E-Commerce E-Commerce Supply Chain E-Commerce Supply Chain Performance Measurement- A Comparative Study of Indian E-Commerce(B2C) Industry

MASTER OF TECHNOLOGY
DISSERTATION REPORT

BY

VIKRAM BADAYA

(2013PIE5197)

DEPARTMENT OF MECHANICAL ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

JUNE 2016

A

DISSERTATION REPORT

ON

“E-Commerce E-Commerce Supply Chain E-Commerce Supply Chain Performance Measurement- A Comparative Study of Indian E-Commerce(B2C) Industry”

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF

MASTER OF TECHNOLOGY
IN
INDUSTRIAL ENGINEERING

BY

VIKRAM BADAYA
(2013PIE5197)

UNDER THE GUIDANCE OF
Prof. (Dr.) A.P.S. RATHORE

DEPARTMENT OF MECHANICAL ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

JUNE 2016

CERTIFICATE

This is to certify that the dissertation entitled **"E-Commerce E-Commerce Supply Chain E-Commerce Supply Chain Performance Measurement-A Comparative Study of Indian E-Commerce(B2C) Industry"** being submitted by **Vikram Badaya (2013PIE5197)** is a bonafide work carried out by him under my supervision and guidance, and hence approved for submission to the Department of Mechanical Engineering, Malaviya National Institute of Technology Jaipur in partial fulfillment of the requirements for the award of the degree of Master of Technology (M.Tech.) in Industrial Engineering. The matter embodied in this dissertation report has not been submitted anywhere else for award of any other degree or diploma.

Prof. (Dr.) A.P.S. Rathore
Professor,
Department of Mechanical Engineering,
MNIT Jaipur
Place: Jaipur
Dated: __ June 2016

CANDIDATE'S DECLARATION

I hereby declare that the work which is being presented in this dissertation entitled **"E-Commerce E-Commerce Supply Chain E-Commerce Supply Chain Performance Measurement-A Comparative Study of Indian E-Commerce(B2C) Industry**" in partial fulfilment of the requirements for the award of the degree of **Master of Technology (M.Tech.) in Industrial Engineering**, and submitted to the Department of Mechanical Engineering, Malaviya National Institute of Technology Jaipur is an authentic record of my own work carried out by me during a period of one year from July 2015 to June 2016 under the guidance and supervision of **Prof. (Dr.) A.P.S. Rathore** of the **Department of Mechanical Engineering, Malaviya National Institute of Technology Jaipur**.

The matter presented in this dissertation embodies the results of my own work and has not been submitted anywhere else for award of any other degree or diploma.

Vikram Badaya
(2013PIE5197)

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Prof. (Dr.) A.P.S. Rathore
Supervisor

Place: Jaipur
Dated:__ June 2016

PLAGIARISM REPORT

FILE	DISSERTATION_REPORT-FINAL-_VIKRAM_07-07-16.DOCX (1.52M)		
TIME SUBMITTED	07-JUL-2016 04:35PM	WORD COUNT	15874
SUBMISSION ID	688330374	CHARACTER COUNT	87058

E-Commerce Supply Chain Performance Measurement- A Comparative Study of Indian E-Commerce(B2C) Industry- M.Tech. Dissertation

ORIGINALITY REPORT

15%	10%	4%	10%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Malaviya National Institute of Technology Student Paper	4%
2	www.ijbmss-ng.com Internet Source	2%
3	arno.unimaas.nl Internet Source	1%
4	www.oppapers.com Internet Source	1%
5	www.softwarecatalog.info Internet Source	1%
6	Submitted to Pembroke High School Student Paper	1%

ACKNOWLEDGEMENTS

With great delight, I acknowledge my indebted thanks to my guide and mentor **Prof. Ajay Pal Singh Rathore** who has always been a source of inspiration and encouragement for me. His stimulated guidance and unwavering support always motivated me to reach out for, and achieve higher levels of excellence. This dissertation could not have attained its present form, both in content and presentation without his active interest, direction and help. I am grateful to him for keeping trust in me in all circumstances. I thank him for being big-hearted with any amateurish mistakes of mine.

I express my sincere gratitude to **Prof. G.S. Dangayach , HoD, Department of Mechanical Engineering, Prof. Rakesh Jain, Prof. Gopal Agrawal, Prof. Awadhesh Bhardwaj, Dr. M.L. Mittal** and **Dr. M.L. Meena** for their support and guidance throughout the course of study at MNIT Jaipur.

