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# ANALYSING THE EFFECT OF INTERNET OF THINGS TO SUPPLY CHAIN MANAGEMENT IN E-COMMERCE INDUSTRY IN INDIA

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I declare that I have compiled the paper independently
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# ABSTRACT

The study of internet of things is a learning paradigm for the researcher because the aspects like supplier integration, customer integration is new. The researcher is familiar with the principles and is aware of the importance of the internet in the management of the supply chain with the help of the dissertation. In this study, the researcher will take into account issues such as integration of the supply chain, customer integration and how it plays a key role in influencing the efficiency of the supply chain.

The aim of the study is to find out the association among internet of things in supply chain integratino and customer integratino on supply chain performance. Moreover, objectives is to find out how internet of things in supply chain and customer integration on supply chain perforamnce. Consequently, the study assess the impact of internet of things on supply chain performance. The study considers the population as employees of E-commerce companies in India. Samples picked out based on non probaility sampling in which convenience sampling considered. As a result, the sample for the study is companies are having internet of things in supply chain managemnet in E-commerce companies in India. The variables for the study inclusion of both integration, internet of things as independent varaibel and supply chain perforamnce as dependent variable. Findings of the study stated that there is a srong postive association among the varibles. Considering the impact of variables (Internet of htings, supplier and customer integration) seen to be 3.8% on supply chain perofrmance. However, there has been an exceptionally low correlation between the Internet of Things and the efficiency of the supply chain. It is therefore clear that the Internet of Things attributes the collective integration of consumers and suppliers to the efficiency of the supply chain.



Keywords: Internet of things, e-commerce, supply chain performance

# INTRODUCTION

Supply Chain Management refers to the strategic way of combining the intermediary members of the supply chain, organizing them to carry out the operation through the exchange of information, materials and resources. The main aim is to maximize the benefits and performance of the entire supply chain (Shin et al 2011). In other words, it can be stated that it is the process of planning , implementing and controlling the activities of the supply chain which, in turn, not only satisfies the needs of the customer, but also performs the operation in an efficient manner. (Oliver and Webber in 1982). In addition, supply chain management combines the entire distribution channel flow right from the supplier until it reaches the customer (Cooper and Ellram 1993). Supply chain activities shall involve three or more associates directly involved in the upstream and downstream flow of goods or services or information from the manufacturer to the customer (Mentzer 2001). Supply chain management combining all the activities, starting with the acquisition of raw materials, processing it with the help of the manufacturer until it reaches the customer. This ensures that the costs are minimized to the maximum extent possible. Subsequently, the activities include production activities, production, sourcing, transporting, stocking and shipping to reach valid customers. Integrating all activities involves a number of constraints, such as lack of visibility of assets, inefficient stock handling. In addition, transport constraints such as improper data handling and lack of effective supply chain risk management. Risks raised due to marginal erosion, sudden change in product demand, ripple effect due to extended value chain and technology obsolescence (Deloitte 2013). In order to overcome such constraints, the organization must identify ways to meet client expectations in a timely manner at a reasonable cost. Today, companies are finding ways to overcome this by adopting technology in supply chain management. By doing so, integration of activities to achieve the Rezaeian 2017 business objectives). Technology assists companies in meeting competitive edges and sets up a robust technology to make it flexible, risk-free and perform highly responsive Chain supply activities for the organization (Christopher 2011). The researcher chooses the Internet of Things as the preferred technology was launched in 2009 by Kevin Ashton. It represented a network of physical objectives embedded in electronics, linked to software using devices such as network connectivity sensors. Objects collected the information and sent it over the Internet to the appropriate persons (Ashton 2009). The Internet of Things connects the smart

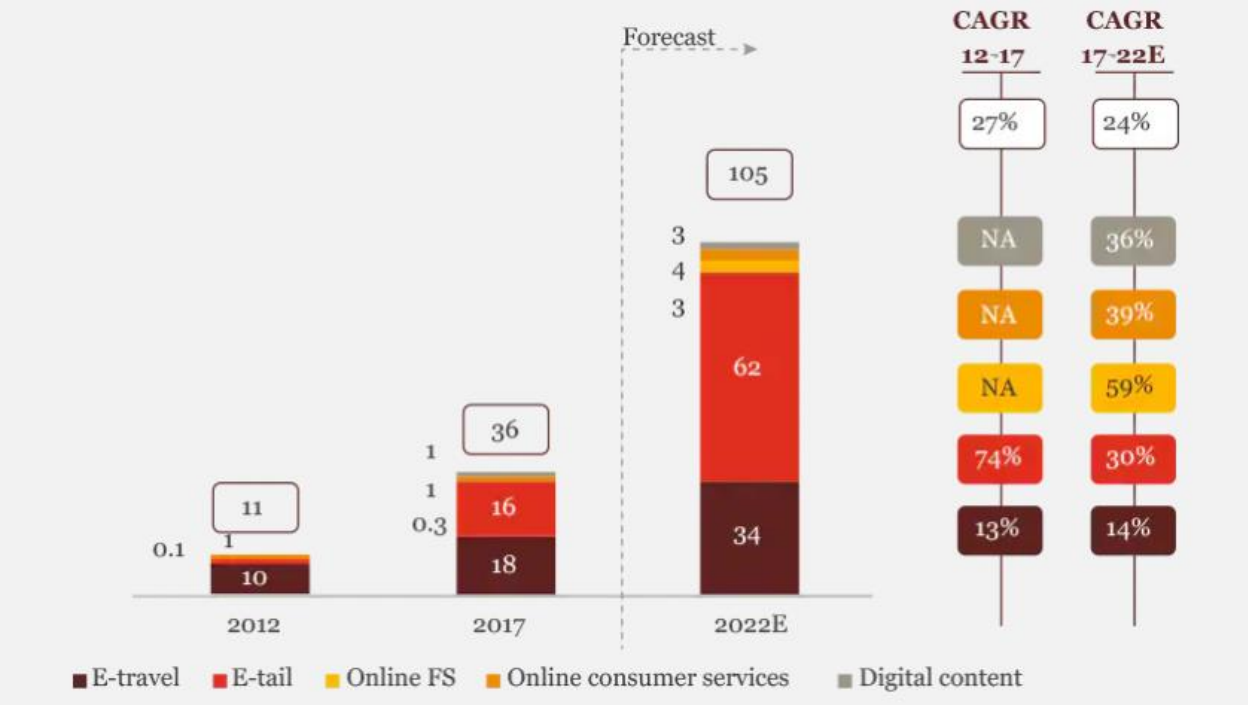
objectives of the global Internet platform. The medium allows you to do things at any time or anywhere using the Internet (Atzori et al 2010, Borgia 2014, de Vass et al 2018).

The word IoT represents the Internet of things that depict objects assigned to an IP address that have the potential to collect and transform information over the Internet. Network connectivity has the power to transfer information very quickly without any manual intervention. The need for the Internet of Things is almost USD 6.2 trillion by the end of 2025. In addition, it has the characteristics of digitally accessing and accessing information on the supply chain from anywhere. It uses objectives, improves communication, which in turn makes it easier to control the logistics. This, in turn, also accelerates process efficiency and organizational efficiency. In addition, it has the power to visualize the inventory available at the warehouse. It brings transparency to the logistic process and finally managers can track the inventory at any point or anywhere. It also allows mobile computing in SCM.

Internet of things technology paves the way for the users to view their information through ICT application. (Borgia 2014). It assists in capturing real time information and share the same with the supply chain executives. Digital advancement combines the conventional way of doing supply chain activities with internet which provides added capabilities to function effectively in the organisation. (Mattern and Floerkemeier 2010). Advancement made in internet of things applications permit the sensor to revolutionise the E-commerce sector and to combine the supply chain process in an effective way. (Kahlert et al 2017).

**E-commerce industry in India**

One of the emerging business models in e-commerce that carries out a business transaction on the Internet. It's quite different from the conventional way of doing business. Consumers do not need to spend their time and distance buying products, however transactions are made online. E-commerce is a widely accepted way to consume goods in India. Pwc's report stated that the e-commerce market currently generated around USD 35 billion in 2019, which will grow by 25% over the next five years.




Source: IBEF

**Market size**

The Indian market notes that e-commerce sales are USD 32.70 billion, which will rise to USD 200 billion in the future. The major dominant players on the Indian market are Flip Kart, Amazon India and Paytm Mall. In India, the E-commerce start-up received USD 13.3 billion in funding to make significant progress for companies. The primary reason for receiving the amount is due to an increase in investor confidence in the companies. The revenues of the companies are around USD 39 billion and the industry has an annual rate of 51% on the Indian market.

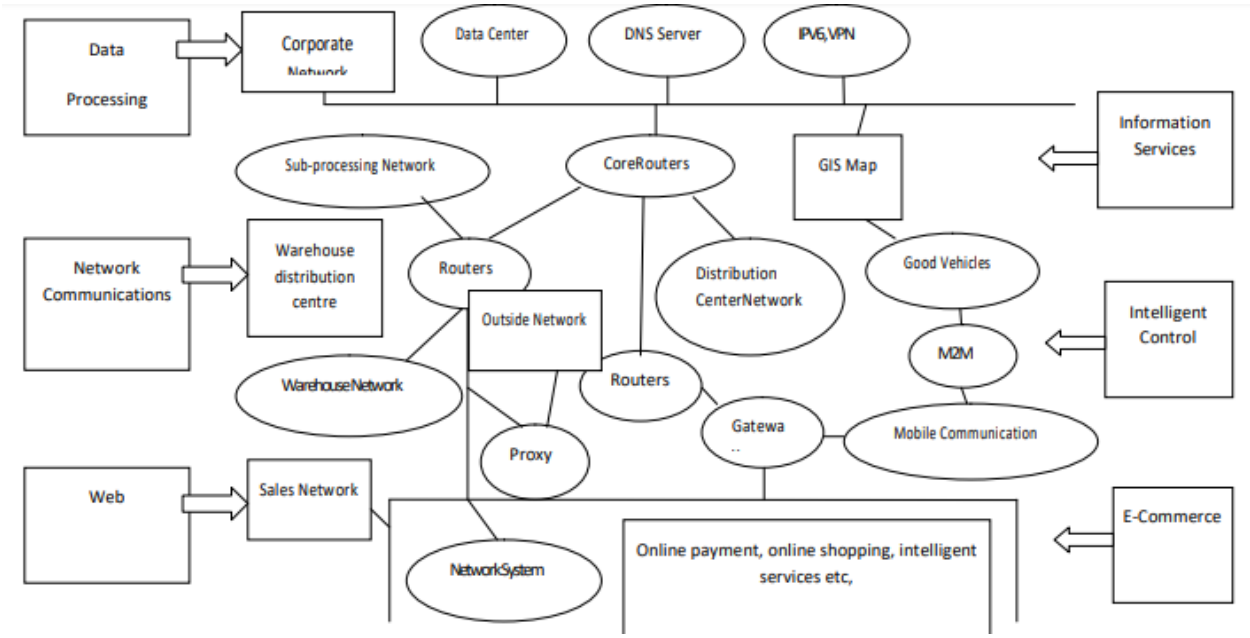
**Market Players**

In India, e-commerce is dominated by two major players. First, Amazon is a US-based company, and second, Walmart is owned by Flipkart. Other notable market players to be Snapdeal followed by Paytm Mall, Shopclues, Myntra, Jabong and others.

**Growth**

The huge growth in the e-commerce sector is mainly due to Internet users triggered and the penetration of smartphones in India. As a result , a large number of users have started using online sources for their products. This, in turn, transforms the conventional business into the

electronic commerce that prevailed in India. However, e-commerce sales are projected to be around USD 200 billion by the end of 2026. In view of the growth, retail companies have begun to adopt the Internet of Things to make use of the current boom in e-commerce in developing countries such as India to provide customers with customer-centric and personalized shopping experience. The implementation of the Internet of Things in e-commerce improves efficiency; reduces operating costs and improves customer experience. Internet of things for e-commerce set out in the diagram below.




Source: Internet of things for E-commerce (Fleisch & Tellkamp 2005)

E-commerce is driven by demand, with an intense digital connectivity that contributes to improving customer service via the Internet through a comprehensive supply chain (Fleisch & Tellkamp 2005). Finally, internet of things plays a key role in influencing E-commerce industry in managing supply networks to meet he customer demands (Yu *et al* 2013). Company based technologies paves the way to have transparency and visibility in supply chain process. Besides, it have the ability to view information from anywhere or at any time. The question is how technologies facilitate external and internal processes in order to improve the performance of the supply chain for e-commerce companies in India.

**Background of the study**

The researcher relies mostly on resource-based theory to help the variables that affect the success of companies in the supply chain. Furthermore, the theory offers a framework for

building a framework to increase supply chain performance in Indian companies. The researcher is therefore investigating the relationship between internet of things, supply chain integration, customer interaction and supply chain efficiency based on contingency theory.

