Above mentioned concerns and their solution shows that there are too many complexities in the supply chain of retail businesses like the FMCG sector and there is a need to address these concerns. The FMCG sector is one of the important and billion-dollar sectors, yet its supply chain is being run in very traditional and old ways, in many grocery stores the old way of counting the goods physically and the old way of following the gut feeling to order the stuff rather than deciding on concrete data; Which is very flawed and it is very difficult to grow this

sector when if it follows the same old traditions, slow growth means less profit, less profit means fewer taxes and ultimately not proving beneficial for the economy and country. The implementation of IT tools can lead to a more vibrant and more efficient supply chain in the FMCG sector which can result from an increase in the pace of growth and ultimately eliminate the discrepancy in supply and demand resulting in the processes like a bullwhip, lost sales, backorders, etc. This research will show how these tools can help in mitigating these effects and ultimately increasing the sales and revenues, which will also lead to an increase in the growth of the company.

## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

The supply chain is a kind of matrix of different entities of different firms that are responsible to deliver the services and products from the upstream chain of activities to the downstream chain of activities, apart from that it must direct and control the exchange of information and different activities in it. (Motiwalla & Thompson, 2012). As per the Council of Supply Chain Management Professional (CSCMP), the supply chain is quite the same as a different system with a set of functions which also includes planning, controlling, and directing the whole process in the matrix of the supply chain. The supply chain also contains multiple interactions amongst organizations and partners in difficult and unexpected conditions. (Sivadasan and Efstathiou, 2013).

The main way of directing and controlling the matrix of the supply chain effectively is to control the process of the interaction between the network component of the supply chain network and the flow of the supply chain network. (Anrerio, 2018). The different variants in the supply chain consist of the information flows of finances, and the feature of the product (Granger, 2019). The item flow consists of the sharing of finished goods amongst different channels, for instance-exchange of raw material or consumer making buying of the products to the companies like sales orders (Wagner & Winder, 2016). The flow of the information consists of the method of sharing of information amongst the members of the supply chain this information includes the raw material purchased by the companies such as purchase orders or the number of orders received by the company such as sales order, its time of delivery and the schedule of shipment (Nelson, 2018)

The flow of finances consists of the sharing of value or information of finances amongst members of the supply chain taking any type of money, such as financing the schedule of payments, cost of delivery (Benson, 2019) By establishing the efficient and more effective integration amongst all the members of the supply chain of all these flows, companies can

effectively increase the functions of supply chain and can respond to the dynamics of market efficiently. To make all these processes efficient the IT flows can help a great deal in that aspect (Kimmy, 2017).

According to the definition of information and communication technology, "A willingness to make data and knowledge strategically and tactically productive and competitive, for example, forecasting, revenue, stocks, inventory swings, market and business strategies are accessible in the direction of supply chain management," (Chase, C. W. 2016).

Continuous change in the inner and outer climate of companies is one of the most important characteristics of the time in today's business world. In such a scenario, the business's performance is more dependent on gathering data and analyzing it. It is better to use it in accordance with business objectives than to rely on factors such as capital and labor force. Technological, economic, political, cultural, and environmental influences, as well as changes in market management, are the basic dynamics that require the use of IT, which makes major contributions to companies in dealing with growing global competition (R. L. 2020). Under risk and uncertainty, information systems can include logistics, customer, price, and on-time delivery, as well as changes in business processes and functions (Tan, 2018).

The aim of information and communication technology management is to improve the quality and productivity of the company's supply chain and business network, thus increasing not only the firm's income but also the entire organization's output at every level (Hong, 2018). At any level of the supply chain, knowledge sharing, intelligence, and proper effective communication play a critical role in assisting businesses in collecting, acquiring, and interpreting data to resolve business challenges (Kache, F., & Seuring, S. 2017). Logistic companies can now monitor their cargo and fleet using technology. This has had a long-term effect on the cargo and fleet's security. The requirement for all truckers in other parts of the world to install the Electronic Cargo Tracking System (ECTS) was met with opposition at first.

Truckers, on the other hand, have gradually accepted the ECTS, which aims to replace the security bond while tracking cargo in transit and providing real-time information on cargo location, security, and condition. Customs authorities in many parts of the world are currently implementing the ECTS to mitigate a variety of risks, including major revenue loss, cargo theft,

and strengthening regulatory enforcement. The use of new technologies such as bar codes and RFID allow for more accurate stock details to be accessed. The wireless non-contact use of radio-frequency electromagnetic fields to transmit data for the purposes of automatically identifying and tracking tags attached to objects is known as radiofrequency identification (RFID). One of the most significant benefits of radio-frequency identification is that data sharing between tags and readers is fast and automatic, requiring no direct contact or line of sight. This will allow for more detailed inventory management data to be accessed. This automatically translates into increase in operational efficiency of the companies (Zephania, J. 2019). Information technologies that have evolved in the business world over time and are built on more practical bases and needs can now generate substantial revenue and allow companies to achieve promised productivity levels. With its open structure, low cost compared to value-added networks, usage without special rules, and global access function, the Internet plays a critical role in the spread of electronic processes among businesses. There are two key reasons for companies to use the Internet at this stage. One of them is the Internet's low startup and application costs, which are due to its inherent characteristics. The other is that, because of its significant environmental influence, the Internet more efficiently increases opportunities arising from new cooperative relationships Mougayar, W. (2016). According to Manavalan (2019), Time spent dealing with customer problems; timely delivery, organizational versatility, and consistent quality have all become essential in today's successful sector. The use of effective communication and information technology is critical to aligning a supply chain to achieve these goals. Communication between supply chain participants necessitates the transfer of relevant data from the point of origin to the point of usage. Huo ET, AL (2014) conducted information and communication studies with vendors, customers, and manufacturers, and discovered that information and communication improves operational efficiency. The external and internal worlds are inextricably linked. Due to the complexities of the retail supply chain, information and communication have a positive effect on operational performance, but not significantly (Huo, B. 2016).

Manavalan (2019) also noted that the successful interoperability between the different organizations managing the relevant information is directly correlated with the efficient flow of information between processes, systems, and humans. Many upcoming challenges and opportunities characterize the future of information technology to logistic performance; the



logistics market has also become more competitive and unpredictable (Nurmala, 2017). The ability of IT adoption to manage knowledge flow, facilitate organizational processes, and help decision-making can be assessed by looking at how IT affects logistics efficiency. According to Kochan (2018), the supply chain integration and logistics framework are directly influenced by IT and information-sharing capabilities. The advantage of real-time information sharing is that it creates electronic connections that facilitate coordination and cooperation across the supply chain. In the short term, the data is used by managers to allocate and use available resources efficiently and effectively, thus increasing the reliability and effectiveness of regular logistics operations.

According to Wang (2018), Long-term, IT systems allow managers to evaluate business data in order to help and enhance management decision-making across a wide range of business activities. Automation has also resulted in a seamless information flow, allowing staff, manufacturers, forwarders, transporters, and clients to communicate easily. It enables real-time/online data communication and sharing through the entire supply chain management to become feasible in terms of time and expense (Abbas, 2016). The use of Electronic Data Interchange (EDI) and the Internet allows supply chain management to benefit from current and consistent data at all levels of the enterprise with minimal resources and methods (Christopher, 2016). Supply chain visibility can improve time-based delivery by increasing collaboration among supply chain participants through real-time data sharing. Different parties in the supply chain will quickly make appropriate decisions if they have enough knowledge and improved visibility and contact between various logistics operations and shareholders (Rokonuzzaman, M. 2018).