I am extremely thankful to **Dr. Gunjan Soni** for providing me with his valuable time and inputs since the inception of my studies at MNIT Jaipur. I extend my deep sense of gratitude to him for his cooperation and sharing his immense pool of knowledge.

I highly acknowledge and duly appreciate the support extended by my seniors, colleagues-friends and juniors at various industries for assistance with the collection of data for my research work. I sincerely thank all the **industry professionals** who, despite of their busy schedule, cheerfully responded to my queries and made this research task possible.

I am thankful to my senior research scholar Mr. Avanish Chauhan, and others at MNIT Jaipur for their support and guidance. I extend my heartiest thanks to my colleagues-friends for their help & support in accomplishment of this work during my stay at MNIT Jaipur.

- Vikram Badaya

ABSTRACT

India is a growing economy and in this there is significant role of online business. The online business is growing at a faster pace than others, and there are enough support system those are developing for the growth of this. The support system includes the third party logistics services, the customer support services and other services like payment, payment collection security and many more. The Supply chain challenges are the most important if someone is able to cope with these challenges the business become easier but with an increased competition in the marketplace it is very difficult for other players to make competitive advantages. This leads to shorter product life cycles for the products those were taking lot of time to coming to the market. The major challenge for the online companies are to better manage their E-Commerce Supply Chain process so that they can better control the supply and demand aspects of their product portfolio. The supply chain need to be efficient and responsive on the frontier.

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods

and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers. As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

Keywords: e-Commerce, E-Commerce Supply Chain Management, Factor Analysis, Principle Component Analysis ,E-Commerce Supply Chain Performance Management System

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

SCM	E-Commerce Supply Chain Management
FA	Factor Analysis
PCA	Principle Component Analysis
B2C	Business to Consumer
B2B	Business to Business
C2C	Consumer to Consumer
C2B	Consumer to Business
EDI	Electronic Data Exchange
CAGR	Compounded Annual Growth Rate
SCPMS	Supply Chain Performance Management System
PMS	Performance Management System
AHP	Analytical Hierarchical Process
CFA	Confirmatory Factor Analysis
SF	Success Factor

Chapter 1
INTRODUCTION

India is at the verge of changing the business technologies, the business became faster and challenging. The launch of new services for internet, the government is supporting the digital India programmed and several more schemes those are utilizing the increasing power of digital world. India is a growing economy and in this there is significant role of online business. The online business is growing at a faster pace than others, and there are enough support system those are developing for the growth of this. The support system includes the third party logistics services, the customer support services and other services like payment, payment collection security and many more. The Supply chain challenges are the most important if someone is able to cope with these challenges the business become easier but with an increased competition in the marketplace it is very difficult for other players to make competitive advantages. This leads to shorter product life cycles for the products those were taking lot of time to coming to the market. The major challenge for the online companies are to better manage their E-Commerce Supply Chain process so that they can better control the supply and demand aspects of their product portfolio. The supply chain need to be efficient and responsive on the frontier. Investors and Venture capitalists (VC) and private equity players have demonstrated their intense faith in the growth of e-Commerce in India. This is amply substantiated by the significant increase in the total investments (US$305 million in 2011 against US$55 million in 2010).

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the

reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers.

As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

There are lot of online successful businesses in the different categories the most successful is travel and hotels the online booking of hotels and travel tickets are rising and at present around 70% hotels are booked online. Similarly there is lot of business online of servicing or advertising of classifieds. Job portals are rising and lot of people and companies are utilizing their services. Different modes of online retails are coming up and the two most prominent are the online marketplace I which the online companies themselves are not managing the inventories but on their behalf their partners are managing the inventories. The other mode is the online player is managing the inventory and warehouse and on behalf of their vendors they are providing the services.