**Contingency theory**

There is no clear theory to assess how companies organize and take actions in the supply chain. (Lawrence 1967, Thompson 2003). The researcher therefore uses the contingency approach, which he finds reductionist. The supply chain operations are categorized into various processes or strategies or even divisions with the aid of this approach. (Sinha, et al. 2005). It must be properly sequenced by the design of the set. The optimal decision on the internal and external environment. In addition, it will affect the performance of the organization. (Donaldson 2001, Lawrence 1967). The outcome can vary according to decision. Participants such as management followed by customers and suppliers are the most crucial elements in the supply chain context particularly in the e-commerce setting. Structural contingency theory developed to explore the relation between the strategy and the success of the organization. If the strategy fits into design and structure, the organization drives the activities and performs them efficiently. In addition, the principle of analyzing strategic operations to optimize performance. Likewise, the theory supports the study to help individual participants (members of the supply chain or customers) coordinate practices to speed up supply chain efficiency. (Chandler 1962, Galbraith 1974, Drazin et al 1987, Venkatraman and Prescott 1990, Milgrom 1995)

**Internet of things**

The primary purpose of using the internet of things is to promote the organization's modern requirements. (Milgrom 1995, Nunberg 2012). It assist the organization in aligning the resources in a single platform mainly to track the process and to identify the areas if there is any stuck in activities. If stuck identified, reduces the constraints presents in the process and accelerate the activities in an efficient way. (De Vass et al 2018). Many practical implications noticed in supply chain activities. In the modern era, organization have their enterprise software, utilized in integrating the activities, aligning the supply chain executives to share the information. The software intention is to enhance the communication among supply chain members. Consequently, it plays a key role in having a smooth flow of supply chain activities in the organization. Supply chain activities changes from conventional way of doing to computerized way of doing it in the organization. Hence, all the activities right from

registering the inventory till customer maintenance in the software. Computerized system ease of way of doing operation. Though there are other sources of operation, internet of things taken into account. Using barcode scanners, RFID technology considered as a prominent device for internet of things. RFID technology is utilized to track the inventory, monitor it, record the activities and analyses the inventory information. Every activity of the supply chain activities get its assistance through internet of things. The main intention of using it to improve the supply chain performance. (Yan 2009). Considering the aspects, the researcher had an interest to investigate how the internet of things influence supply chain performance. Besides, considering the integration of both suppliers and customers plays a key role in accelerating supply chain performance. It assists both suppliers and customers to maintain a cordial relationship with the manufacturer. The intention is to upsurge the interaction among manufacture and suppliers. With the help of interaction, supplier can recognize the requirements of manufacturer, make a strategic planning and accelerate inventory for their production. Producer can utilize information communication technology using internet of things. Hence products can be designed at reasonable cost. Besides, internet of things have a positive impact on supply chain integration which in turn accelerate supply chain performance. However, it have the power to influence customer integration. This in turn enable the customer to not only have a cordial relationship but also enhance the communication with the manufacturers. Besides, it paves the way for the customers to book online, check the standards and specification in internet itself. By doing so, customers can maintain a close communication with the manufacture. Consequently, it enhances the communication with the manufacturer. At last, it plays a major role in satisfying the customers, get the customer loyalty and reorder the same from the manufacturer. It is considered as a best way to gain competitive advantage and to accelerate the financial performance in the market.

**Supply chain integration**

Supply chain integration is emerging as a new concept. The relationship between supply chain members such as manufacturer, supplier and customer is one-dimensional in nature (Paulraj et al 2008, Mabert 1998, Spekman et al 1998, Fawcett 2002). In addition, very few studies have focused on studying the association of supply chain partners (Lee 2001). In addition, very few studies considered the supply chain to be a single system. Supply chain integration refers to the flow of material from one supply chain component to another (Benton 1996). Simply put, it is referred to as cash or resource flow or information in the

supply chain subsystem. It is divided into two dimensions, one of which is internal integration and the other external integration. External inclusions of suppliers and customers integration (Flynn et al 2010). In this case, integration implemented in the supply chain, with the aim of collaborating with other supply chain partners, is to have a free flow of information and resources to manage both the inter-organisation and intra-organisation processes and to ensure a smooth flow of operations. The aim of supply chain integration is to have a free flow of information or resources or money or products and services to serve customers in an efficient and effective manner. This, in turn, influences rapid organizational processes and reduces operating costs (Naylor et al 1999, Bowersox et al 1999, Frohlich 2001). It also encourages supply chain patterns for strategic collaboration and provides both operational and strategic benefits (Sanders 2008). It encourages supply chain partners to share information, reduce risks in the supply chain and accelerate the duration of the contract and enhance trust between the partners (Ellram 1990, Heide 1990, Poirier 1996). It highlights the importance and outcomes of both the inter-organizational and intra-organizational processes. The objective is to achieve both operational and organizational performance. The aim of supply chain integration is to satisfy customers. Customers and suppliers are the primary members of external integration. With the help of both Supply Chain Integration and Customer Integration, the researcher explores the strategic relationship between the manufacturer followed by the supplier and the customer in developing inter-organizational strategies followed by processes and collaboration (Stank and Keller 2001)

Customer integration consists of practices followed by competence and coordination, while supply chain integration is associated with critical suppliers (Bowersox et al 1999). Both integrations are vital in order to have an efficient process to meet customer requirements.

**Internet of things capability**

It refers to the fact that additional capabilities are vital for accelerating technology related supply chain devices. The aim is to recognize, understand and use the network to process the ability to connect services over the Internet with appropriate devices and services (Whitmore et al 2014).

**Supply chain performance**

It refers to how supply chain activities such as product availability followed by time delivery and required inventory and capability in the supply chain to meet the requirements of end users and deliver output responsively. Generally, it goes beyond company boundaries

because it includes activities such as the consumption of basic raw materials, components, subassemblies and finished products, distributes them through intermediaries and makes them available to end users. It's going beyond conventional usable lines. In order to achieve success in the new world, continuous improvement in supply chains is vital. Subsequently, the measurement of continuous improvement using metrics provides information to the company that is useful to them or not. (Hausman, 2017) Supply chain performance is used to assess the management of the supply chain in terms of both tangible and intangible factors (Presutti 2003). The main objective of evaluating the performance of the supply chain is to define the difference between real and desired results and to determine the efficiency and effectiveness of the process. Performance measurement guided the organization to achieve a double improvement in the performance of supply chain management and an accurate evaluation of the benefits achieved. Quality measures taken from two viewpoints. The first concerns financial factors and the second concerns the non-financial viewpoint. Financial indicators take into account sales and efficiency. Evaluating the financial viewpoint allows the shareholder to know the long-term success of the business and how it serves its own clients on the market. Understanding the aspects will make an company effective in providing good product quality to meet consumer expectations (Wisner et al., 2010).

**Research aim**

The aim of the study is to examine the effect of internet of things on the supply chain process. Besides, it assess how it improves the supply chain activities of E-commerce companies in India.

**Research objectives**

The objective of the study is

- To identify the association among the internet of things in supply chain integration and supply chain performance of E-commerce companies in India
- To find out whether internet of things capability has affected the supply chain for E-commerce companies in India.
- To find out how the internet of things in supply chain integration has impacted the supply chain performance for E-commerce companies in India

**Research questions**

- What are the attributes involved in internet of things in supply chain integration?

- Is the internet of things connected to the supply chain process and performance?
- Is there a relationship between the Internet of Things in the Supply Chain Process and Supply Chain Performance?
- How does the internet of things influence the supply chain performance in E-commerce companies in India?

**Significance of the study**

The purpose of the study is a learning paradigm for the researcher because the aspects like supplier integration, customer integration is new. Preparation of dissertation guides the researcher to know the concepts in detail and to know the significant importance of internet of things in supply chain management. The present dissertation covers both the integration of suppliers and customers and how it influence the supply chain performance in E-commerce sector in India. To assess the variables, the researcher get an assistance from contingency theory. Because the theory supports in evaluating how supply chain members align their activities in accomplishing effective supply chain performance in the organization. To have continuous flow of supply chain operation, manufacturer have to develop the strategy, picks the suitable strategy to accomplish the both operation and organization performance. Organization have to respond to both internal and external environment to have a free flow of operation. It is crucial for the manufacturer to have a good cordial relationship not only with the customer but also for the producer to make a loyal customer especially in recognizing the customer needs through information sharing. Good share of information among the producer helps to predict the demand, recognize the design, and make an appropriate production planning, manager inventory to meet the customer demands on time. Conversely, customer integration plays a key role in influencing the manufacturer in enhancing the supply chain performance in the organization. Moreover, it have the power in enhancing the customer satisfaction level and the producer to get feedback from its customer directly. This in turn paves the way to have a product innovation and product development to be made indirectly. AT last, the aim of the customer integration is to satisfy the customer requirements and to accelerate the supply chain performance. Conversely, supplier integration is to enable the supplier in anticipating it, understand the requirements and forecast the changes made in producers demand. Consequently, it plays a major role in sharing the information, recognize the potentialities, develop the plan, and construct the delivery process and fixing cost at an appropriate time. This medium can enhance supply chain performance of the organization. This have the power not only strengthen the association among producers and suppliers but

also accelerate the satisfaction level, customer service and get loyalty customers. This in turn improve the organization performance.

It have the power to not only strengthen the association among producer and supplier but plays a key role in accelerating the satisfaction level, customer service and loyalty which in turn directly accelerate the organisation performance. Therefore, the study is highly benefit to the E-commerce companies and the policymakers to enhance supply chain performance in the organisation. Hence, the study is highly benefited to improve supply chain efficiency in the organization by the e-commerce companies and policymakers.

**Chapter scheme**

Chapter 1: Literature review

Chapter 2: Research methodology

Chapter 3: Data analysis

Chapter 4: Impact of internet of things on supply chain performance of E-commerce companies in India

Chapter 5: Classification of sectors and its impact of internet of things on supply chain performance

Chapter 6: Empirical findings

Chapter 7: Discussion and conclusion

# 1. LITERATURE REVIEW

This section discusses the literature within the framework of the work carried out. Sources from journals, publications and magazines were gathered from literature review followed by books and technical reports that contribute to identify the impact of internet of things on supply chain performance. This section covers the empirical results of various scientists studied and examined in particular to recognize the feasibility of established research goals. This categorizes and clarifies the research carried out so far, especially in the field of Internet of things in supply chain management and the uses of internet of things in E-commerce.

## 1.1.Internet of things in SCM

Supply chain management combines the demand and supply processes of the entire organization. Many businesses faced delayed order delivery, followed by demand and supply gaps and unpredictability in business conditions. The above-mentioned constraints were encountered while integrating the activities of the supply chain. Organizations are keen to overcome the constraints of integrating SCM activities, companies are taking steps to redesign SCM not only to meet customer needs, but also to address the constraints of the development path. As a result, companies have begun to adopt technology in the supply chain business. Technologies deliver services in a fast, scalable manner through smart and connected devices. As a result, it offers a quick and efficient solution to SCM constraints and is therefore referred to as the Internet of Things. The Internet of Things is the processing, recording, storing and sharing of information through interconnected devices, in particular through data or wireless networks. The researcher therefore demonstrates how important it is for the organization to use the Internet to manage the supply chain.

de Vass et al 2018 noted in the study that the advent of internet of thing sin retail services has a huge impact on the industry. To explore the advent of technology in retail services, the authors investigated the theory of organizational capacity to analyze technology adoption and how it has an impact on organizational efficiency. The research analyzed characteristics such as internal process integration and external process integration along with supply chain and organization efficiency. The study showed an outcome which has a positive impact both internally and externally on the Internet of things, which in turn affect the supply chain and organizational performance. Finally, the study assisted the managers with knowledge that, it is vital for managers to create the awareness that a potential investment in the Internet of Things is necessary for managers to achieve a performance result.

Kothari et al 2018 Represented in the study internet of things was widely applied by many supply chain companies. Supply chain management combines all operations that are very difficult to do. This in turn produces a large variety of limitations and vulnerabilities for SCM activities. The author therefore concentrated on defining the limitations suggested by SCM and how these limitations can be overcome by implementing Iot. With the help of secondary studies, the author highlights the visibility and transparency of internet of things in SCM activities as internet of things integrates activities using smart devices that effectively monitor the production process.

Phase and Mhetre, 2018 reported that SCM has grown in recent decades. The transition takes the form of a basic RFID-based tag for product recognition, then adopts sensor technology and then communicates devices to a smarter supply chain. The author found that technical advances have opened the way not only to track the goods but also to predict situations for avoiding losses on the company and safeguarding the goods properly for the right individual to collect information and convey them to the right person at the right time for the early delivery of the goods.