When an organization has more knowledge, the difficulties of information management are that it is difficult to effectively represent, evaluate, react, and ensure availability to those who need it. When authorities implement communication proper manufacturing processes and information technology in the supply chain, they must always develop the advantages and disadvantages of these methods and technologies, as well as build a control structure to maximize the benefits of information and technology (Hugos, M. H. 2018). Communication and knowledge are called oxygen for supply chain management because they allow you to see from one side of the pipe to the other (Christopher, 2016).

## **2.2 Technological Factors that influence Operational Flexibility**

Apart from the fact that changes in physical format in the case of the store, the operations of the supply chain have been transformed from the producers to retailers and retailers reduced the level of inventories with them by introducing a demand-driven supply chain. (Fernie & Sparks, 2014). Apart from that, retailers have focused more on their competitive advantage and to stand first in the market they have outsourced most of their operations (Svetlana, 2018). Apart from this, present trends prevailing in the market such as globalization, the shorter product life cycles, more pressure on the costs, and increase in the demand for the customization of the products had a vital and significant role in the sector of retail. (Ellram, La, & Weber, 2019). Customers these days demand a high level of customization (Sternbeck, 2020). And because these changes in the priorities of the customers it has increased the complexity and burden in the supply chain of retail. To cope up with these difficulties and complexities in the sector of retail the retailers required more variability, visibility, and more connection into the supply chain. (Ebrahimi, 2017).

So, to deal with these complexities there are different technologies available that can help the retailers out to achieve their goals for instance retailers can use POS systems that track the transactions of sales (Jan3, 2018). With this tech the transactions are also integrated with the level of stock in the distribution centers, When the point of stock level reaches the reorder point, the EDI will generate orders to the suppliers automatically without requiring any manual interference, and to check when the shipment is going to arrive the retailers can use the RFID tags to check the status. (Kent & Mentzer, 2018).

The Information technologies tools are being used across the retail supply chain. The implementation of new technologies can make the flow of retail operations smoother; the goods, services, and information arrive in a timely and very cheap way (Anand & Grover, 2015). IT tools inevitably play a significant role in the supply chain of the retail sector by the provision of visibility in the inventory and by developing a proper and appropriate strategy of replenishment of goods (Kabir, 2018). IT also allows the retailers to use the software which can connect or integrate every department across the supply chain whether it relates to the upstream chain of activities or downstream chain of activities. Because of this integration, it created a more advance, accurate, and on-time flow of information between the retailers and their trading partners which is also helpful in reducing the discrepancy in supply and demands (Waheed,

2018). So, in the end, utilization of IT tools has made the supply chain of the retail sector more responsive and efficient and retailers hold a low level of inventory reducing the cost of holding and also fulfilling customers' demand as soon as it arose. IT tools have also made it possible for retailers to create a competitive advantage in the market (Jillian, 2020).

### **2.3 Electronic Data Interchange (EDI)**

EDI is the sharing of information amongst different departments across the supply chain through the internet or electronically amongst buyers and sellers to increase efficiency in the delivery of goods and retain the customer for the long term (Rain, 2020). It shows the application of communication technology. There are too many benefits of EDI such as low cost of stationery and paperwork, increase effectiveness, reduce inaccuracy, functions being entered timely, improved cash flow, and helping in reducing the level of inventories (Abdullah, 2019). Implementing EDI can increase benefits into the supply chain of an organization to too many extents, For instance- to numerous practitioners (Dearing, 2017). Markus (2019) states with the increase in the usage of EDI can yield much higher performance in on-time delivery, however very little empirical research has been done in this matter, in a relationship between customer and vendor, EDI can be of too great assistance and can be helpful for the organization such as improved customer services. (Usman, 2018)

There have been many research and studies in the past which were done to check the effectiveness of EDI with too few empirical studies on production facilities (Agarwal, 2018). The production facilities in the supply chain add pretty much value to the products, For this reason, the production plants can be chosen as the measure of analysis and utilize its performance of delivery to evaluate the effectiveness of EDI, For this reason, the organization who use the EDI can provide much greater performance in the delivery than the organization who use very less often (Tiffany, 2018). EDI improves integration amongst all the departments in the supply chain because of the on-time sharing of information. The information about patents shared amongst the departments of the supply chain makes it more responsive and hereby enables transacting organizations to share information as per the needs so that everyone can react to all the new risks and dynamics of the market to avoid any kind of uncertain situations and hence improving performance of delivery (Jabile, 2018).

EDI is also becoming an important way to conduct any business (Mukhopadhyay, 2013). This is very important in an environment that is characterized by a quick response to changes (Kiera, 2017). For this reason, to make the supply chain more efficient it should be more flexible, and it should react to all the needs and changes arising/occurring in the market. (Raman, 2017). The producer can also be reactive to the needs of customers to deliver the products to the customer as soon as demand from customer arises in the past measures like lead time (the time that took to fulfill the demand of customer) and throughput time (the time of production from the first to the last step) were used to cater the demand of customers as quickly as possible (Christopher, 2019). Jade, 2015) states that time is of critical importance across the supply chain to gain shorter lead times, order control, and reduce inventory levels.

Peters (2017) states that EDI links increase the exchange of a wide range of documents electronically such as purchase orders, material releases, shipping notices in advance, bills of freight, receiving reports of the discrepancy, invoice bills, and advice of remittances amongst all the trading partners. This exchange in the information increases the processing speed of transactions, delivery of products on time which is quite essential for improving customer services. Good customer service means an increase in customer satisfaction. According to a survey by (Vixen, 2019) on the advantages of EDI on a Likert scale of 5 points, the benefit which stood first among everything was the improved customer service.

## **2.4 Enterprise Resource Planning (ERP)**

When different enterprises and organizations are faced up with the different amounts of information across the department of the organizations it accumulates to be in a very larger quantity and it is very difficult to manage this large amount of data and information which is also very difficult to be transferred in their formats (Oghazi, 2019). The certain information which has been piled up from the organization in the department and is not transmitted to the different departments of the organization where it is necessary to decide because of unavailability of data and the manual data management is the faulty cause. (Kanzie, 2017). Therefore, many organizations implement the ERP systems across their organizations to provide the customers with the delivery of goods on time and hence reducing cost and increasing customer satisfaction. (Häkkinen & Hilmola, 2018).

ERP is the kind of software in which retailers provide information of order via a web-services technology and a central website. The software deals with both kinds of data and information whether it is downstream data or upstream data. (Lo, Hong, & Jeng, 2018). Consequently, suppliers have the access to information in the compatible format of their system. With the help of this software retailers and vendors are integrated into one system that connects many environments without having a conventional standard (Pramatari K., 2017). The ERP software is based on different modules that can connect information from different departments of the organization. The different module of ERP consists of finance, logistic, fulfillment, order, manufacturing) which shows a particular function of an organization. By connecting all the departments through one software allows the managers to have a bird eye-view and make the decision accordingly for the best interest of the organization. (Vikram, 2019)

Apart from that, ERP software also enables the automation of the processes of businesses which can enable the companies to increase efficiency in the processes and reduce the cost accordingly (Ismaili, 2018). For this reason, it is of quite significance that organizations check their processes before implying the ERP systems because to automate the non-effective and non-efficient processes will be performed persistently and it will be quite hard to bring it back to its natural state once it is automated (Sheikh, 2018). The implementation of ERP systems by the producers and companies dealing in the supply chain allows for informational infrastructure to exchange information amongst the supply chain partners, Through the ERP software, the information regarding the level numbers of inventory, several orders, and production rate can be effectively shared amongst the producers and its suppliers at the time when it is requiring and pretty much lower cost. (Levi & Kaminsky, 2018).