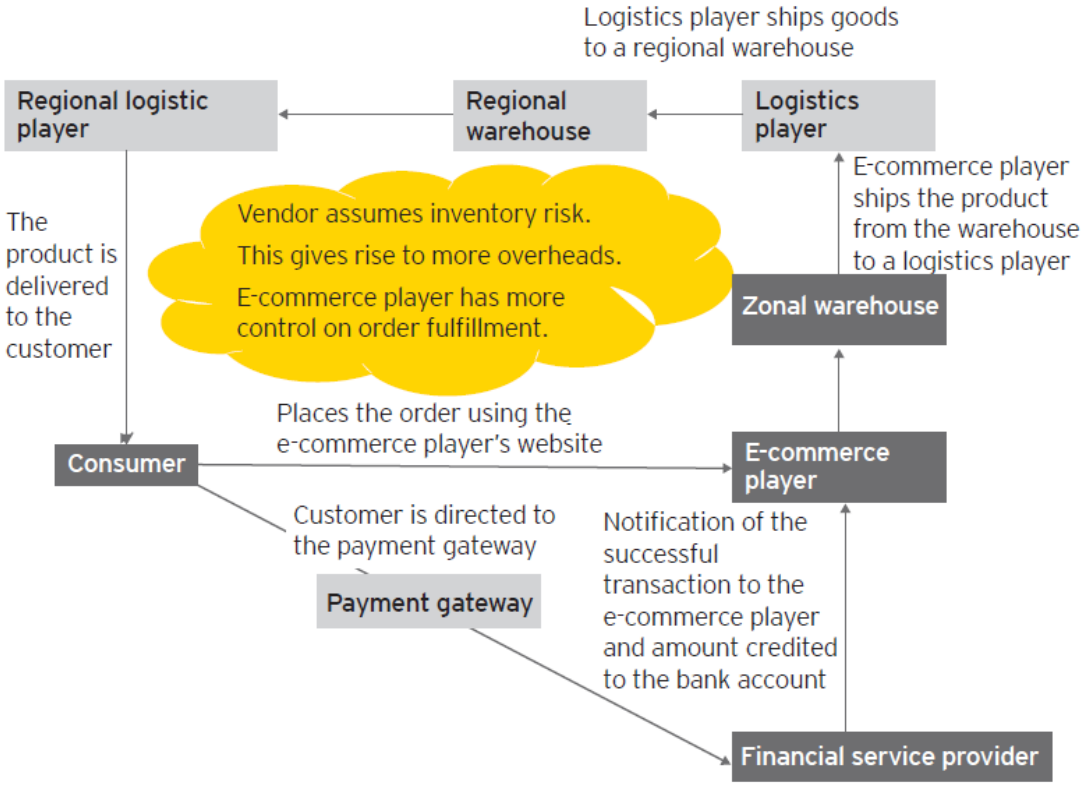


Figure 1.1: Structure of e-Commerce Business

India is a growing economy and in this there is significant role of online business. The online business is growing at a faster pace then others, and there are enough support system those are developing for the growth of this. The support system includes the third party logistics services, the customer support servies and other services like payment, payment collection security and many more. The Supply chain challages are the most important if someone is able to cope with these challenges the business become easier but with an increased competition in the marketplace it is very difficult for other players to make competitive advantages. This leads to shorter product life cycles for the products those were taking lot of time to coming to the market. The major challenge for the online companies are to better manage their E-Commerce Supply Chain process so that they can better control the supply and demand aspects of their product portfolio. The supply chain need to be efficient and responsive on the frontier.