Tajfar and Gheysari 2016 showed that tools like RFID followed by wireless sensor networks and then middle ware, web platforms and cloud computing plays a significant role in integrating the supply chain information digitally. The study examined the impact of cloud-centric Internet technology on supply chain management. The author found that IoT cloud computing influenced the process of supply change positively. Adopting technology in SCM also decreases the times required to purchase or buy products and services, and offers improved communication using items that in effect speed up the efficiency of companies.

Vass et al 2018 evaluated if internet of things affects the supply chain and client performance. The study therefore aims to examine the use of internet of things to incorporate SCM in the Australian retail market. The study showed that internet of things is strong in terms of visibility, auto capture and sharing of information. This in turn provides a positive effect on costs, followed by quality and then supply flexibility in integrated supply chain business. At last, effect of internet of things accelerates the industrial, social and environmental performance of the retail business.

### 1.2.Internet of things in E-commerce

Organization has restructured the conventional SCM to technology based SCM. The intention is to disperse the entire supply chain operation and imply some innovation in it to accelerate the efficiency of supply chain operation through internet of things. Many SCM retailers utilize internet of things to track, store and distribute followed by environment control and custom promotions. The primary purpose of using technology is to increase forecast rates, to develop a strategic plan and to use organizational capital to achieve intelligent exchange. Finally, internet of things have a significant influence in in the e-commerce sector is shown here.


IBER.ORG

Dinesh et al 2018 stated in the study that the majority of people using the Internet for shopping products through e-commerce. Proliferation in the internet has changed the

conventional way of consuming the product. This is due to the changing lifestyle of the customer and the adoption of more online shopping. It is therefore vital for the organization to maintain itself and upgrade to the latest technology. Only then can the company satisfy its customers. In the field of information technology, the Internet of Things is a new revolution in the sector. The Internet of Things has made it possible for devices primarily used to exchange data over the Internet, to help retailers and e-commerce to operate efficiently. The authors have made an effort to describe the Internet applications of things in e-commerce companies and have therefore stated the same in the study.

Gulumbe and Rahman 2017 pointed out that one of the giant company in E-commerce named as Alibaba portray the importance of using internet of things in sector. . Technology has developed enormously which makes communication easier and more accurate. Technology innovation paved the way for the Internet of Things to be popularized. The study found that the internet's effect has brought enormous progress toward exchanging knowledge across smart devices. In addition, devices such as embedded technology and RFID technology, which are commonly used for transmitting data, continue to know the real-time value of the information. Lastly, the study found that Alibaba has gained a great deal in terms of speed, precision, quality goods maintenance, timely delivery of products to customers at an appropriate time.

Sohaib et *al* 2017 stated that the internet of things has been said to link the physical object to the digital world, offering massive aids for e-commerce firms. The research was presented to disabled people. Internet of things is extremely useful for people to access their information. Healthy internet access helps to gain social benefits and economic benefits. The study showed that internet of things gives a significant benefit to people with disabilities who shop online.

### 1.3.Internet of things capability

The emergence of the Internet of Things, by adopting it in the context of organization, adds value to the information and communication technologies adopted within an organization. Borgia 2014 has already confirmed that the use of the Internet of Things paves the way for the organization to have an efficient flow of knowledge for intra-organization and inter-organization contact. Huh et al 2008 reported that variables such as knowledge sharing

followed by intra-organizational knowledge communication and inter-organizational communication have the potential to accelerate process integration. The present study focuses on the communication and exchange of knowledge viewed through the Internet of Things and has the power to accelerate the capacity between and within the organization.

### 1.4.Supply chain integration

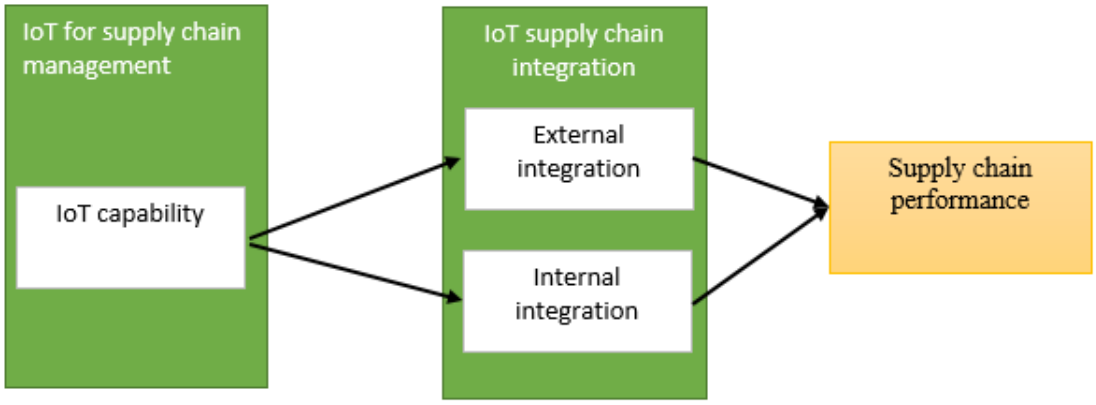
Supply chain integration described as combining inter organization and intra organisation management. By doing so, it accelerate the strategic, tactical and even business processes to make an effective and efficient flow of goods or data or funds to accelerate the customer satisfaction at lowest cost and fastest pace. (Alfalla-Luque et al 2013, Hu & Bentler 1999, Zhao et al 2011) Generally, supply chain integration classified as internal integration and external integration. Former reflects the elimination of cross-functional barriers in the enterprise through the processes to efficiently share business tasks, collaborate and organize output. External integration involves sharing, planning and collaboration with suppliers and clients between focal organizations. Integration strives mainly to fulfill consumer requirements at a higher speed and low cost, thus increasing customer value. (Näslund et al 2012).

### 1.5.Research Gap

From these studies, nobody investigates the effect of internet of things in supply chain integration on the performance of the supply chain of the E-commerce industry. Furthermore, no quantitative studies on the subject are available. The research has thus taken steps to tackle the knowledge gap by researching internet of things in India's e-commerce industry.

### 1.6.**Conceptual Framework**

The investigator developed a model of two integrations, one external integration and the other internal integration. The researcher also describes how effect of supply chain integration on supply chain performance. (Rai et al 2006, Fabbe-Costes & Jahre 2008)



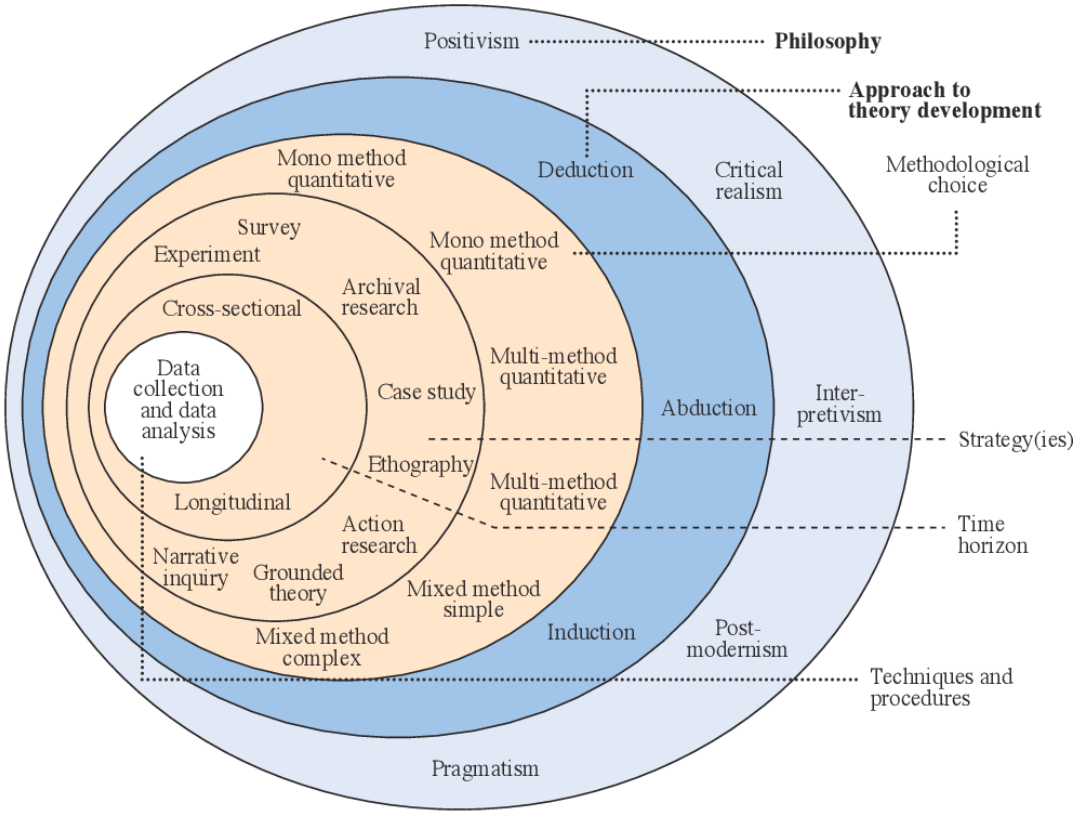

**Source: Author own conceptual framework**

# 2. RESEARCH METHODOLOGY

This section shows how the researcher performed the research methodology. It explains how the researcher has selected the correct approach to achieve the research objectives. It is necessary for the researcher to offer strong ideas on research methodology, mainly in order to reduce errors in the data analysis portion. This Chapter describes the research participants, how the system was created, ways to collect data and methods for data analysis for the whole sample.

**Research design**

It offers a model for constructing the research work. In this study, the researcher describes the design of research through research onion. (Saunder 2012).




*e 1*. Research onion[1]

Source: Research onion (Saunders, M.N. and Lewis, P., 2012)

## 2.1. Research Philosophy

The key qualities of research philosophy stated in research onion. Research philosophy shows how respondents view the world with assumptions and decide the philosophy on the basis of assumptions. There are various ideologies such as positivism, realism, interpretivism and pragmatism.

- Positivism views the universe as being strongly extrinsic. Positivism's main purpose is to provide independent generalizations in their situation and period (Crossan, F., 2003.)
- Realism says that the reality is highly independent, particularly in the state of mind and the sense of the researcher is proof of the truth behind the analysis. The research was highly appropriate based on findings and world views (House, E.R., 1991)
- Interpretivism outcome as the researcher attempts to collect laws such as generalization or rich perspectives. (Leitch, C.M., Hill, F.M. and Harrison, R.T., 2010.)
- Pragmatism is about portraying the capacity of observations to interact with the realistic general consequences.(Bryant, A., 2017)

Considering the above theory, positivism is the most appropriate theory of study since the researcher chooses to collect the data using the survey process. So the analysis is strongly correlated with positivism.

## 2.2. Research Approach

Research approach offers information on the analysis strategy's basis and offers a guide for choosing the most suitable research methods. Generally, the research methods is of two types

- Deductive approach is of constructing a theory, creating a hypothesis and developing a techniques to test it.

- Inductive approach: gathering data to create and believing a theory as a result of the research sample.

Taking account of the latter approach, inductive approach is the most successful approach for the study. As the researcher uses the data, a hypothesis is made and a result for the research question is given.

### 2.3. Research Strategy

It serves as the guide to achieve the study objective and provides a way to achieve the goals. This research approach involves numerous approaches such as discovery, case studies, action analysis, ethnography and archival study. The researcher uses the survey approach to address questions about study.

### 2.4.Choice of Method

Researcher uses a mono-approach with quantitative data used to collect at the end. The quantitative research method is used to determine the association between the variables and to identify the variable dependence effect of independent variables. (Chilean, 2006 et al.). (Saunders et al, 2016) argued in their analysis that quantitative methods are the rich approach, while selection is based on the survey process. Finally, the researcher uses quantitative methods to use statistical tools to classify the question of the analysis

### 2.5.Time Horizons

The present study is cross-sectional in nature, as the researcher has a certain amount of time to evaluate the mechanism over time. Thus, cross sectional is strongly applicable for data collection.

### 2.6. Techniques and Procedures

Data analysis is the inner most layer of the onion. The researcher plans to use SPSS software to implement such methods, such as descriptive statistics, reliability test, regression, and correlation.

## 2.7. Population

The study considers the population to be E-commerce companies in India with Internet of Things in Supply Chain Management

## 2.8.Samples

Respondents picked out based on Iot application of E-commerce companies as well as logistics providers in India who used IoT in their organisation. The researcher gets to contact the e-commerce companies through the economic council of India and proceed the work forward. Maximum number of companies to be included for the study will be 25 for E-commerce companies and 15 belong to logistic providers and hence there is a chance to get a decent suitable response rate. Because its fixed by sekaran (2015) that minimum number of respondents should be 30. But for our study 39 respondents taken into account. Considering responsible person in the company will be supply chain manager of E-commerce company and Manager of IT in logistic providers company considered.