## **2.5 Radio Frequency Identification (RFID)**

RFID is the automatic identification and data capture technology and its chief objective are to recognize, track and direct all the stuff that is transferred across the supply chain (Kamaladevi, 2018). RFID consists of three important parts. The first part is the reader or also known as the transponder which contains a chip. The tag can further be stacked to any physical object in any case of product level or case level, pallet level, or container level. (Srivastava S. K., 2017). The second part is a reader, and it is comprised of the antennas which share the information with the tag. The third part is the host server which is installed in the middleware app so that it can direct and somewhat control the tags (Attaran M., 2018). The tag communicates the information to the

reader via radio frequencies with the help of an antenna and the reader further transport the data to the middleware for updating data on the system (Khalid & Azali, 2016), Information or Data is possessed in RFID via an Electronic Product Code (EPC) which is the ID to identify and remember each unique traits of the product. So it allows the exchange of information across the supply chain by connecting and integrating objects, information, people, and computers. (Burgess, & Hawking, 2017).

RFID is a technological system and physical product which is being used by many organizations as a tool to label and check objects (Suriya, 2019). This part of technology uses a specific identifier that transmits a signal from one device to the reader with the help of radio waves with a specific (Vekas, 2018). Particularly, RFID consists of a microprocessor that contains very specific informational memory space (Angelina, 2017). This unique feature in RFID makes the RFID a pretty important tool to perform many functions (Vandila, 2018), The specific tool is important to perform particular functions out of all of the supply chain management (Oghazi, 2019).

RFID enables the management of the inventory of warehouses, it allows to check if the shipped product has been delivered to its required destination or not, it helps in avoiding the stock-outs at the sales level. it allows the managers to check what is the deal in the production phase, it helps in reducing the paperwork, increases the production efficiency, clears the product development process across the supply chain, decreases the labor cost, and makes the forecasting quite accurate to a significant level. (Srivastava B., 2014). This physical infrastructure of the technology enables to tracking down of every product which is tagged, across the supply chain. (Rijha, 2019). Apart from that, using the RFID also enables the different departments of the organizations to monitor and track down the products or goods as they are in the motion in the organization (Haris, 2018). Because these tags can carry the required information, the tagged products and materials can find at different locations.

Radiofrequency identification (RFID) technology is an information communication technology (ICT) and for some time it is being used for underdeveloped technology. It allows the users to collect the information at each point-of-sale (POS), which is of quite a significance in imagining true offers of advertising patterns (Asha, 2017). This technology is very beneficial for the clients

to match different products in a couple of minutes which is quite helpful in increasing the quality of services and also decreasing the time of delivery (Mike, 2017).

This tech is being used by many retailers that are connected to different products and after that used to catch inclinations of clients and screen the stocks progressively, this is why this technology is connected to trace the orders in a network store (Doukidis, 2017), which is quite significant to change the levels of productivity (Zare, 2018). Different problems in many industries are a more important subject to a clear flow of variables and show different supply chain interventions to eliminate the problems. Short product cycles longer lead times, and high anticipating of errors are the main issues in these industries, especially the textile. (Lam & Postle, 2016).

Apart from too many benefits of RFID, certain disadvantages come along it which the organization should deal, there are privacy concerns with the data stored in this technology (Nystrom, 2016). Therefore, the study done by (Günther, & Spiekermann, 2015) argues that 73 percent of customers would prefer to remove the RFID tags on the products they purchased at the level of checkout due to their concern of data possessed on the tags (Megan, 2018). Apart from the privacy concerns, the data which is stored in the tags do not follow a conventional which can be understood by different organizations across the supply chain which can also be the source of major concern and that is false data which is stored in the databases of the partner firms. (Natine, 2019)

To cope up with these issues the RFID technology is recommended RFID is of significant importance to eliminate these kinds of problems, improve the quality of services and also reduce the delivery time.

## **2.6 Material requirements planning (MRP)**

Kumar (2012) says that in any sector, MRP software is implemented using System Application Product (SAP) Materials Management (MM-Module). By implementing the SAP (MM-Module) in the sector for Material requirement planning, the goods can be checked and can also be received with the time of safety. The classification of material by ABC analysis planning to order the required goods can also be done on the priority by ordering the required or essential goods online.

(Karen, et al., 2015) argues that implementing the MRP tools in the sector of furniture can help a great deal in reducing the cost of inventory, increase the effectiveness in the production processes, and increase accuracy in the information. MRP is implemented in any organization as per the internal personnel and organizational changes required (Santosh & Chi, 2015) In the system of MRP to determine the optimum lead time, which is to be used by the system, the mixed integrated programming model was proposed. MRP is based on the set of integrated constraints which determine the planned orders same as how an MRP system would act while the executions of these planned orders are under the capacity and component availability constraints. Experimental results using data from a DRAM manufacturer—shows that the method which was proposed to determine the planned lead time in MRP is pretty much advanced to a method that is commonly used known as the tech method.

Gerhard, (2019) States that a modern system of manufacturing and production when a new order from the customers comes with some unique requirements of processing, it directly enters the make-to-order system of manufacturing for products that are dependent on the present system of estimated finishing time. So, in this scenario, the focus is on the different purpose machine and multi-product production environment without the know-how of configuration of the resources, to for the estimation of lead time simple, iterative algorithms were used. (Panagiotis, & Maro, 2016) show in their research based on the Greek Manufacturing company. The adaption of MRP is especially considered in the strategic context because it is going to affect the whole company, its methods, way of doing things, culture, and its ability to compete in the market. In this case, it has behaved as a tool of information technology software, it was used as processing systems of data, priority planning but it was not connected with the capacity planning function.

## **2.7 Operational Flexibility**

In supply chain management, the concept of operational flexibility is to develop the right supply chain strategy for deriving the overall market plan (Turkulainen and Ketokivi 2012). A marketing strategy is described as "the collection of consumer needs that its goods and services aim to fulfill" (Delery and Roumpi, 2017). Every organization in the retail industry attempts to follow a specific strategic approach that matches its strategy, so it attempts to have the necessary skills and resources to help accomplish that. For example, one company plans to deliver high-quality products at high costs, a further company promises to make full functionality of a spectrum of reasonable-quality products at affordable prices, but another company focuses on



delivering many products and services that such approach to business requires to be centered on customer's convenience, accessibility and responsiveness, and many more. Any corporation which wants to achieve success should integrate among its supply chain management system and its competitive planning (Delery and Roumpi 2017). Strategic fit originally referred to an accuracy of strategic objectives among consumers' requirements to meet competitive strategy (Chopra 2007). Companies generate flexibility in the supply chain with different tactics & tools. (Wang ET. Al. 2009) built flexibility-based models of the supply chain. Gimenez, Al. (2011) examined earnings, speed of production, and travel costs as success metrics. Vanichchinchai (2014), analyzed the operational flexibility of the company, which consisted of versatility, expense, connection, and responsiveness. Westbrook (2011) claimed that the reduction of un-added benefit operations, reducing order variance, and speeding up inventory flows have an impact on the efficiency of organizations. Hult and ET. Al. (2012) suggested that creativity in Technology and procedures would make a substantial difference to operational flexibility. Baird et al. (2011) said it was important for organizations to understand the essence of trade between customer experience and expense.