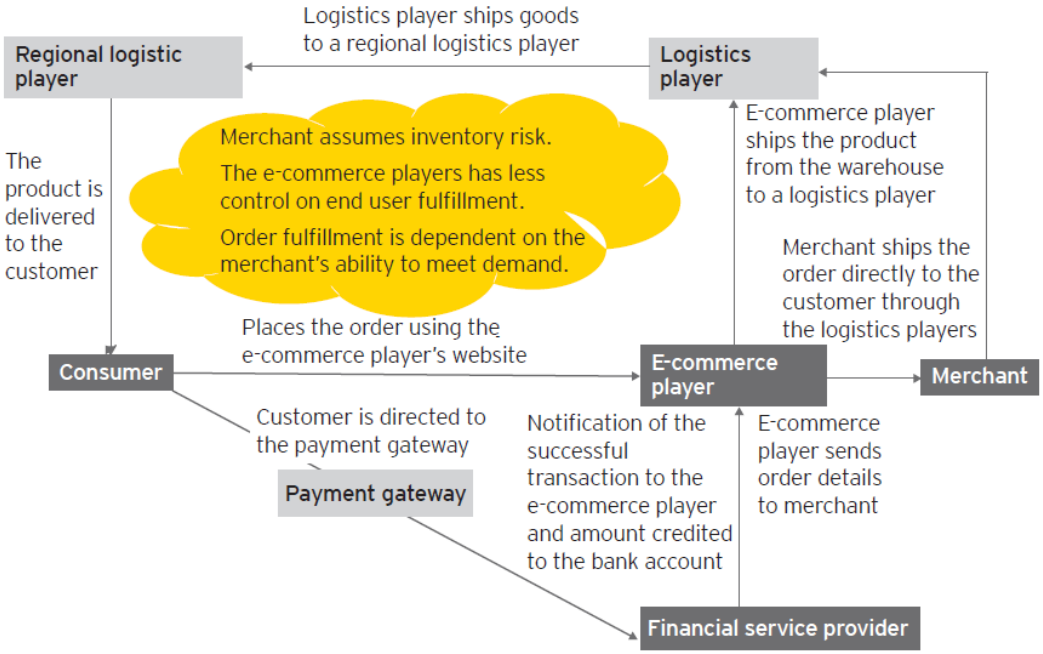


Figure 1.2: Structure of Marketplaces

The Indian online industry is expected to have an aggregated spend of $950 to $1,900 million each year between 2017-2020 on infrastructure, logistics, and warehousing, according to a study by ASSOCHAM and PwC. The online companies are making lot of investments to reduce their costs and improving their service quality. Lot of investment is also their on the technology part to manage the business efficiently. Snapdeal is making an estimated E-Commerce Supply Chain investment of $100-125 million in FY 2014-15. After successfully raising $1 billion, Flipkart is expected to invest in warehouse automation technologies such as Robotics and automation to manage the business and achieving the benchmarks for the excellence. The other online companies are also making significant investment for the development of the E-Commerce Supply Chain related issues. The E-Commerce Supply Chain issues are need to be resolved as the companies need to attract more customers from their traditional base.

1.1 Motivation for Research:

The motivation behind this research work is to resolve the E-Commerce Supply Chain issues occurring in the development of the online business related to the business to consumer. The countries growth potential the companies need to became competitive and the challenges for the upcoming businesses. The lots of foreign investment is coming the countries growth prospect is promising and the eco system is falling in place for the support of these businesses. The government is facilitating the business new laws are upcoming to manage these businesses and lot lot investment in technologies to support this business.

Lot of research work was carried out in the sector of performance management, supply chain performance management and e-Commerce business. But the few work was donor in the integration of e-Commerce with the Supply chain performance measurement. India is a growing economy and in this there is significant role of online business. The online business is growing at a faster pace than others, and there are enough support system those are developing for the growth of this. The support system includes the third party logistics services, the customer support services and other services like payment, payment collection security and many more. The Supply chain challenges are the most important if someone is able to cope with these challenges the business become easier but with an increased competition in the marketplace it is very difficult for other players to make competitive advantages. This leads to shorter product life cycles for the products those were taking lot of time to coming to the market. The major challenge for the online companies are to better manage their E-Commerce Supply Chain process so that they can better control the supply and demand aspects of their product portfolio. The supply chain need to be efficient and responsive on the frontier. (B2B2C) to more developed. The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers.

1.2 India's growth potential

India is a growing economy and in this there is significant role of online business. The online business is growing at a faster pace than others, and there are enough support system those are developing for the growth of this. The support system includes the third party logistics services, the customer support services and other services like payment, payment collection security and many more.