## 2.9.Measurement of items

The researcher receives support from the authors listed below in developing the questionnaire. The things listed below are calculated using five-point likert scale.

| **Particulars** | **Variables** | **Authors** |
|---|---|---|
| 1 | Internet of things capability | Lee and Lee 2015 |

| | | |
|---|---|---|
| 2 | Integration | Huo 2012<br>Rai et al 2006 |
| 3 | Supply chain performance | Schoenherr and Swink 2012 |

## 2.10. Hypothesis Framed

- Internet of things have a strong positive impact on external integration of E-commerce companies in India
- Internet of things have a strong positive effect on internal integration of E-commerce companies in India
- Internet of things on external integration have a strong impact on supply chain performance
- Internet of things on internal integration have a strong effect on supply chain performance

# 3. DATA ANALYSIS

Data analysis is considered to be an integral part of the research. (Marshall and Rossman 1990) have argued that the analysis of the data is a process of giving appropriate meaning to the opinion of the respondents in the survey. Generally, the researcher finds it difficult to gather the data because it's a complex process. In addition, it takes a considerable amount of time to display the data in the form of tables and figures. The purpose of the Data Analysis section is to find answers to research questions. (Flynn et al 2010). The results of the present chapter are presented in the form of three sections below.

- In the first section, the researcher presents the results using the percentage analysis method. The objective of using this technique is to show the results of the demographic attributes of respondents who are members of Indian e-commerce companies
- In the second section, the researcher presented the results using the average method. The study has both dependent and independent variables and their central tendency is shown in this section.
- In the third section, the researcher displays the provision of attributes using the descriptive statistic method. This method is considered to be the basic form of statistics. The researcher defines variables using mean and standard deviation values.

## 3.1.Percentage method

Percentage analysis was primarily considered to be the basic statistical tools. The aim of the tools in the study is to define the demographic characteristics of the samples, such as age , gender, education and work experience of the respondents. Distribution of demographic attributes of respondents indicated below.

**Table 3. 1 showing the frequencies demographic characteristics**

| Particulars | Frequency | Percent |
|---|---|---|

| | | | |
|---|---|---|---|
| **Age** | Less than 25 years | 9 | 23.1 |
| | 25 to 35 years | 14 | 35.9 |
| | 36 to 45 years | 10 | 25.6 |
| | Above 45 years | 6 | 15.4 |
| **Gender** | Male | 19 | 48.7 |
| | Female | 20 | 51.3 |
| **Education qualification** | Undergraduates | 6 | 15.4 |
| | Bachelor's degree | 14 | 35.9 |
| | Master's degree | 12 | 30.8 |
| | Others | 7 | 17.9 |
| **Work experience** | Less than 3 years | 9 | 23.1 |
| | 3 to 6 years | 14 | 35.9 |
| | 6 to 9 years | 6 | 15.4 |
| | Above 9 years | 10 | 25.6 |
| **Total** | | **39** | **100.0** |

Table 3.1 shows the demographic characteristics of the respondents. The respondents were 39 employees of e-commerce companies in India. Of these, more than half of respondents are aged 25-35 years (35.9 per cent) while 25.6 per cent are aged 36-45 years, 15.4 percent are above 45 years and 23.1% are aged below 25 years. Of the sample 39, 48.7 per cent were male and 51.3 per cent were female. More than half of the respondents had a bachelor's degree followed by 30.8% of Master's degree holders and an equal distribution of undergraduates and others (17.9%). Of the study subjects, 35.9 percent had worked in the organization for 3-6 years, 25.6 percent had been in the organization for more than 9 years, 23.1 percent had been in the organization for less than 3 years, and 15.4 percent had been in the organization for 6-9 years.

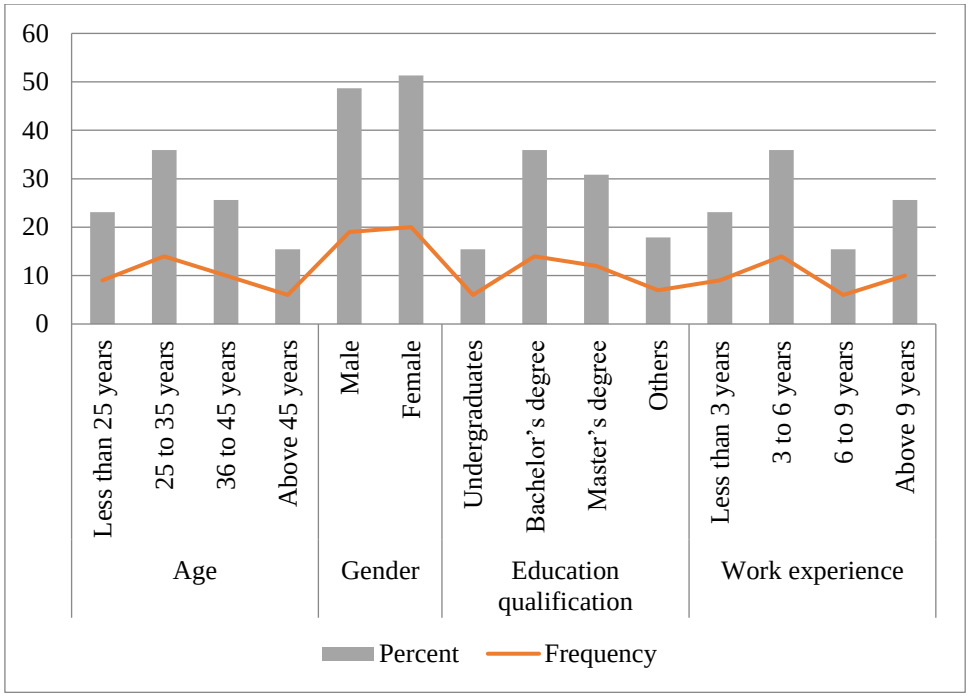



**Figure 1: Demographic profile of respondents**

**Table 3. 2 showing the frequencies of internet of things**

| Particulars | | Frequency | Percentage |
|---|---|---|---|
| Awareness of Internet of things | | 39 | 100.0 |
| Usage of Internet of things | | 39 | 100.0 |
| **Years of using internet of things** | Less than a year | 15 | 38.5 |
| | 1 to 3 year | 11 | 28.2 |
| | More than 3 years | 13 | 33.3 |
| **Equipment to be used in internet of things** | Internet based logistics equipment | 5 | 12.8 |
| | Internet based devices | 12 | 30.8 |
| | Internet based fixed devices | 8 | 20.5 |
| | Real time streaming analytics via Internet of things | 5 | 12.8 |
| | Data analytics using Internet of things | 4 | 10.2 |
| | Image recognition through Internet of things | 3 | 7.7 |

| | | | |
|---|---|---|---|
| | Others | 2 | 5.1 |
| **Sectors** | Electronics | 8 | 20.5 |
| | Apparels | 12 | 30.8 |
| | Home appliances | 19 | 48.7 |
| **Classification of Internet of things** | Customer to customer | 15 | 38.5 |
| | Business to customer | 10 | 25.6 |
| | Customer to business | 14 | 35.9 |
| **Experience** | Some experience | 19 | 48.7 |
| | Neutral | 10 | 25.6 |
| | Experienced | 10 | 25.6 |
| **Total** | | **39** | **100.0** |

Table 4.2 shows the frequency of information related to the Internet of Things. Of the 39 respondents, they were all aware of the Internet and their use in the organization. Of the sample respondents, more than half of respondents used it less than a year (38.5 per cent), 38.2 per cent used it between 3-5 years and 33.3 per cent used it for more than 5 years. Considering the equipment to be used on the Internet, 12.8 per cent of Internet-based devices used, 30.8 per cent of Internet-based fixed devices used, 15.4 per cent of Internet-based logistics equipment used, and 20.5 per cent of respondents using real-time streaming on the Internet of things and data analytics using the Internet of Things used, respectively. With regard to the classification of sectors, 20.5 per cent of those involved in electronics, 30.8 per cent in apparel and 48.7 per cent in household appliances. However, the Internet classification of goods based on supply indicated that 38.5 per cent of respondents were customers to consumers, 25.6 per cent were customers to customers, and 35.9 per cent were customers to businesses. Finally, experience in using the Internet of Things has shown that 48.7 per cent of respondents with some experience and an equal distribution of 25.6 per cent remain neutral and experienced.

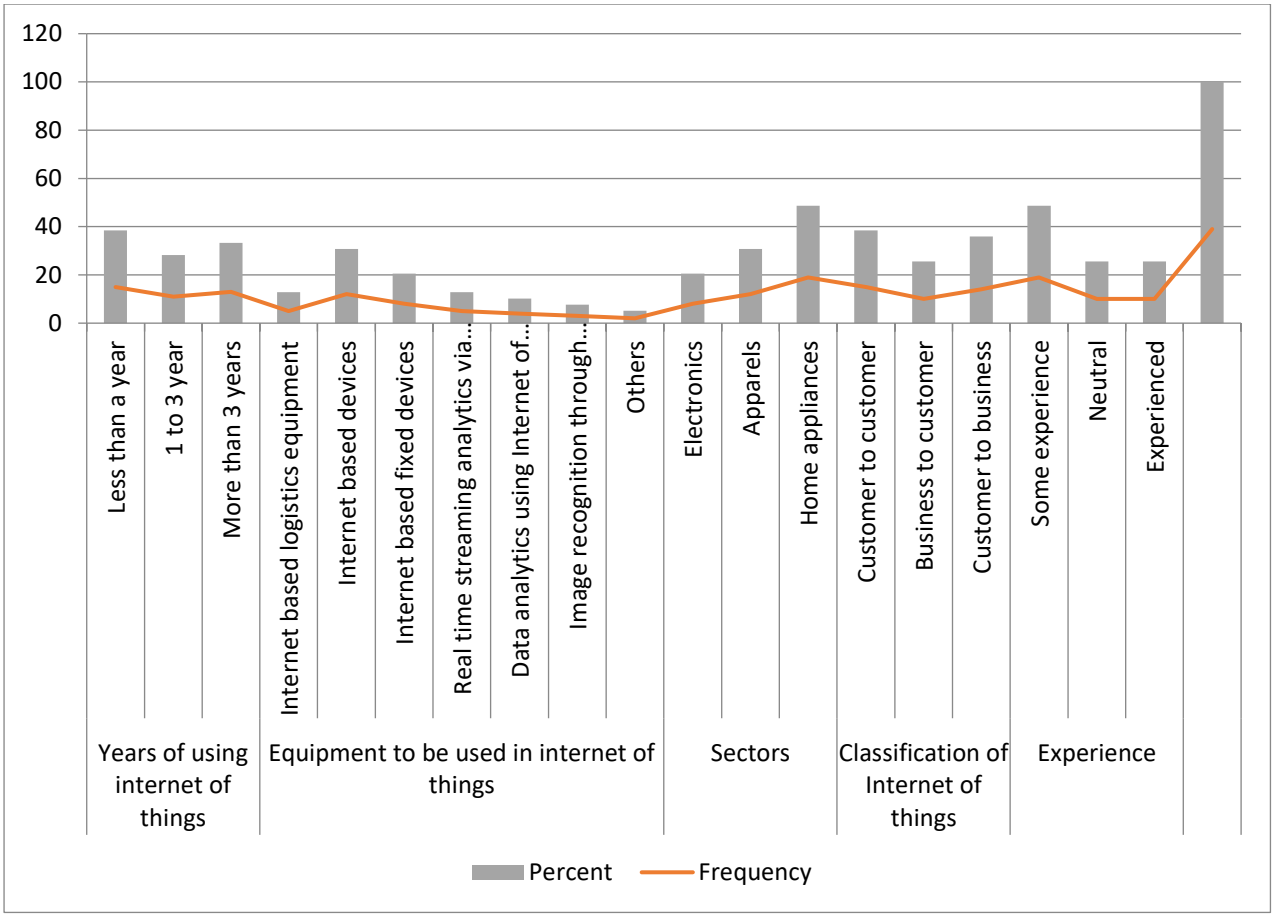



**Figure 2: Internet of things**

### 3.2.Average mean

The researcher shall use average mean analysis for both dependent and independent variables. In addition, the researcher evaluates the outcome on the basis of the E-commerce product sectors. Average mean depicts the distribution center of gravity. In simple terms, it is stated as an average of all the values stated in a particular distribution. In this study, the researcher is keen to classify e-commerce products based on electronics, followed by apparel and home appliances.