The firms aim to achieve competitive benefits by connecting supply chain practices and structures with their business strategy (Sadikoglu and Olcay, 2014). Shah (2009) argued that the supply chain framework will also ensure that the value chain will provide the end-user with outstanding value. Zelbst, ET. Al. (2009) emphasized how successful an organization is largely depending on the flexibility of the supply chain in which the organization participates as a member. (Wheelen and Hunger 2012) analyzed Porter's business methods (decreased price, focus to uniqueness) and suggested that the organizational strategy focused on strengthening the leading advantages, goods, and/or services of a corporate entity. Wheelmen and Hunger (2012) suggested the capabilities of the supply network have a direct impact on the success of the company. Alam. ET. Al (2014) suggested that operational flexibility has a sign on the overall supply chain. Bowersox. ET. Al. (2015) stated that the use of outer correlation flexibility measurements leads to the success of end-customer valuation through the cooperation of operational activities as well as communicating directly with other chain management industry partners. Harrison and New (2012) emphasized the impact of operational flexibility indicators as a common operational measuring flexible solution that supports internally and externally interrelationship among organizations. Vaidya and Hudnurkar (2012) provided flexible

evaluation metrics across cost, customer experience, efficiency, asset management, consistency, time, innovativeness, size, flexibility/adaptability, collaboration capability, supplier profile, and marketing behavior. Apparent operational efficiency as some criteria as well as resilience scale and applied by companies to achieve organizational efficiency, service quality as well as substantial efficiency (Cao et al., 2015). The supply chain's operating efficiency was measured with the following attributes: Flexibility, Time (Speed), Productivity, and Costing as considered as the most useful to them all.

### **2.7.1 Responsiveness**

Building a strategic plan to be agile includes dedication to other behavior and practices, including recruiting workers for specific roles, encouraging employees to work more flexibly, working in teams, and strengthening internal coordination (McGovern, Small, and Hicks 2017). Net land (2016) described flexibility as 'the company's ability to grow agile operations in a hyper-competitive environment to accommodate the regular number, product mix, and schedule changes.' Flexibility in this era is the capacity of the company to respond to market variations in terms of good and quality -y of service, duration & timely production (Danish, Romano, and Boscari 2017). Relevant objects that represent the organizations' ability to resolve these variations in demand were calculated.

### **2.7.2 Time (Speed)**

Creating a plan focused on minimizing the time between consumer requirements before these requirements are fulfilled includes focusing on the following: anticipating the market environment, organizing work processes and improving the operational structure, and controlling transport (Flynn et al 2015). The conventional dimension of output calculation is represented by distribution time and lead time. The time, lead time, and cycle time were described in different studies. Period time is the time from one job or work completion to another, i.e. beginning one process or mission continuing the same process, or working again, (Awasthi & Omrani, 2019). Lead time is the period taken to position a purchase order for the delivery of goods & services (company and supplier) involving production, shipping, refining, storage, and distribution to the final customer of the product or service. (Gimenez, Me. Al. 2011) specified the time limit for the delivery of the products to the main buyer (Azbari et al., 2018). The researcher adopts the distribution time provided by the customers to distribute the services and products to the

customer with a negotiated timetable. These models are calculated through the chosen objects representing the level of delivery to consumers of the products and services (Huo et al. (2014).

### **2.7.3 Cost**

Creating a plan focused on minimizing total costs needs the following to run out: reduction of inventories, optimum resource efficiency, work-in-process product turnover, and removal of non-added benefit practices (Kull, Yan, Liu & Wacker 2014). Price is the most common and significant factor in determining operational flexibility. Ox bowers, et.al. (2009) described the costs as the cumulative costs incurred in carrying out a specific project. The company is working to drive down costs and increase revenue (Simpson, 2015). Vaidya and Hudnurkar (2012) described costs as the aggregate of all costs including inbound and outbound freight, warehouse costs, and storage costs for third parties, order processing costs, direct labor costs, administrative and service costs. Cerita, and ET. Al. (2012) described the costs as 'absolute supply chain operational costs.' The analyst described the costs in this research as the overall costs and expenditures incurred by undertaking all / and or similar tasks and operations within the supply chain (Autry, Rose, & Bell, 2014). This was measured by selected products that represent the overall costs and expenses incurred. Referring to the previous studies and the significance of supply chain management and the resulting significant benefits as a result of integration.

## **2.8 Theoretical Framework**

Difficulties in the supply chain and different activities are pretty much hard to understand, explain, and hard to manage in any sector. The difficulties in the supply chain network are the same as difficulties in the flow of the supply chain network which includes different activities and the aspects connected. (Bode & Wagner, 2015). The supply chain of the FMCG sector is very complex because of too many varieties of products in this sector, because of this variety it is important to keep the digital record of the whole system. In this whole study, we are going to find the impact of information technology on the supply chain management of the FMCG sector and for this study, I have considered information technology as an independent variable that has a significant impact on the efficiency, cost, and collaboration, however, the MRP, ERP, EDI, and RFID are considered as independent variable which is dependent on the operational flexibility.

### **2.8.1 Theory of Constraints**

The theory of constraints (TOC) is known as the philosophy of management which was elaborated by (Goldratt E., 1990) which goal is to start and implement the improvements through

the strong focus on a constraint which does not allow a system to achieve the high level of performance. The paradigm of TOC shows that every organization consist at least one constraint. (Goldratt & Cox, 1992) states that constraint as any problem or thing that does not allow the organization to achieve its, goal for which it was establish in the first place. The head of an organization seems to organize and establish its goal. The main goal of any business is to earn profit because that is what makes it different from the philanthropic organizations. Other persons who are directly or indirectly are involved with the business can establish the important conditions that must be met to allow for the organization to continue its operations. The theory of constraints enables managers to establish and check what is the problem or constraint that is avoiding them to achieve the goals of the business and after identifying it there is need to find solutions to it.

The problems in the case of FMCG or any retail sector is the problem of product variety, to keep the track of the goods, profits costs and forecasting, these all problems can be encountered with the help of Information technology tools. The components of IT can help a great deal in fetching the qualitative data in the process of supply chain and elaborate it for spreading across the members of supply chain, IT tools help in dealing with different problems like enterprise resource planning implemented supply chain. IT shows and helps out in the actor network theory (Hanseth, 2015). IT tools also helps out in the support of theory of social exchange for the benefit of each other in order to enhance the performance of the organizations (Ambrose, Marshall, & Lynch, 2010).

Apart from that, SCM activities with the blend of tool of IT jointly enforce the organizational information processing theory which helps out in improving the information sharing and quality of information amongst all the members which are linked with the organization (Gunasekaran, & Blome, 2018). The relationship between the buyer and supplier in effected and evolved through the cost economics of the transaction (Ambrose, Marshall, & Lynch, 2010).