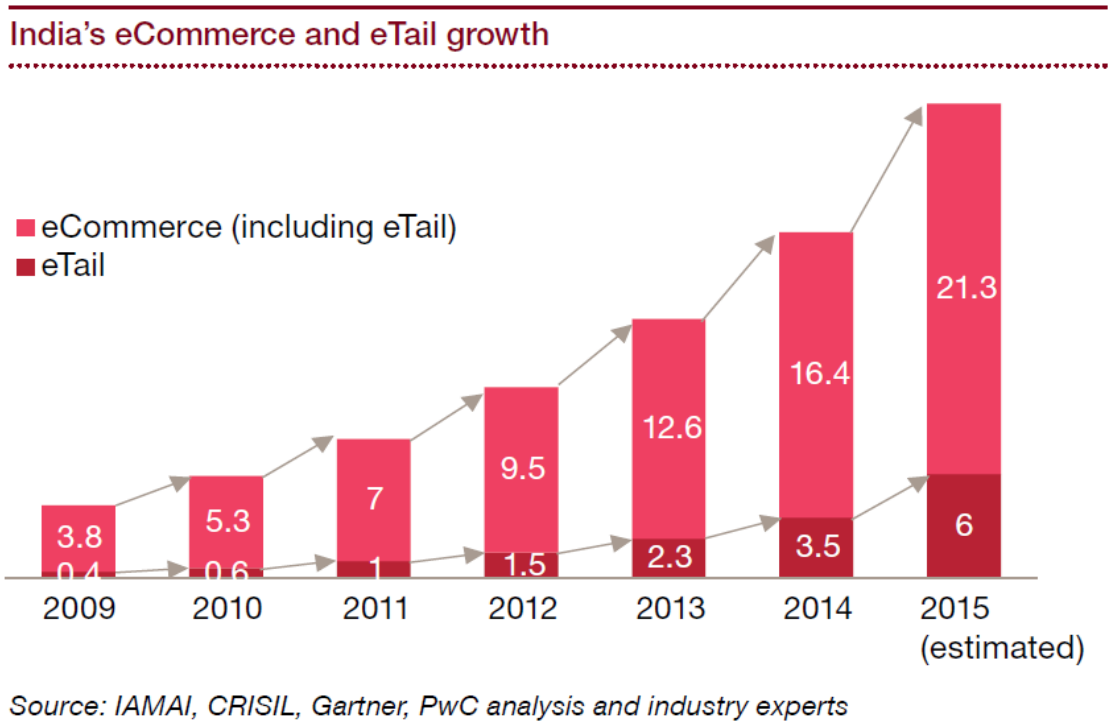


Figure 1.1: India's eCommerce and eTail Growth

1.3 Structure of the Dissertation:

This dissertation report is organized into six chapters as shown in the Figure 1-1. *Chapter 1* discusses the topic of the study, its motivation and need of study. It outlays the objectives of the research. Finally, the layout and content of the chapters is described.

Chapter 2 provides literature review on E-Commerce Supply Chain Performance Measurement process, Key Performance Indicators. Selection of Key Performance

Indicators and E-Commerce Supply Chain Performance Measurement techniques and its utilities in different sectors.

Chapter 3 consists of the description of the research methodology. The design and organization of survey is explained in this chapter, along with the methods and tools used to analyze the data. The Factor Analysis and Principle Component Analysis is also discussed in this chapter.

In *Chapter 4*, the responses of the empirical study (survey) are analyzed and results are generated for the different FA-PCA related to the performance parameters. The data analysis and results of the study are documented in this chapter.

Chapter 5 discusses the implications of the study and reports the conclusions drawn from the study. A comparative study result is also analyzed in this chapter.

Chapter 6 lists the limitations of this research study, and suggestions are made to show path for future research scope.