**Table 3. 3 showing the average mean of Internet of things capability based on sectors**

| Particulars | Electronics | Apparels | Home appliances |
|---|---|---|---|
| In E-commerce, Internet of things offers the identification of individual item | **3.04** | **2.98** | **2.74** |
| In E-commerce, Internet of things defines the unit level as a package or box or as a pallet | **2.85** | **2.85** | **2.23** |
| E-commerce can be monitored easily using supply chain entities. People observed using data | **2.79** | **2.34** | **2.69** |
| In E-commerce, Internet of things helps you to quantify events, processes or environmental conditions | **2.54** | **2.82** | **3.01** |
| It facilitates to direct supply chain remotely | **3.5** | **3.87** | **2.92** |
| It assists in making an independent decision on supply chain activities | **2.73** | **3.47** | **2.83** |
| It offers real time information on managing supply chain activities | **2.69** | **3.01** | **2.79** |
| It offers up to date information regarding supply chain activities | **2.94** | **2.6** | **2.9** |
| It offers huge data volumes through data analytics | **2.9** | **3.35** | **2.60** |
| Data management, tactical and strategic decision making | **2.8** | **2.33** | **2.48** |
| The internet of things in ecommerce promotes | **3.14** | **2.74** | **2.87** |

| | | | |
|---|---|---|---|
| decision-making within the supply chain. | | | |
| Internet of ecommerce issues strengthens coordination and cooperation between operators | **3.45** | **2.79** | **2.47** |

Source: Primary Data

Table 3.3 displays the average capacity of internet value of capability of items. This shows that the highest mean value of electronic is 3.5 for this facilitates to direct supply chain remotely whereas the lowest value for electronic is 2.54 for E-commerce, Internet of things helps you to quantify events, processes or environmental conditions. The highest mean value of Apparels is 3.87 to facilitate to direct supply chain remotely and the lowest value is 2.34 for E-commerce can be monitored easily using supply chain entities. People were often caught using data and making decisions based on data analysis, both tactical and strategic. For Home appliances the highest mean value is 3.01 for E-commerce, Internet of things helps you to quantify events, processes or environmental conditions and the lowest value is 2.23 for E-commerce, Internet of things defines the unit level as a package or box or as a pallet.

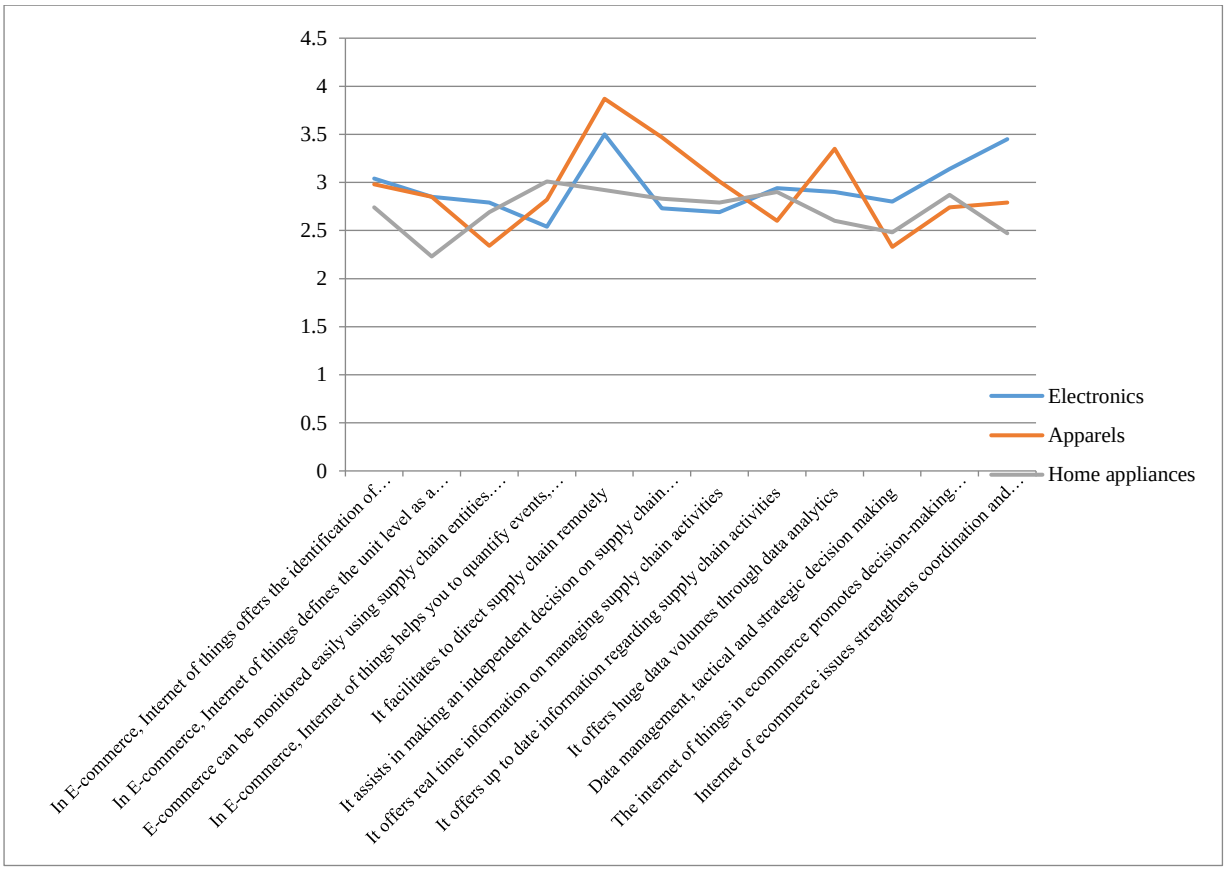



**Figure 3: Internet of things capability**

**Table 3. 4 showing the average mean of Supplier integration based on sectors**

| Particulars | Electronics | Apparels | Home appliances |
|---|---|---|---|
| Internet of things in Ecommerce enhances information exchange with Ecommerce suppliers. | **2.59** | **2.93** | **2.42** |
| It Establish a quick ordering of Ecommerce inventory from our suppliers. | **2.72** | **2.98** | **2.76** |
| It makes a strategic plan and adopt the procurement process in collaboration with our suppliers. | **3.10** | **2.67** | **2.96** |
| It Stabilize procurement with our suppliers. | **3.21** | **2.75** | **2.81** |
| Share real-time demand forecasts of E-commerce products with our suppliers. | **3.0** | **2.78** | **3.14** |
| Improve strategic partnerships with Ecommerce suppliers. | **3.67** | **3.16** | **3.57** |
| It assist the suppliers in enhancing their processes to better meet our needs. | **3.42** | **3.18** | **3.03** |
| It Improve the account payable processes for suppliers. | **3.1** | **3.19** | **2.89** |
| It improve the transport/logistics processes of logistics partners to deliver orders just in time. | **2.33** | **2.98** | **2.76** |

Source: Primary Data

Table 3.4 shows the integration of suppliers. It can be noted that the highest mean electronics value is 3.67 to improve strategic partnerships with Ecommerce suppliers and the lowest mean value is 2.33 to improve the transport/logistics processes of logistics partners to deliver orders just in time. The highest mean value of apparels is 3.19 to Improve the account payable processes for suppliers. In order to enhance strategic partnerships with E-Commerce suppliers, the highest mean value of home appliances is 3.57 for Improve strategic partnerships with Ecommerce suppliers and the lowest value is 2.42 for the Internet of things in Ecommerce enhances information exchange with Ecommerce suppliers.

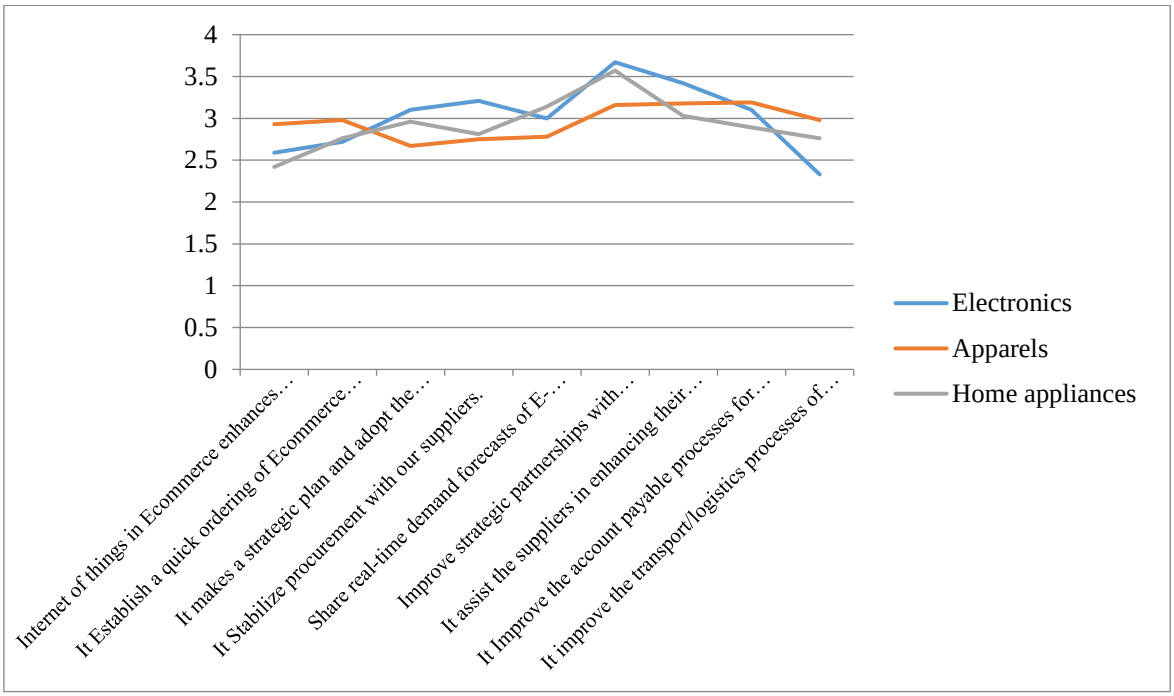



**Figure 4: Supplier integration**

**Table 3. 5 showing the average mean of Customer integration based on sectors**

| **Particulars** | **Electronics** | **Apparels** | **Home appliances** |
|---|---|---|---|
| In E-commerce, Internet of things stuff accelerates the integration among the internal functions | **2.94** | **3.16** | **3.07** |
| Internet of things plays a key role in improving real time communication. It provides a connection among the internal functions of the organization | **2.68** | **2.91** | **3.01** |
| Making a strategic plan and adopting internal processes through a collaboration with cross functional team. | **2.87** | **2.13** | **2.92** |
| It is highly useful in forecasting demand and uses it as a cross functional team | **2.78** | **3.12** | **3.12** |
| It strengthens inventory management by connecting a cross functional team | **2.7** | **2.17** | **2.8** |

| | | | |
|---|---|---|---|
| Internet of things advances the real time searching the inventory level of E-commerce products | **2.78** | **2.56** | **2.82** |
| It enhances the logistics data searching for operating E-commerce items | **2.73** | **3.12** | **2.52** |
| It hires to strengthen the processes through cross functional team | **2.98** | **2.73** | **3.0** |
| It improves the replenishment of shop floor shelves for E-commerce | **2.72** | **3.57** | **2.71** |
| It eliminates stocks in shop floor shelves | **2.82** | **2.93** | **3.67** |

Source: Primary Data

Table 3.5 shows the customers integration based on sectors. It can be observed that the highest mean value from Electronics is 2.98 for the hires to strengthen the processes through cross functional team and the lowest mean value is 2.68 for the Internet of things plays a key role in improving real time communication. It provides a connection among the internal functions of the organization. The highest mean value of apparels is 3.57 for improves the replenishment of shop floor shelves for E-commerce and the lowest value is 2.13 for making a strategic plan and adopting internal processes through a collaboration with cross functional team. The highest household appliances mean value is 3.67 to eliminate stocks in shop floor shelves and the lowest value is 2.52 to enhance the logistics data searching for operating E-commerce items.