The improvement process in the constraints is based on the five steps. The formal procedure of the focusing process is known as the five-step-focusing process (Goldratt E., 1990)

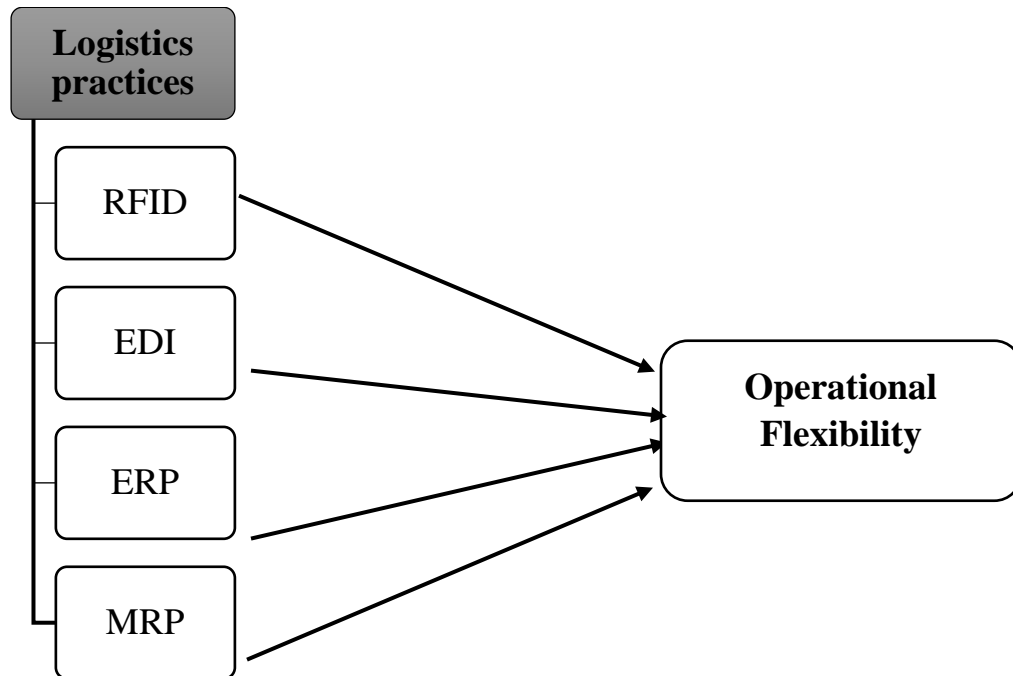
- The profitability of current supply chain is determined by the problem or constraint which is existed there.

- Then, the profitability of the company can be improved through the elimination of the constraints.
- The identified constraint when removed can increase the profitability of a company to a significant extent.
- The next step is to elevate the constraint by redesigning products to further delay in diversity points, where changing of needs of customers can be accomplished.
- The last step is to avoid the inaction from stopping the regular improvement in the processes.

## **2.9 Research Framework**

**Independent  
Variables**

**Dependent  
Variable**



### 2.10 Research Hypothesis

**H1:** EDI has positive impact on the supply chain performance of FMCG sector.

**H2:** ERP has positive impact on the supply chain performance of FMCG sector.

**H3:** RFID has positive impact on the supply chain performance of FMCG sector.

**H4:** MRP has positive impact on the supply chain performance of FMCG sector.

## Chapter 3 Research Methodology

### 3.1 Introduction

This section discusses the overall approach to analysis that would have been adopted for the study, as well as the research methodologies and data sources that would have been applied. This also specifies how data will be processed, interpreted, and communicated as part of the data

collecting process. The strategies used to collect data and knowledge in order to attain research objectives are referred to as research methodology. In order to address this issue, this section of the study will conduct research to assess the role and " Impact of Technological Factors That Influence the Operational Flexibility in FMCG Sector of Pakistan".

### **3.2 Research Type**

There are two basic research methodologies that we might employ for research: qualitative research and quantitative research. We have employed a quantitative data analysis methodology for our research. The quantitative technique in this study entails the statistical collecting of data, which is then applied to a detailed and analytical analysis of the data. In this study, quantitative research techniques are used to compare and objectively find the results regarding the " Impact of Technological Factors That Influence the Operational Flexibility in FMCG Sector of Pakistan (Case of twin cities of Pakistan)".

The advantage of using a quantitative research methodology for this study is that we can reach a much larger sample group. In this quantitative investigation, systematic testing was used. In a quantitative method, the results can be digitized. The results and findings were acquired utilizing a quantitative research technique and closed ended survey-based questionnaire with a 5-point Likert scale, which was distributed among the respondents via Google Forms due to the covid-19 circumstance and constraints.

### **3.3 Research Approach**

Furthermore, the deductive method was applied in a recent study that aimed to answer our research questions. The deductive technique is the most common approach for proving an existing theory. After analyzing the problem statement, the answers to the identified problems are presented in the form of theory. The research topics for this study were also set out to investigate the " Impact of Technological Factors That Influence the Operational Flexibility in FMCG Sector of Pakistan." To get at the answer to the research question, the method went through the steps of data gathering and analysis.

### **3.4 Research Design**

This study adopted the descriptive design for the research in obtaining the information of "Impact of Technological Factors That Influence the Operational Flexibility in FMCG Sector of Pakistan". This kind of research is recommended because it allows the researcher to collect data

in order to answer questions about the status of the subject under investigation. As according to Karasti (2018), the goal of a descriptive research is to establish how things are now, this aids in determining the current nature of a subject under investigation.

A descriptive research approach also enables in-depth examination of variables and demographic characteristics to be researched, as well as the collection of huge volumes of data in a cost-effective manner. It allows for the development of accurate study data. This is due to the descriptive design's heavy reliance on secondary data, which aids in the development of a case based on facts, backed up by statistics and descriptive interpretation of archive materials and data.

### **3.5 Research Technique**

Research technique is the method which tells how the data is collected for the research work while keeping the margin of error in mind. There are many methods which researchers make use of while collecting the data. Due to the COVID situation and limitations, we made questionnaire on Google forms and floated it amongst the relevant persons to respond. Our questionnaire was consisted of different sections. First section deals with the demographics while others with the dependent and independent variables respectively. To improve the quality of the data, respondents were asked to rate the extent to which the statements indicating variables applied to their businesses using a Likert scale. The research questionnaire employed a five-point Likert scale. The structured questions were utilized to make the analyzing process easier.

This allowed people to take a moment, think about it, and then respond in the most appropriate way. Respondents maintained their feelings, emotions, and thoughts confidential.

### **3.6 Target Population**

Since this research is about the “impact of logistics practices on operational performance of FMCG sector” so, the population is the whole FMCG sector of Pakistan. But the target sample is the FMCG sector of twin cities (Islamabad and Rawalpindi) and that too Nestle, Unilever and P&G.

The target population for this study was 250 people (FMCG sector employees, supervisors, and managers with references of friends, colleagues, and relatives). That population was preferred which were directly or indirectly linked with transportation and logistics operations.



### **3.7 Sampling**

Sampling the research is an important approach for gathering information in a population sample size. It defines the researcher's strategy or strategy for selecting the best sample items.

For this research, the sampling framework is following:

### **3.8 Sampling Framework**

A sample frame is the substance or system from which a measurement is extracted in research. It is a list of all those who can be collected from a population, which can be persons or organizations.

Employees of 3 FMCG companies Nestle, Unilever and P&G (and other related persons) made up the study's sample frame.