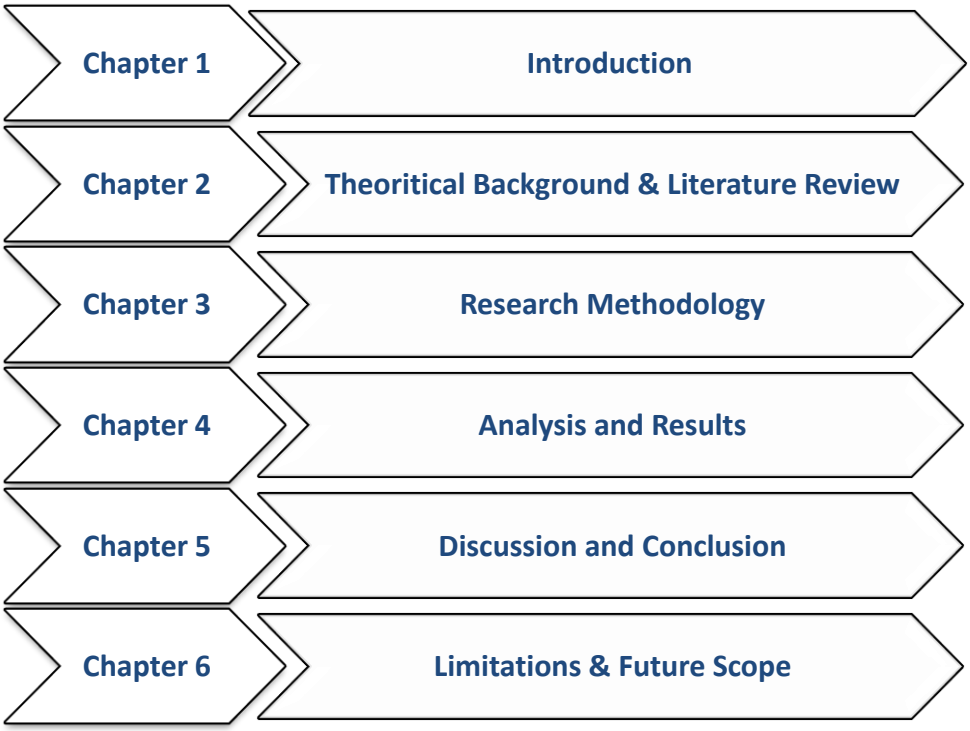


Figure 1-1: Outline of the dissertation

Chapter 2

THEORITICAL BACKGROUND & LITERATURE REVIEW

The major challenge for the online companies are to better manage their E-Commerce Supply Chain process so that they can better control the supply and demand aspects of their product portfolio. The supply chain need to be efficient and responsive on the frontier. Investors and Venture capitalists (VC) and private equity players have demonstrated their intense faith in the growth of e-Commerce in India. This is amply substantiated by the significant increase in the total investments (US$305 million in 2011 against US$55 million in 2010).The present research objectives are as follows:

- To review the literature in the e-Commerce SCPMS areas.
- Identify the Important SCSF for B2C e-Commerce.
- Identify few most important Supply Chain factors for e-Commerce Industry.
- Conduct a comparative study between Indian e-Commerce Companies.

2.1 Definition and Objectives of E-COMMERCE SCPMS

Neely et al. (2009) defined E-Commerce Supply Chain Performance Measurement System (PMS) as a balanced and dynamic system that enables support of decision-making processes by gathering, elaborating and analyzing information. Taticchi et al. (2010) further elaborated this definition by commenting on the concept of ‘balance’ and ‘dynamicity'. ‘Balance’ refers to the need of using different measures and perspectives that tied together give a holistic view of the organization. The concept of ‘dynamicity’ refers instead to the need of developing a system that continuously monitors the internal and external context and reviews objectives and priorities.

Bititci et al. (1997) defined E-COMMERCE SCPMS as the reporting process that gives feedback to employees on the outcome of actions. Stefan Tangen (2004) proposed that performance be defined as the efficiency and effectiveness of action, which leads to the following definitions: (i). E-Commerce Supply Chain Performance Measurement is defined as the process of quantifying the efficiency and effectiveness of action; (ii). A performance measure is defined as a metric used to quantify the

efficiency and/or effectiveness of an action; and (iii). Performance Management System is defined as the set of metrics used to quantify the efficiency and effectiveness of an action.

Effective E-Commerce Supply Chain management (SCM) has been associated with a variety of advantages including increased customer value, increased profitability, reduced cycle times and average inventory levels and even better product design (William et al., 2007). The objective of E-COMMERCE SCPM therefore has to facilitate and enhance the efficiency and effectiveness of SCM. The main goal of E-COMMERCE SCPM models and frameworks is to support management by helping them to measure business performance, analyze and improve business operational efficiency through better decision-making processes (Tangen, 2005). An effective, integrated and balanced E-COMMERCE SCPMS can engage the organisation's E-Commerce Supply Chain Performance Measurement system as a vehicle for organisational change. E-COMMERCE SCPM can facilitate inter-understanding and integration among the SC members. It makes an indispensable contribution to decision making in SCM, particularly in re-designing business goals and strategies, and re-engineering processes (Charan et al., 2008).

The present research objectives are as follows:

- To review the literature in the E-COMMERCE SCPMS areas.
- Identify the Important SCSF for B2C e-Commerce.
- Identify few most important E-Commerce Supply Chain factors for e-Commerce Industry.
- Conduct a comparative study between Indian e-Commerce Companies.

2.2 Desirable Characteristics of E-COMMERCE SCPMS

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the

marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers , and challenges of the Internet have embraced every detail of the business environment.