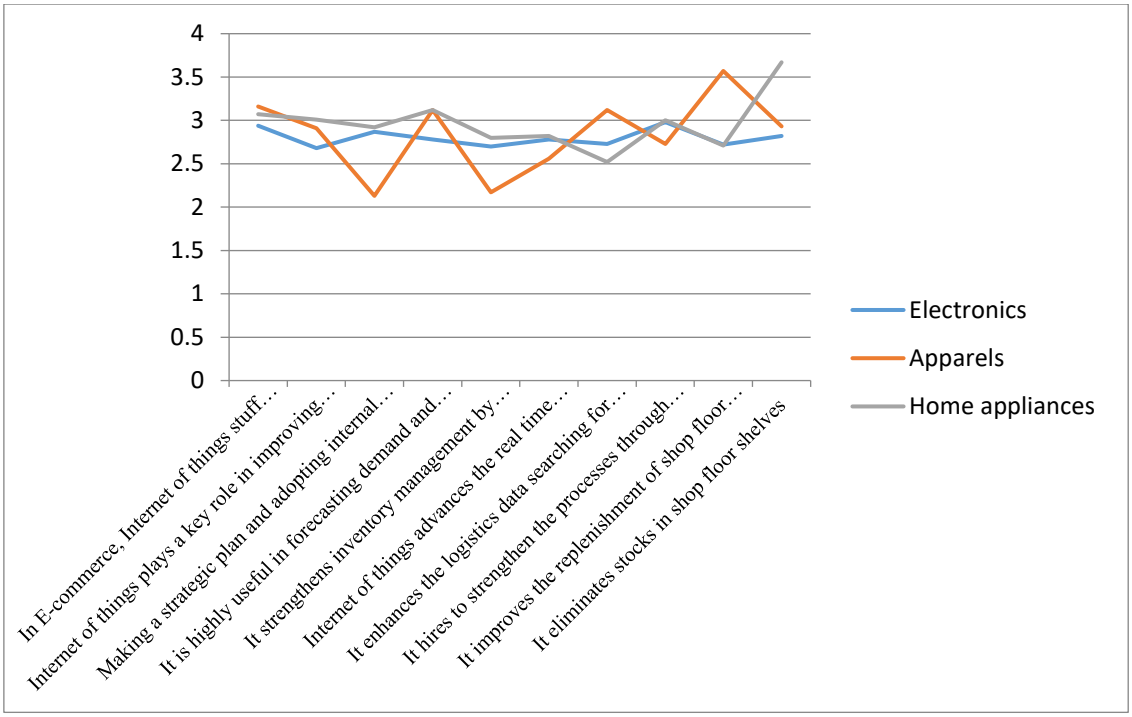



**Figure 5: Customer integration**

**Table 3. 6 showing the average mean of Supply chain performance based on sectors**

| **Particulars** | **Electronics** | **Apparels** | **Home appliances** |
|---|---|---|---|
| In E-commerce, internet of things improves the product quality | **3.89** | **2.82** | **2.93** |
| Internet of things enhance delivery efficiency through enhancing supply chain performance | **2.86** | **2.99** | **3.6** |
| Internet of things assist the business to make deliveries without errors which accelerate supply chain performance | **3.03** | **2.89** | **2.31** |
| Internet of things accelerates flexibility in supply chain in terms of volume, identify the blends and make an instant responds to product changes made in E-commerce products on time | **2.87** | **2.79** | **2.98** |
| Internet of things assist in diminishes the cash to cash period time in supply chain activities | **2.75** | **2.7** | **2.24** |

| | | | |
|---|---|---|---|
| It have the power to reduce the total supply chain management cost | **2.56** | **2.67** | **2.43** |
| Reduces the cost of goods sold in E-commerce products which improves the supply chain performance | **3.04** | **2.64** | **3.57** |
| It improves the value added productivity in terms of employees | **2.76** | **3.87** | **3.0** |

Source: Primary Data

Table 3.6 shows the supply chain performance. The highest mean electronics value is 3.89 for In E-commerce, internet of things improves the product quality and the lowest mean value is 2.56 because it has the power to reduce the total supply chain management cost. Apparels maximum mean value is 3.87 because it improves the value added productivity in terms of employees and the lowest value is 2.64 because it reduces the cost of goods sold in E-commerce products which improves the supply chain performance. The maximum mean value of household appliances is 3.6 Internet of things enhance delivery efficiency through enhancing supply chain performance and 2.24 for Internet of things assist in diminishes the cash to cash period time in supply chain activities.

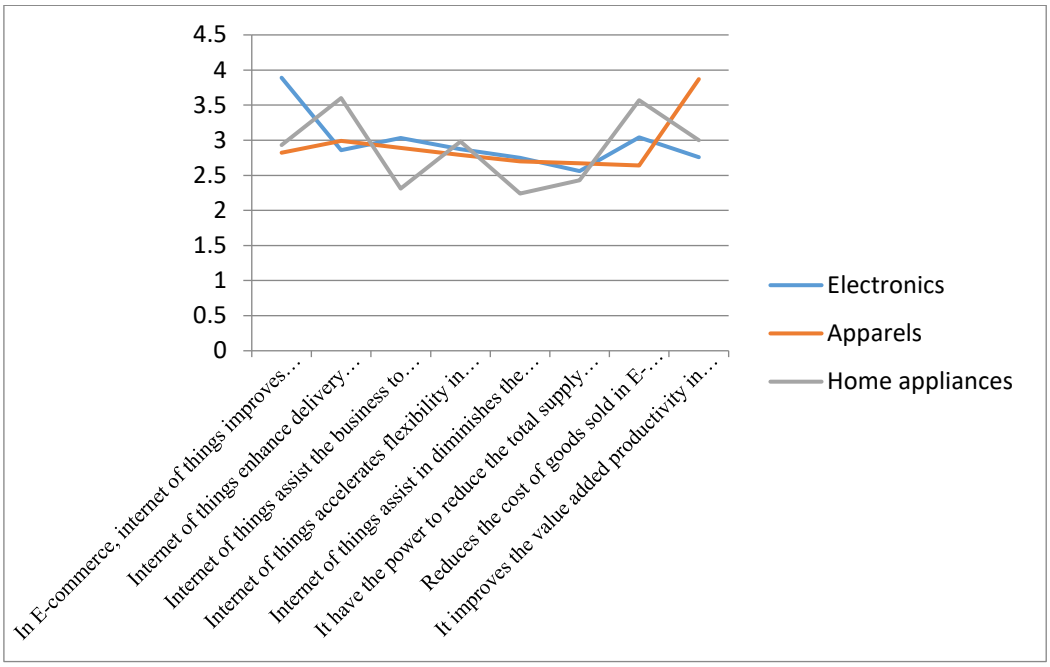



**Figure 6: Supply chain performance**

### 3.3.Descriptive statistics

The researcher uses the descriptive analysis to define independent and dependent variables using the information requirements. In other words, the researcher presents the descriptive result using simple sample summaries. The study considers independent attributes, such as the integration of suppliers and the internet, of the capabilities and integration of customers. Supply chain performance is considered to be a dependent variable.

**Table 3. 7 showing descriptive statistics of independent variables and dependent variables**

| | Mean | Std. Deviation |
|---|---|---|
| Internet of things capability | **3.0125** | **.53281** |
| Supplier integration | **2.7891** | **.59834** |
| Customer integration | **3.2943** | **.45732** |
| Supply chain performance | **3.1834** | **.49873** |

Descriptive analysis applied in the study to identify the data prerequisites. It sets out simple sample summaries. In this section, the mean and standard deviation of both independent variables, i.e. the Internet of things capability, supplier's integration and customers integration and dependent variable to be supply chain performance.

# 4. IMPACT OF INTERNET OF THINGS ON SUPPLY CHAIN PERFORMANCE OF E-COMMERCE COMPANIES IN INDIA

In this section, the researcher is interested in identifying the relationship between variables by means of a correlation analysis, while the impact by means of a regression analysis as described in the following section

- Correlation outcome for dependent and independent variables discussed in the first section. Besides, it shows the association among dependent and independent variables used in the study.
- The second section contains the regression analysis outcome. The objective of using the tools is to find out the impact of independent variable on the dependent variable.

## 4.1.Correlation

The researcher utilizes the correlation as the one of the tools to find out the association among variables. The tool have the capability to express the complexity of the relationship exist among the variables. In this section, the researcher exhibits the correlation outcome for dependent variable and independent variable. Further, how supplier and consumer integration have an association with the supply chain performance.

Table 4.1 shows the statistical views which are intended to define the relationship between the response variables and the performance of the supply chain. This table examines the relationship between individual, independent and dependent factors.

The above table shows that a relative positive correlation, i.e. 0.061, is obtained by the coefficient of interaction between the Internet of things capability and the performance of the supply chain. It has a value of 0.000 below 0.005 and is considered important. It therefore

opposes the null hypothesis that "there is no relationship between the Internet of Things and the performance of the supply chain" and embraces alternative hypotheses.

**Table 4. 1showing the results of bivariate correlation between Internet of things in supply chain management and supply chain performance**

| Particulars | Internet of things capability | Supplier integration | Customer integration | Supply chain performance |
|---|---|---|---|---|
| **Internet of things capability** | **1** | **.034 (.000)** | **.192 (.000)** | **.082 (.000)** |
| **Supplier integration** | | **1** | **.005 (.000)** | **.221 (.000)** |
| **Customer integration** | | | **1** | **.075 (.000)** |
| **Supply chain performance** | | | | **1** |

Source: Primary Data

From the above table it shows that the variable of supplier integration, it can be seen from the table above that a positive correlation, i.e. 0.221, has been achieved by the coefficient of correlation between supplier integration and supply chain performance. It has a sensory value of 0.000, which is less than 0.005, and therefore contradicts the null hypothesis that "there is no link between supplier integration and supply chain performance" and supports an alternative hypothesis.

As for the last variable of customer integration, the above table shows that a positive correlation, i.e. 0.075, was obtained by the coefficient of correlation between customer integration and supply chain performance. It has a sensory value of 0.000, which is less than 0.005, and therefore contradicts the null hypothesis that "there is no link between customer integration and supply chain performance" and supports an alternative hypothesis.

### 4.1.1. Summary of hypothesis

**Table 4. 2 showing the summary of hypothesis using correlation test**

| Particulars | Hypothesis | Outcome |
|---|---|---|

| | | |
|---|---|---|
| Correlation among Internet of things capability and supply chain performance | Internet of things have a strong positive relationship with supply chain performance | S |
| Correlation among Supply chain integration and supply chain performance | Supply chain integration have a strong positive relationship with supply chain performance | S |
| Correlation among Customer integration and supply chain performance | Customer integration have a strong positive relationship with supply chain performance | S |

**(S represents significant)**

### 4.2.Regression

The researcher will demonstrate the impact of independent, dependent variable assessments using a regression analysis. It is used only if there is more than one independent variable, but at the same time it should have one dependent variable. Similarly, our study has attributes such as supply chain integration followed by the Internet of Things Capacity and customer integration as independent variables and supply chain performance as dependent variables.

**Table 4.3 depicts general linear regression showing the impact of Internet of Things determinants on supply chain performance**

| Particulars | R square | Beta | F | Sig |
|---|---|---|---|---|
| Effect of Internet of things capability on supply chain performance | **.007** | **.061** | **.136** | **.000** |
| Effect of Supply chain integration on supply chain performance | **.038** | **.174** | **.465** | **.002** |
| Effect of Customer integration on supply chain performance | **.038** | **.070** | **.465** | **.681** |

**Internet of things capability and supply chain performance**

From the regression analysis, the coefficient of determination is 0.007 which indicates that 0.7% influence of internet of things capability on supply chain performance

R square value is 0.007 which means that there is only 0.7% impact of Internet of things capability and supply chain performance alternatives. The P value from the Anova table is 0.000 which is lesser than 0.05 which indicates that regression model statistically predicts the dependent variable and is reliable. From the Analysis of variance it makes clear that F statistic as 0.136 and the significance level is .000 which is lesser than 5% level of significance and hence it shows high level of significance. Thus null hypothesis stating "There is no influence of Internet of things capability and supply chain performance" rejected and alternate hypothesis accepted. It is observed that beta value to be 0.061 and p value is 0.000 which is lesser than 5% level of significance. It is concluded that there is a strong positive influence of Internet of things capability and supply chain performance.

**Supply chain integration and supply chain performance**

R square value is 0.038 which means that there is only 3.8% impact of Supply chain integration and supply chain performance alternatives. The P value from the Anova table is 0.000 which is lesser than 0.05 which indicates that regression model statistically predicts the dependent variable and is reliable. From the Analysis of variance it makes clear that F statistic as 0.465 and the significance level is .002 which is lesser than 5% level of significance and hence it shows high level of significance. Thus null hypothesis stating "There is no influence of Supply chain integration and supply chain performance" rejected and alternate hypothesis accepted. It is observed that beta value to be 0.174 and p value is 0.000 which is lesser than 5% level of significance. It is concluded that there is a strong positive influence of Supply chain integration and supply chain performance.

**Customer integration and supply chain performance**

R square value is 0.038 which means that there is only 3.8% impact of Customer integration and supply chain performance alternatives. The P value from the Anova table is 0.000 which is lesser than 0.05 which indicates that regression model statistically predicts the dependent variable and is reliable. From the Analysis of variance it makes clear that F statistic as 0.465 and the significance level is .681 it not shows high level of significance. Thus, null hypothesis stating "There is a influence of Customer integration and supply chain performance" rejected and alternate hypothesis accepted. It is observed that beta value to be 0.070 and p value is 0.681 which is greater than 5% level of significance. It is concluded that there is no strong positive influence of Customer integration and supply chain performance.