### **3.9 Sampling Unit**

A single person serves as the sampling unit. A single value in a group of samples is referred to as a sampling unit. Because of Covid-19, the sampling unit for this study included FMCG supply chain employees and other related persons who were referred by friends, relatives, and coworkers. For this study, 152 individual respondents were chosen as the sample unit.

### **3.10 Sampling Technique**

This study employed a convenient sampling technique. As the name implies, convenience sampling is based on the researcher's or the object's convenience (shaltoni, 2018). Samples are taken from a group of people who are easy to reach or contact in convenient sampling. This strategy relies on data collection from members of the public who are willing and able to participate in the study. Sounders, Lewis, & Thornhill (2016) define this sampling strategy as "gathering responders wherever you can get them at any time you want". This method is used since it is it was most appropriate keeping in view the circumstances and constraints courtesy covid-19.

### **3.11 Sample Size**

In research, choosing the right sample size and making observations are critical. The sample size for this study is 152 individual respondents from FMCG sector of Pakistan. Data obtained

without a sufficient sample size may not be reliable, and the conclusions drawn may not be generalizable.

The sample size for this study was calculated using the formula and the Krejcie and Morgan table from 1970.

### **3.12 Data Collection and Data Analysis**

#### **3.12.1 Data Collection Procedure**

After the adaptation of the questionnaires, they were further modified for respondents' convenience in order to obtain accurate and trustworthy responses. Data was collected by delivering structured questionnaires to respondents (workers) working in FMCG companies in Pakistan's twin cities. The surveys were disseminated online via "Google Docs" by the researcher. Personal interviews or collecting data on personal basis was not possible due to the Covid-19 pandemic. The data acquired from the questionnaires has been appropriately synchronized to enhance the study's realistic results and conclusions. Over the course of ten days, 152 questionnaires were received. None of the responses were excluded, and all of the questionnaires received had complete results. In IBM SPSS statistics, valid replies were recorded and analyzed.

#### **3.13 Analysis**

The data for the study was collected using quantitative data processing methods via a questionnaire. With the help of SPSS software, statistical tools such as regression and correlation analysis were used to determine the extent and direction of the relationship between ERP, MRP, RFID and EDI (independent variables) and operational flexibility (dependent variable). Statistical tools (regression and correlation) are frequently utilized for data analysis around the world and have proven to be extremely accurate and valid.

#### **3.14 Research Instrument/Measurement/Scale Used**

The standardized questionnaire was used by me to get the responses and attitudes of the general public as per the variables of my research. There are different ways to gather the information and draw analysis, however for this research work I used the quantitative analysis and the questionnaire I used is based on the Likert scale method was based on hierarchy for the collection of data. For this research work the questionnaire was already established and I adapted

it from the different papers, Hence the questionnaire is adapted to past research work. The questionnaire for Radio Frequency Identification was adapted from the research paper of (Binh, 2017), The questionnaire for Electronic Data Interchange (EDI) was adapted from the research paper of Sheffield Hallam University the UK and its author was (Fatorachian, 2014), The questionnaire for Material Requirement Planning was adapted from the research paper of the University of Nairobi with an author whose name goes like (Millicent, 2017), The Enterprise Resource planning instrument was adapted from the research paper of Lunds University, Sweden, the author and research paper information goes like (Rickard & Erik, 2014) and the questionnaire for the dependant variable Supply chain performance was adapted from (Naseer, 2015).

## **Chapter 4**

## **Results and Analysis**

### **4.1 Introduction**

Data was collected from the managers, supervisors, owners, and all the working staff of the FMCG sector of Pakistan. The basic purpose of this study was to find the Impact of Technological Factors That Influence the Operational Flexibility in FMCG Sector of Pakistan. Operational flexibility was used as a dependent variable and modern technological factor (ERP, MRP, RFID, EDI) were used as independent variables. The questionnaire was designed to collect the data. The scale was based on 5 ratings Likert scale. All the responses were collected on a demographic basis.

Test the data on the SPSS statistics. In this chapter, the researcher shows the results of the data by using the methods of Reliability Test, Correlation, Regression, Anova, and Coefficients.

### **4.2 Demographic of the Respondents**

Approximately 180 questionnaires were distributed to the targeted population and 152 accurate respondents returned the filled questionnaire. Data was collected from the respondents of the FMCG sector of Pakistan.

So that it would be easier to comprehend, this study's researcher divided the obtained data into several categories. The participants were included in the research provided they answered these questions as expected.

#### **4.2.1 Education Level**

Under this section, education level was categorized in 5 sections which were namely Matriculation/O-Level, Intermediate/A-Level, Bachelors, Masters and PHD respectively.

#### **4.2.2 Managerial Position**

Managerial Positions of the Employees were also categorized in 5 options which were Front Line Manager, Executive, Supporting Staff, Middle Level Manager and Senior Manager respectively. We got 41 responses from upper level 68 from middle level and 43 from lower level managers.

### 4.2.3 Respondents Experiences

Experience of respondents was categorized into 5 sections. One was less than a year, second was 1-3 year of experience, third was 4-6 year of experience, fourth was 7-9 year of experience and fifth was for those who have got more than 9 year of experience.

### 4.3 Reliability test

The reliability test has been used to determine the consistency and reliability of questionnaire items for each study variable. According to Chang (2017), there are four levels of reliability in terms of Cronbach alpha values. Cronbach's alpha values of 0.9 and above indicate excellent reliability, 0.70-0.9 indicates high reliability, and 0.50-0.70 indicates moderate reliability, while values below 0.50 indicate low reliability. According to the numbers shown below in the tables as a result of the SPSS reliability test, the five variables employed in this study have reasonable reliability.

**Table 1**  
**Cronbach's Alpha**

<b>Variables</b>	<b>Cronbach's Alpha</b>	<b>N of Items</b>
<b>Radio Frequency Identification (RFID)</b>	.725	5
<b>Electronic Data Interchange (EDI)</b>	.639	5
<b>Enterprise Resource Planning (ERP)</b>	.754	5
<b>Material Requirement Planning (MRP)</b>	.760	5
<b>Operational Flexibility (OFB)</b>	.760	5

The values of Cronbach's alpha shown by reliability statistics are highly acceptable in terms of this study. The values of Cronbach's alpha have clearly indicated the higher level of reliability and consistency possessed with the questionnaire used primarily the research conducted within the study. Values of Cronbach's alpha are very close to 1 that demonstrates the reliability of questionnaire used as well as the reliable responses provided by the respondents, it is in between the set standard of 0.7-0.9. However, the reliability of EDI is acceptable. This Cronbach alpha

shows the higher consistency in the Likert scaling and the floating questionnaire for this quantitative research is authentic and clear.

#### 4.4 Correlation Analysis

Correlation explains and assesses the strength of the relationship between the dependent and independent variables. Pearson r is the most commonly used correlation coefficient. Correlation results of our study are explained in the table given below.