### 4.2.1. Summary of hypothesis

**Table 4. 4 showing the summary of hypothesis using regression analysis**

| **Particulars** | **Hypothesis** | **Outcome** |
|---|---|---|
| Internet of things capability and supply chain performance | Internet of things capability have a positive impact on supply chain performance | Significant |
| Supply chain integration and supply chain performance | Internet of things on supply chain integration have a positive impact on supply chain performance | Significant |
| Customer integration and supply chain performance | Internet of things on customer integration have a positive influence on supply chain performance | Insignificant |

# 5. CLASSIFICATION OF SECTORS AND ITS IMPACT OF INTERNET OF THINGS ON SUPPLY CHAIN PERFORMANCE

In this chapter, the researcher evaluates the results on a sector-based basis. For authors, sectors such as apparel, home appliances and electronics have been taken into account.

- The first section is to provide the outcome of the Kruskal Wallis test. The main purpose of the test is to determine whether there are differences. If so, how it actually differs from sector to sector.
- The second section presents the results using the Mann Whitney U test. The main purpose of the test is to determine whether the samples are derived from the sample population.

## 5.1.Kruskal Wallis test

It is a non-parametric test to test whether the samples originate from the same distribution. It is also used to compare variables that are independent and not related. The result is that whether one of the samples differs from the other samples. To do so, the researcher's assumption as Internet of Things in Supply Chain Management, internet of things in Supply Chain Integration and Supply Chain Performance differs between Electronics, apparels and home appliances of e-commerce companies in India.

From the table, it makes clear that the kruksal wallis test classified based on supply made by the E-commerce companies in India. From the mean rank, it is found that highest mean rank value seen in home appliances i.e. 24.77 for internet of capability and supplier integration.

**Table 5. 1 showing the Mean rank table to determine the impact of internet of things on supply chain performance based on sectors**

| Particulars | Mean rank |
|---|---|

| | Apparels | Home appliances | Electronics |
|---|---|---|---|
| Internet of capability | 19.76 | 25.38 | 17.83 |
| Supplier integration | 21.46 | 21.74 | 20.61 |
| Customer integration | 19.24 | 17.35 | 29.35 |
| Supply chain performance | 22.34 | 21.78 | 19.67 |

Mean rank stated that internet of things capability for home appliance is 25.38 while apparels is 19.76 and electronics is 17.83. Considering supplier integration for apparel is 21.46, home appliances is 21.74 and electronics is 20.61. Customer integration for apparels is 19.24, home appliances is 17.35 and electronics is 29.35. Finally, supply chain performance for apparels is 22.34, home appliances is 21.78 and electronics is 19.67.

| Particulars | Chi-square value | Sig. |
|---|---|---|
| Internet of things | 3.785 | 0.001 |
| Supplier integration | 0.109 | 0.004 |
| Customer integration | 6.271 | 0.003 |
| Supply chain performance | 0.419 | 0.001 |

The above table stated that internet of things capability secured chi-square value as 3.785 and p value is 0.001. Supplier integration secures 0.109 as chi-square value and p value as 0.004. Customer integration secures 6.271 as chi-square value and p value is 0.003 and at last supply chain performance is 0.419 and p value is 0.001. All the variables secured significance value is lesser than 5% level of significance. Hence all the variables are statistically significant. The table exhibited that the influence of internet of things capability, integration of suppliers and customers vary based on supply chain performance. From the mean ranking, it makes clear that internet of things in supply chain management is higher for home appliances but a moderate supply chain performance.

### 5.2.Mann Whitney u test

#### 5.2.1. Mann whitney U test to compare the apparels with home appliances

**Table 5. 2 showing the mean rank to compare the variables based on sectors**

| Particulars | Apparels | Home appliances |
|---|---|---|
| Internet of things capability | 14.23 | 18.65 |
| Supplier integration | 16.32 | 14.79 |
| Customer integration | 19.36 | 14.32 |
| Supply chain performance | 18.47 | 15.68 |

Mean rank stated that internet of things for apparels is 14.23 and home appliances is 18.65. Considering supplier integration secures 16.32 for apparels and 14.79 for home appliances, customer integration for apparels is 19.36 and home appliances is 14.32 and at last supply chain performance for apparels is 18.47 and 15.68 for home appliances. Internet of things in supply chain management to be higher in home appliances whereas integration to be higher in apparels.

**Table 5. 3 showing the test statistics of Mann Whitney U test Apparels compared it with home appliances**

| Particulars | Mann Whitney U | Wilcoxon W | Z | Sig. |
|---|---|---|---|---|
| Internet of things | 62.000 | 156.00 | -1.728 | 0.000 |
| Supplier integration | 87.500 | 182.50 | -0.161 | 0.009 |
| Customer integration | 81.500 | 178.50 | -0.627 | 0.000 |
| Supply chain performance | 94.500 | 191.50 | 0.000 | 0.000 |

From the table, it makes clear that the significance values of internet of things capability to be 0.000. Supplier integration secures 0.009, customer integration and supply chain performance secures 0.000. P values are lesser than 0.005 and hence it concludes that the variables differs based on supply made by E-commerce companies. It is having a significant impact on supply chain performance.

### 5.2.2. Mann Whitney u test: Comparing apparels and electronics

**Table 5. 4 showing the mean ranks for apparel and electronics**

| Particulars | Apparels | Electronics |
|---|---|---|
| Internet of things capability | 15.46 | 13.52 |

| | | |
|---|---|---|
| Supplier integration | 15.22 | 14.21 |
| Customer integration | 12.38 | 18.15 |
| Supply chain performance | 15.79 | 13.42 |

It makes clear that the mean ranks for internet of things capability for apparels is 15.46 and electronics is 13.52. Considering supplier integration for apparels is 15.22 and electronics is 14.21. Customer integration secures 12.38 for apparels and 18.15 for electronics and at last supply chain performance for apparels is 15.79 and electronics is 13.42. Finally it concludes that the internet of things on supply chain management to be higher in apparels and have a highest supply chain performance. Considering integration, Electronics s have a higher value but lesser supply chain performance.

**Table 5. 5 showing the test statistics for apparel and electronics**

| Particulars | Mann Whitney U | Wilcoxon W | Z | Sig. |
|---|---|---|---|---|
| Internet of things | 75.00 | 166.00 | -0.490 | 0.004 |
| Supplier integration | 77.50 | 168.50 | -0.361 | 0.000 |
| Customer integration | 50.50 | 141.50 | -1.748 | 0.000 |
| Supply chain performance | 69.50 | 160.50 | -0.775 | 0.000 |

From the table, it makes clear that the significance values of internet of things capability to be 0.004, supplier integration and customer integration to be 0.000 and supply chain performance to be 0.003. Therefore, the variables values are lesser than 0.005 and all the values are statistically significant.

### 5.2.3. Mann Whitney u test: Comparing home appliances of INTERNET OF THINGS with electronics sector

**Table 5. 6 showing the mean ranks for Home appliances and electronics**

| Particulars | Home appliances | Electronics |
|---|---|---|
| Internet of things capability | 17.82 | 12.36 |
| Supplier integration | 15.38 | 15.21 |

| | | |
|---|---|---|
| Customer integration | 11.21 | 19.34 |
| Supply chain performance | 14.98 | 14.89 |

Mean ranks for internet of things for home appliances is 17.82 for home appliances whereas 12.36 for electronics. Supplier integration for home appliances is 15.38 whereas 15.21 for electronics. Customer integration for home appliances is 11.21 whereas 19.34 for electronics and at last supply chain performance for home appliances is 14.98 whereas 14.89 for electronics. Finally, it concludes that home appliances have a highest value of internet of things in supply chain management and supply chain performance. Conversely, integration to be higher in electronics but lesser performance noticed among E-commerce companies in India.

**Table 5. 7 showing the test Statistics for home appliances of internet of things with electronics sector**

| Particulars | Mann Whitney U | Wilcoxon W | Z | Sig. |
|---|---|---|---|---|
| Internet of things | 51.0 | 142.0 | -1.722 | 0.004 |
| Supplier integration | 80.5 | 171.5 | -0.206 | 0.000 |
| Customer integration | 37.0 | 128.0 | -2.451 | 0.000 |
| Supply chain performance | 78.5 | 169.50 | -0.310 | 0.000 |

It makes clear that the significance value for internet of things capability have 0.01 while supplier integration secures 0.000 followed by customer integration earns significance value is 0.002 and supply chain performance is 0.000. All the variables are statistically significant and the values differ based on supply made by E-commerce companies in India.

# 6. EMPIRICAL FINDINGS

Demographic attributes like age, gender, education qualification and work experience assessed using percentage analysis.

- Age: Highest number of respondents (35.9%) between the age categories of 25-35 years. Consequently, 25.6% of between the age category of 36-45 years, 15.4% of are above 45 years of age.
- Gender stating that 61.5% of respondents are female whereas 38.5% of respondents are male.
- Education qualification stating that 35.9% of respondents are bachelors, 30.8% of are holding masters degree, 17.9% of holding others qualification and 15.4% of are undergraduates.
- Work experience depicts that 35.9% of respondents having work experience of 3-6 years while 25.6% of having more than 9 years of experience followed by 23.1% of having less than 3 years and 15.4% of between 6-9 years of experience.

Other attributes like awareness, usage and experience of using internet of things assessed using percentage analysis method.

- It observed that the maximum number of respondents are having awareness of internet of things to be used in the organization. Majority of the respondents aware of using internet of things in the organization.
- Years of using internet of things stating that 38.5% of using it for less than a year while 33.3% of using it for more than 3 years and at last 28.2% of between 1-3 years.
- Usage of equipment stating that 15.4% of using it for internet based logistics equipment while 28.2% of using internet based devices, 17.9% of using internet based fixed devices followed by 12.8% of using internet of things based real time streaming analytics and internet based data analytics. Internet of things based image recognition is 7.7% and 5.1% of using other equipment's.

- Considering sectors, 20.5% of respondents are in electronics department, 30.8% of in apparels and at last 48.7% of in home appliances sector.
- Internet of things based on supply stating that 38.5% of belong to consumer to consumer, 25.% of business to customer and 35.9% of belong to customer to business.
- Experience stating that 48.7% of having some experience in using it whereas 25.6% of experienced and opined it as neutral.

Average mean value provides an outcome that

- **Internet of things capability:** Highest mean value of electronics was 3.5 for this facilitates to direct supply chain remotely whereas the lowest value for electronic is 2.54 for E-commerce, Internet of things helps you to quantify events, processes or environmental conditions. The highest mean value of Apparels is 3.87 to facilitate to direct supply chain remotely and the lowest value is 2.34 for E-commerce can be monitored easily using supply chain entities. People were often caught using data and making decisions based on data analysis, both tactical and strategic. For Home appliances the highest mean value is 3.01 for E-commerce, Internet of things helps you to quantify events, processes or environmental conditions and the lowest value is 2.23 for E-commerce, Internet of things defines the unit level as a package or box or as a pallet.

- **Supplier integration**: highest electronics mean value was is 3.5 for this facilitates to direct supply chain remotely whereas the lowest value for electronic is 2.54 for E-commerce, Internet of things helps you to quantify events, processes or environmental conditions. The highest mean value of Apparels is 3.87 to facilitate to direct supply chain remotely and the lowest value is 2.34 for E-commerce can be monitored easily using supply chain entities. People were often caught using data and making decisions based on data analysis, both tactical and strategic. For Home appliances the highest mean value is 3.01 for E-commerce, Internet of things helps you to quantify events, processes or environmental conditions and the lowest value is 2.23 for E-commerce, Internet of things defines the unit level as a package or box or as a pallet.
- **Customer integration:** the highest mean value from Electronics was 2.98 for the hires to strengthen the processes through cross functional team and the lowest mean value is 2.68 for the Internet of things plays a key role in improving real time communication. It provides a connection among the internal functions of the organization. The highest mean

value of apparels is 3.57 for improves the replenishment of shop floor shelves for E-commerce and the lowest value is 2.13 for making a strategic plan and adopting internal processes through a collaboration with cross functional team. The highest household appliances mean value is 3.67 to eliminate stocks in shop floor shelves and the lowest value is 2.52 to enhance the logistics data searching for operating E-commerce items.

- **Supply chain performance:** The highest electronics mean value **was** 3.89 for In E-commerce, internet of things improves the product quality and the lowest mean value is 2.56 because it has the power to reduce the total supply chain management cost. Apparels maximum mean value is 3.87 because it improves the value added productivity in terms of employees and the lowest value is 2.64 because it reduces the cost of goods sold in E-commerce products which improves the supply chain performance. The maximum mean value of household appliances is 3.6 Internet of things enhance delivery efficiency through enhancing supply chain performance and 2.24 for Internet of things assist in diminishes the cash to cash period time in supply chain activities

**Objective 1: To find out the association among internet of things in supply chain integration and supply chain performance**

From the correlation test, it makes clear that

- Internet of things capability and supply chain performance was highly positive and statistically significant. Correlation value is 0.061 and significant value is 0.000 which was lesser than 0.005
- Supply chain integration and supply chain performance secured value to be 0.171 and the p value is 0.000 which was lesser than 0.005. Hence, the correlation was strong positive and its statistically significant
- Customer integration and supply chain performance secured correlation value to be 0.055 and the p value was 0.000 which was lesser than 0.005. Hence the correlation was strong positive and its statistically significant.

**Objective 2: To find out how Internet of things have a significant impact on the influenced the supply chain performance of E-commerce companies in India**

Regression analysis stated outcome that the Internet of things capability have an impact of 0.4% on the Supply chain performance. Significance value was 0.000 and its lesser than 0.005 and hence its statistically significant.

**Objective 3: To find out the impact of Internet of things in supply chain integration on supply chain performance**

- Customer integration, Supplier integration, Internet of things capability explains a 3.8% impact on the Supply chain performance. All the variables were statistically significant.

Kruskal Wallis test exhibited that the home appliances secured higher mean rank for internet of things in supply chain management. It is having a moderate supply chain performance. Conversely, lower internet of things in supply chain management and higher supply chain performance. Apparels having higher integration and at the same time high performance noted.

Mann Whitney U test provided the outcome that

- Internet of things in home appliances is higher whereas integration for apparels is higher
- Internet of things in apparels is higher whereas electronics secured higher value but a very low supply chain performance.
- Home appliances secured higher value whereas electronics secured higher value for integration but a very less performance for E-commerce companies in India.

# 7. DISCUSSION AND CONCLUSION

## 7.1. Discussion

Supply chain management is considered by each organization to be the most important element. However, Supply Chain Management considers the integration of the supply chain to be an integral part of the organization. The same applies to e-commerce companies in India. In e-commerce companies, business processes, customers, suppliers with producers aligned with the help of supply chain integration. This, in turn, accelerates the performance of the supply chain of e-commerce companies in India. Similarly, other authors have already stated that there is a strong positive relationship between supply chain integration and supply chain performance. In the present study, the researcher identified, using correlation statistics, that the supply chain integration has a strong positive relationship with the performance of the supply chain. As a result, similar results can be seen in the study (Flynn et al2010, Huo, 2012).

One of the emerging technology ruining E-commerce industry is internet of things. Internet of things utilizes sensors or devices or smart phones and actuators to capture the information related to supply chain activities. Consequently, SCM captured information to be share it with the appropriate executives through internet. Moreover, it has the potential to connect things digitally and hence anyone can read, recognize, collect and even access the information through internet (Borgia 2014). In the present study, the researcher found that Internet of things capability is closely associated with the integration of suppliers and customers. The literature of (De Vass et al 2018) indicates the same result.

In addition, the Internet of Things has a direct impact on the integration of supply chains and the integration of customers. In addition, the Internet of Things has an indirect impact on the performance of the supply chain. In order to evaluate, both integrations act as a mediating variable in the study. Considering the Internet of Things as an independent variable and the performance of the supply chain as a dependent variable to determine its impact. The results of the study indicated that the Internet of Things had a positive impact on the performance of the supply chain. In addition, both Customer integration and supplier integration had a

positive and statistically significant impact on the performance of the supply chain. The result was also found in the literature of (De Vess et al 2018).

Regression analysis provided an outcome that integration of customers and suppliers has a strong effect in supply chain activities. This is possible only because of Internet of things capability. Moreover, indirect influence also possible with the usage of internet of things capability which reflects in supply chain performance. Assessing both direct and indirect impact of supply chain performance, integration act as the mediating variable for the study. Getting an assistance from the previous studies, the researcher fixed independent variable as internet of things and supply chain performance as dependent variables. Statistical tools stated outcome that internet of things has a strong positive significance on supply chain performance. Consequently, integration of suppliers and customers has a strong positive influence on supply chain performance. In additions, the variables are statistically significant. Likewise, the same findings contained in (De Vess et al 2018) the study.

From the perspective of the author, it is obvious that all independent variables on dependent variables is statistically relevant. Moreover, all the comprehensive variables used in the study have a positive effect on supply chain performance.

### 7.2.Practical implications

The study shows that the internet of things has the potential to influence the performance of the supply chain. In addition, integration has the power to alter the performance of the supply chain. Managers must therefore be more prone to E-commerce supply chain activities carried out by the manufacturer until it reaches the customer. Integrating the activities carried out through a proper link between the devices of the customers and the suppliers to a single internet platform. This medium paves the way for instant feedback from both people, modifying the activities, monitoring them properly can accelerate the performance of the supply chain.

In this study, the researcher classifies made based on E-commerce products. E-commerce product session assessed based on electronics followed by apparels and home appliances. The study finds that the internet of things in supply chain management is higher in home appliances session but a moderate performance gained in the report. So, giving more

importance to home appliances can improves the supply chain performance which in turn give more return to the organization.

The study provides policy makers with knowledge that e-commerce businesses rely more on the Internet. IoT has tremendous opportunities not only in e-commerce businesses, but also in other industries. Therefore, the use of the opportunities offers both tangible and intangible benefits.

### 7.3.Conclusion

In the current technological age, the Internet of Things is one of the most emerging technologies for accelerating supply chain activities with a proper flow of information between supply chain members. Through doing so, the Internet of things capability provides benefits to manufacturers, consumers and suppliers of e-commerce companies to boost the efficiency of the supply chain. Through the aid of internet-based computerized technology, the company saves time and money. Therefore, the researcher examines the Internet of Things and its significant two-dimensional impact. It is with consumers and the other is with manufacturers and how those measurements affect the efficiency of the supply chain. The above listed variables were evaluated using correlation, and found that the variables had a clear positive association with the output of the supply chain. In addition, the effect on supply chain efficiency was seen to be 3.8 percent influence of attributes (Internet of stuff capacity, manufacturer integration and consumer integration). However, very low correlation between the internet of things capability and the efficiency of the supply chain has been found. Therefore it is clear that the Internet of Things attributes collective of consumer and supplier integration affect the efficiency of the supply chain.

Internet of things is one of the most emergent technologies in todays technological age to speed up supply chain activities with a proper flow of data between supply chain members. By doing so, the Internet of things have the potential to extend their aids to manufacturers, customers and suppliers of e-commerce companies to improve the performance of the supply chain. With the aid of computerized internet technology, the company saves time and money. The researcher therefore assesses internet of things and its major impact based on two dimensions. One is for consumers and the other is for manufacturers and how these measurements affect the efficiency of the supply chain. The above listed variables tested

using correlation analysis and found that the variables were strongly positive association with supply chain performance. The impact on the supply chain performance was 3.8% influenced by attributes (internet of things and integration of both suppliers and customers). However, the impact between internet of things capability and supply chain efficiency was very low. Therefore it is clear that internet of things attributes collectively influence the performance of the supply chain with customer and supplier integration.

### 7.4. Scope for further research

The study restricts its reach to the integration of supply chain and customers, internet of things and the supply chain performance. In this study, the researcher considers sample size to be small to determine the large population. . However, it is very difficult to identify the large population in a lesser sample size. The researchers will therefore conduct the analysis on a very wide scale, taking into account all external supply integration, internal supply inclusion, supply chain efficiency and organizational efficiency. In this analysis, the investigator overlooked the results and activities of the organization.

### 7.5.Internet of things near future developments

From the outcome of regression analysis, the researcher gets an equation as Supply chain performances = 3.208+0.067(Internet of things capability). Considering this equation as a base, the study predicts the supply chain performance for five consecutive years.

| Observations | Predicted values |
|---|---|
| 1 | 6.198 |
| 2 | 6.416 |
| 3 | 9.842 |
| 4 | 19.902 |
| 5 | 46.656 |

From the observations, it is clear that the supply chain performance considerably gets an improvement for the next five years. Hence, it is advisable for E-commerce companies to

utilize the devices and have a good performance for their own organization. Using the aspects, not only accelerate the supply chain performance, but also accelerate the company to gain competitive advantage in the market. This in turn can reflects in the margin of the company.

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# Appendices

## Appendix 1. Questionnaire

### Demographic profile of respondents

1. Name of the participants
2. Age
    a. Less than 25 years
    b. 25-35 years
    c. 36-45 years
    d. Above 45 years
3. Gender
    a. Male
    b. Female
4. Education level
    a. Undergraduates
    b. Bachelors degree
    c. Masters degree
    d. Others
5. Designation
6. Work experience

### Organisation Prerequisites

7. Name of the organisation
8. How many employees are currently working in the organisation?
9. Have you heard of iot in your organisation?
    a. Yes
    b. No
10. Do you use Iot in your organisation?

a. Yes
b. No

11. If yes, How long have you been in the operation?
12. Which of the following equipment do you use a lot for iot?
    a. Internet based logistics equipment
    b. Internet based devices
    c. Internet based fixed devices
    d. Real time streaming analytics via iot
    e. Data analytics using iot
    f. Image recognition through Iot
    g. Others
13. Which of the following retail sector do you work for Iot in E-commerce?
    a. Electronics
    b. Apparels
    c. Home appliances
14. Whom do you supply most?
    a. Customer to customer
    b. Business to customer
    c. Customer to business
15. State your experience of using iot in your organisation?
    a. Some experience
    b. Neutral
    c. Experienced
16. Please indicate your reaction towards internet of things capability items by using five-point likert scale below

| **Particulars** | **SA** | **A** | **N** | **DA** | **SDA** |
|---|---|---|---|---|---|
| Iot in E-commerce offers to identify individual item | | | | | |
| Iot in E-commerce identify the unit level in terms of container or box or in the form of pallet | | | | | |
| E-commerce products can be easily tracked and traced using supply chain entities. Even people also captured using data | | | | | |
| Iot in E-commerce can paves the way to measure the activities or processes or environmental conditions | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| It assist to direct supply chain processes remotely | | | | | |
| It assist to make an autonomous decision regarding supply chain activities | | | | | |
| It provides a real time information on how to optimize supply chain activities | | | | | |
| It provides an UpToDate information on supply chain operation | | | | | |
| It provides a huge volume of data through data analytics | | | | | |
| Based on data analytics data, tactical and strategical decision making made | | | | | |
| Iot in ecommerce facilitates both inter and intra organizational decision making within the supply chain | | | | | |
| Iot in ecommerce strengthen the communication and cooperation among the operators | | | | | |

17. Please indicate your reaction towards supplier integration items by using five point likert scale below

| **Particulars** | **SA** | **A** | **N** | **DA** | **SDA** |
|---|---|---|---|---|---|
| Iot in E-commerce enhances information exchange with E-commerce suppliers. | | | | | |
| It Establish a quick ordering of E-commerce inventory from our suppliers. | | | | | |
| It makes a strategic plan and adopt the procurement process in collaboration with our suppliers. | | | | | |
| It Stabilize procurement with our suppliers. | | | | | |
| Share real-time demand forecasts of E-commerce products with our suppliers. | | | | | |
| Improve strategic partnerships with E-commerce suppliers. | | | | | |
| It assist the suppliers in enhancing their processes to better meet our needs. | | | | | |
| It Improve the account payable processes for suppliers. | | | | | |
| It improve the transport/logistics processes of logistics partners to deliver orders just in time. | | | | | |

18. Please indicate your reaction towards customer integration items by using five point likert scale below

| **Particulars** | **SA** | **A** | **N** | **DA** | **SDA** |
|---|---|---|---|---|---|
| Iot in E-commerce improves the integration of data among internal functions | | | | | |
| It plays a huge role in enhancing real time communication and creates a linkage between internal functions of the organization | | | | | |
| It makes a strategic plan and adopt internal processes by having a collaboration with cross functional team | | | | | |
| It makes a demand forecast and adopt it using cross functional team | | | | | |
| It enhance inventory management because iot association with cross functional team | | | | | |
| It progress the real time searching of the E-commerce inventory level | | | | | |
| It enhances real time searching of logistics related operating E-commerce products data | | | | | |
| It employs cross functional teams in process improvement | | | | | |
| It enhance replenishment of shop floor shelves of E-commerce | | | | | |
| It diminishes stock outs in the shop floor shelves | | | | | |

19. Please indicate your reaction towards supply chain performance items by using five point likert scale below

| **Particulars** | **SA** | **A** | **N** | **DA** | **SDA** |
|---|---|---|---|---|---|
| Iot in ecommerce upsurge product quality | | | | | |
| It plays a huge role in improving the delivery reliability | | | | | |
| It assist the companies to make deliveries with an absence of errors | | | | | |
| It improves supply chain flexibility in terms of volume and then mix and reaction to product changes in E-commerce | | | | | |
| It diminish the time taken for cash to cash cycle | | | | | |
| It have the power to reduce the total supply chain management cost | | | | | |
| It diminishes the cost of goods sold | | | | | |
| It improves the value added productivity in terms of employees | | | | | |

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