**Table 2**

		<b>Correlations</b>				
		<b>RFID</b>	<b>EDI</b>	<b>ERP</b>	<b>MRP</b>	<b>Operational Flexibility</b>
<b>RFID</b>	<b>Pearson Correlation</b>	1	.			
	<b>Sig. (2-tailed)</b>					
	<b>N</b>	152				
<b>EDI</b>	<b>Pearson Correlation</b>	.755**	1			
	<b>Sig. (2-tailed)</b>	<.001				
	<b>N</b>	152	152			
<b>ERP</b>	<b>Pearson Correlation</b>	.803**	.830**	1		
	<b>Sig. (2-tailed)</b>	<.001	<.001			
	<b>N</b>	152	152	152		
<b>MRP</b>	<b>Pearson Correlation</b>	.721**	.814**	.707**	1	
	<b>Sig. (2-tailed)</b>	<.001	<.001	<.001		
	<b>N</b>	152	152	152	152	
<b>Operational Flexibility</b>	<b>Pearson Correlation</b>	.794**	.818**	.776**	.818**	1
	<b>Sig. (2-tailed)</b>	<.001	<.001	<.001	<.001	
	<b>N</b>	152	152	152	152	152

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### **Correlation between RFID and operational flexibility**

#### **Correlation, $r_1 = 0.794$**

The relationship between operational flexibility and RFID is significant at significance level of 0.01. Value of Pearson correlation is .794; this implies that RFID and operational flexibility have a positive relationship. It signifies that the two variables are connected in a positive way.

### **Correlation between EDI and operational flexibility**

#### **Correlation, $r_2 = 0.818$**

The relationship between operational flexibility and EDI is significant at significance level of 0.01. Value of Pearson correlation is .818; which suggests a positive result between operational flexibility and EDI. It means that both variables are connected in a positive way.

### **Correlation between ERP and operational flexibility**

#### **Correlation, $r_3 = 0.776$**

The relationship between operational flexibility and ERP is significant at significance level of 0.01. Value of Pearson correlation is .776; which suggests a positive result between operational flexibility and ERP. It means that both variables are related in a positive way to each other.

### **Correlation between MRP and operational flexibility**

#### **Correlation, $r_4 = 0.818$**

The relationship between operational flexibility and MRP is significant at significance level of 0.01. Value of Pearson correlation is .818; this implies that MRP and operational flexibility have a positive relationship. It signifies that the two variables are connected in a positive way.

## **4.5 Regression analysis**

Correlation analysis determines the existence of a relationship, while regression analysis is used to determine the nature of the relationship. The table below is commonly used to present the overview of the regression model.

**Table 3**

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
<b>1</b>	.847	.717	.709	.3218

a. Predictors: (Constant), **ERP, MRP, RFID, EDI**

The above table is about the model summary of regression analysis. Value of (R) indicates the simple correlation. However, the value of R is 0.847 (84.7%), which gives a strong indication of a high degree correlation between Radio Frequency Identification (RFID), Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP), Material Requirement Planning (MRP) which are the (independent variables) with the Supply chain performance (SCP) which is the dependent variable. Similarly, R<sup>2</sup> indicates the extent to which (Supply Chain performance) can be explained by (Radio Frequency Identification (RFID), Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP), Material Requirement Planning (MRP)). Regarding this study, R<sup>2</sup> is 0.717 (71.7%), which is very high. On the other hand, Adjusted R<sup>2</sup> shows how to fit the theoretical model has been. So, when it comes to this study, Adjusted R<sup>2</sup> is .709 (70.9%) fit, which is a good sign. The value of R<sup>2</sup> shows the “goodness of fit” which is the impact of the independent variable on the dependent variable.

## 4.6 ANOVA

**Table 4**

<b>Model</b>		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1	<b>Regression</b>	60.467	4	15.117	91.652	<.001 <sup>b</sup>
	<b>Residual</b>	15.476	144	.107		
	<b>Total</b>	75.943	148			

a. Dependent Variable: Operational flexibility



b. Predictors: (Constant), ERP, MRP, RFID, EDI

The total regression model is significant, according to the ANOVA table. The value of F must be more than 4 ( $F > 4$ ) and the value of p must be less than 0.05 ( $p < 0.05$ ) for the regression model to be significant. Here the value of F is 91.652 which is greater than 4 and the value of p is less than 0.05 so the overall regression model proves to be significant.

#### 4.7 Coefficient

**Table 5**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.670	.454		1.475	.142
AVG RFID	.240	.093	.142	2.599	.001
AVG EDI	.391	.045	.530	3.739	.001
AVG ERP	.217	.043	.321	2.392	.001
AVG MRP	.282	.050	.339	1.938	.001

**a. Dependent Variable:** Operational Flexibility

From the table above, it is clear that all of the predictors have a positive connection with operational flexibility and are statistically significant at the 95 percent confidence level. The importance of the link between the dependent and independent variables is explained by these coefficients. There is a significant association between the dependent and independent variables since all of the t values are greater than 2 ( $t > 2$ ) and the p values are less than 0.05 ( $p < 0.05$ ). The constant number (0.407) indicates that if all of the observed logistical practices were rated zero, Fast Moving Consumer Goods (FMCG) businesses' operational performance would be reduced by 0.407.

According to the study, a unit increase in RFID improves operational performance by 0.240, a unit increase in EDI improves operational flexibility by 0.391, a unit increase in ERP improves

operational flexibility by 0.217, and a unit increase in MRP improves operational flexibility by 0.282.

#### 4.8 Results

<b>Variables</b>	<b>Significance Level</b>	<b>Result</b>	<b>Accept / Reject</b>
<b>Radio Frequency Identification</b>	.001	Positive Impact on operational flexibility	Hypothesis accepted
<b>Electronic Data Interchange</b>	.001	Positive Impact on operational flexibility	Hypothesis accepted
<b>Enterprise Resource Planning</b>	.001	Positive Impact on operational flexibility	Hypothesis accepted
<b>Material Requirement Planning</b>	.001	Positive Impact on operational flexibility	Hypothesis accepted

## **Chapter 5**

### **Discussion, Conclusion and Recommendations**

#### **5.1 Discussion**

The supply chain is the process of procurement, converting the raw material to finished product and then delivering it to the customer upon demand, this process also includes after-sale services in certain cases, so the main purpose of the department of the supply chain is to make these operations very smooth, less costly, to reduce the lead time and to make it more efficient to survive in this tough competitive market. Supply chain management represents and tells the way how to make the processes of these operations less costly and how to make these operations smoother.

The IT tools or the variables which I have mentioned in this research paper shows that smooth supply chain performance is directly or positively correlated with the tools of IT. The study which I have done shows that the framework that the impact of IT is too much on the supply chain performance of the FMCG sector of Pakistan.

The companies of FMCG sector must have to identify the important characteristics of and determinants for their company is efficient supply chain performance because of a large number of variety of goods into the organization system, so as discussed in the paper and by running the test it shows that IT tools like RFID, EDI, ERP, MRP has a positive impact in the supply chain performance of FMCG sector.

So, to have the competitive advantage and to maintain a long term relationship with the customer the traditional way of doing things must be overcome and the adaptation of new technology must be considered, because of high diversity in the line of products in the FMCG sector so the implementation of these tools are of significant importance for the productive supply chain performance of this sector. The above discussion has made it clear that there are plenty of challenges faced by the companies of the FMCG sector these days and to overcome these challenges and to achieve the perks of an efficient supply chain with low cost and less lead time the company needs to adapt the IT tools.

## **5.2 Conclusion**

Supply chain management is of significant importance in many industries, but it becomes more important when it comes to the FMCG sector. The variables which were mentioned play a significant role in the supply chain of the FMCG sector. With more levels of variety and different products in the sector of FMCG, it becomes too important to digitize it or to implement the tools of information technology to make the supply chain of these products more efficient and effective. Information technology plays an important role in the supply chain performance of the FMCG sector. The result in this research shows that all the stakeholders working in the field of the FMCG sector are pretty much aware of the dimensions of the measuring of supply chain performance and information technology tools.

The supply chain of the FMCG sector is too vast because of its diversity in the product and because of large volume since with the manual work it gets too hard for the company to maintain the efficient and effective supply chain of the company, so in this case, the IT tools help a great deal in controlling the cost of the companies and to control maintain the efficient and smooth flow of goods from the producers to the customers, The use of IT tools, for instance, RFID, EDI, MRP, ERP plays an important role in the efficient performance of the supply chain of the FMCG sector.

The operations part in the FMCG sector is of immense importance because of large numbers of quantity and a large number of variety, without the smooth operations in the supply chain it gets very difficult for the company especially in the FMCG sector, so to maintain the longevity and survival of the companies in the FMCG sector it is of immense importance to control the operations of the supply chain of the company which can only be smooth out with the help of IT tools and these tools/variables are correlated with the efficient supply chain performance.

The variables or the tools of IT which I have mentioned above are too important for a smooth and efficient supply chain because there is too much risk involved in the supply chain the risk of less quantity, bullwhip effect, false products/goods because of manual work, these risks can be eliminated with the help of the IT tools like the use of RFID, EDI, ERP, MRP can eliminate the risk and help out the business to reduce the cost, ultimately making the business more profitable.

Like above there are too many risks involved, and these risks can be too costly for the organization and can increase the cost to a significant level, the use of IT like I proved in the

above case can reduce cost, increase supply chain integration, and ultimately can increase the efficiency of the supply chain performance of the company which is important for the smooth operations.

### **5.3 Recommendations**

By analyzing the whole paper it has become crystal clear that FMCG industries these days in Pakistan are facing too many challenges because of their usage of the old way and traditional way of doing things, this inefficient process is costing companies too much because the consumers are shifting towards their competitors and the companies are facing with the problems of lost sales, backorders and bullwhip effects, with these problems facing by the companies in the current era is because of lack of adaption of new technologies by most of the stores/companies operating in our country.

The problems in the sector of FMCG of Pakistan is not only limited to the internal factors but it is extended to external factors as well, the main external factors which areas political instability, changes in economic policies, complex supply chains, socio-economic factors like high rate of food inflation, high cost of transportation, high rate of taxes, etc, these external factors can prove to be very fatal for companies in the FMCG sector. The diverse demand of the goods because of the different ethnic belonging of citizens of Pakistani people can also prove to be a hurdle for efficient procurement and forecasting of the goods. These are the external challenges being faced by them.

Apart from the external factors, the internal factors can also prove to be very fatal for the company the internal factors like the lack of digitization which can lead to false demand estimation/false forecasting, and with the fluctuation in both demand and supply, there is the problem of bullwhip effect which can lead to less income, more lead time, etc. Apart from that the companies in our country are also facing different problems of fraud, mismanagement, false naming and labeling for instance there is the case in some cases where the imported products are being manufactured in Pakistan and then being sell to the stores and customers as a high-quality product which of course is not the case and which can lead to many problems for instance fake products may lead to dissatisfaction on the part of the customer, ultimately leading to lost sales of the products. The companies will have to adapt themselves to the new technology and new digitization of the infrastructure of the companies to survive and thrive, the lack of implementation of these tools can lead to distortion in supply/demand, bad forecasting, more

cost, lost sales, and more lead time so this process must be catered and to be dealt accordingly with the implementation of IT tools.

There are some strategic recommendations for the FMCG sector of Pakistan as per the subject and objective of this research study:

Implementation of digitized systems or automated tools can help in increasing the efficiency of the processes and can reduce the error of humans to a certain extent.

Automated systems like ERP can be installed in the companies for tracking raw materials and to meet certain deadlines.

The use of data analytics with certain tools of IT can also help a great deal in productivity performance and increase the efficiency of the supply chain performance of the FMCG sector.

The more integrated departments of the company there is the more efficient and smooth the supply chain there is going to be.

So, the aim of this research has successfully been achieved with the connections of the FMCG sector and IT tools. Apart from that, the management should look into these factors to increase the profitability of the company and sustainability in the market. Apart from that, the researcher has also shown the recommendations for the increase in the integration of the departments across the supply chain to compete for long sustainable profits and to compete over a global market with the companies operating in the FMCG sector of Pakistan.

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## **Appendix**

### **Impact of Technological Factors That Influence the Operational Flexibility in FMCG Sector of Pakistan**

#### **Research Questionnaire**

This survey has been created with the sole intention of gathering information on the " Impact of Technological Factors That Influence the Operational Flexibility in FMCG Sector of Pakistan". The information gathered will be treated with high degree confidentiality and will only be used for academic purposes. You are kindly asked to fill out this questionnaire by circling appropriate answers.

#### **Section A : General Information**

**Name:** \_\_\_\_\_

**Gender:**

- Male
- Female



- Prefer not to say

**Email Address:** \_\_\_\_\_

**Age:**

- 20-30
- 31-40
- 41-50
- Above 50

**Education level:**

- Matriculation/O-Level
- Intermediate/A-Level
- Bachelors
- Masters
- PhD

**Organization:** \_\_\_\_\_

**Designation:**

- Senior Manager
- Middle Level Manager
- Supporting Staff
- Executive
- Front Line Manager

**Job Experience:**

- Less than a year
- 1-3
- 4-6
- 7-9
- More

## Section B: Independent Variables

<b>Radio Frequency Identification</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
RFID offers better tracking and inventory control	1	2	3	4	5
RFID offers, less stock-outs and increase in sales	1	2	3	4	5
RFID offers labor cost reduction	1	2	3	4	5
RFID offers improve stacked lead time	1	2	3	4	5
RFID offers better warehouse management of goods	1	2	3	4	5
<b>Electronic data interchange</b>					
EDI helps reduction in the cost. (e.g. Accounting, manufacturing, distribution and finance)	1	2	3	4	5
EDI helps in efficient flow of information.	1	2	3	4	5
EDI helps in improving the quality of products.	1	2	3	4	5
EDI helped our company in high turnover.	1	2	3	4	5
EDI improved competitiveness.	1	2	3	4	5
<b>Enterprise Resource Planning</b>					
The contract agreements will be easier to manage	1	2	3	4	5
The order lead-time will decrease	1	2	3	4	5
The costs in procurement will be reduced	1	2	3	4	5
The customers are more integrated in	1	2	3	4	5

the new system					
The suppliers are more integrated in the new system	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Material Requirement Planning:</b>					
Implementation of MRP has improved responsiveness	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Implementation of MRP has reduced production cost.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Implementation of MRP has increased sales revenue.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Implementation of MRP has improved delivery time to customers.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Implementation of MRP has increase operational flexibility.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**Section C: Operational Flexibility**

<b>Operational Flexibility</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
Modern technologies system is inevitable to enhance operational capabilities of a firm.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Efficient technological process helps in cost reduction.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Technogym and innovation boosts the responsiveness of the firm.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Implementing technologies helps in creating flexibility in firm in order processing.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

Implementing technologies helps in improving the overall value chain.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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