As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

A firm's E-Commerce Supply Chain Performance Measures should:

- Must be simple and easy to use.
- The purpose should be clear.
- Must be able to provide the fast and correct feedback.
- Not only able to do performance monitoring but also able for the performance improvement.
- Firm's strategy must be integrated..
- Both long term and short term objectives must be focused.

- Must be in synergy with firms culture.
- Performance measures should not be conflicting.
- Must be interrogated in the complete organization
- System should be consistent.
- Customer focus is the key.
- Competitive strategy should be focused.
- Activities those are waste must be eliminated.
- Learning prospective must be taken in account.
- Focused should be on group task rather then individual performance.
- Performance should be well counted.
- PMS should be linked to the organizational system

2.3 Evolution of E-COMMERCE SCPMS

Supply Chain Performance Measurement has its roots in early accounting systems. From the 1980 the cost account system was prevalent, there were few approaches was taken to improve and correctly measure the efficiency of the system. Initially lot of performance was driven by the transaction cost and the profitability. Till 1990 the business organizations became global and the challenges related to the businesses are more global. The organizational goals became global and the organizations need to be more competitive and need to adopt the global processes. According to Gomes et al. (2004), E-Commerce Supply Chain Performance Measurement evolved through two phases. As a result of this the automation in business processes was integrated Operations focus is increased and the more value added ativities and started and non value added activities are eliminated. The most of the focus are gone to the customer and the customer became more and more important. Now the concepts of Total Quality Management are evolved and customer satisfaction is the goals to the organizations and all supply chain activities are done to improve the customer focus. In the next phase the evaluation of e-Commerce is started and the businesses are more global and competitive the virtual world of shopping is evolved. People are started observing the products in the virtual manner and to support this lot of support systems

are developed. Now the measurement systems are need to developed around a balanced view and it includes the supply chain and interfaced activities.

Table 2.1: . Evolution of PMS in an organizational context (Gomes et al., 2004 and Morgan, 2007)

Period	**Characteristics of business organiation**	**Characteristics of PMS**
Before 1980	Systematic large organizations	(i). Cost Accounting orientation. (ii).Retroactive approach and results used to promote organizational efficiency, facilitate budgeting and attract capital from external entities (iii).E-Commerce Supply Chain Performance Measurement dominated by transaction costs and profit determination
1980 - 1990	Business organizations became global	(i). Cost Accounting orientation (ii).Retroactive approach and results used to promote organizational efficiency. (iii).Enhanced to include operations and value adding perspectives.
1990 – 2000	Automation of business processes	(i).A mixed financial and non financial orientation. (ii).A mixed retroactive and proactive approach. (iii).Results are used to manage the entire organization. (iv).PMS enhanced to include process, quality & customer focus
2000 - 2010	e-Commerce and borderless business activities	(i).A balanced and integrated orientation. (ii).A more proactive approach. (iii).Results are used to enhance organizational responsiveness.
2010 onwards	B2C e-Commerce, RFID	(i).E-Commerce Supply Chain Performance Measurement enhanced to give a balanced view of the organization and included the SC & inter-process activities.

Literature survey indicates development of a number of E-Commerce Supply Chain Performance Measurement Models since 1980s. The initial focus was in this also the accounting measures of the organization those are ROI, ROCE and ROE. Literature this stage the economic value added models are developed those have the direct focus on the customer value added activities. The most widely cited Supply Chain Performance Measurement systems are the SMART (1988), The Supply chain challenges are the most important if someone is able to cope with these challenges the business become easier but with an increased competition in the marketplace it is very difficult for other players to make competitive advantages. This leads to shorter

product life cycles for the products those were taking lot of time to coming to the market. The major challenge for the online companies are to better manage their E-Commerce Supply Chain process so that they can better control the supply and demand aspects of their product portfolio. The supply chain need to be efficient and responsive on the frontier. the Supply Chain Performance Measurement matrix (1989), the Balanced Score Card (1992), and the integrated dynamic PMS (1997). As per the screen plot and the components correlations with the variables depending on the variations we perform the factor loading following components has been extracted. The component loading is done for the all the four kind of variables to find out the relevant factors those are affecting the e-Commerce supply chain performance for the particular variable. These can be called the key supply chain performance for the e-Commerce.

1. Order Fulfillment
2. Competitive Pricing
3. Order Delivery Accuracy
4. Customer Returns
5. Order Delivery and Return Cost

The Supply chain challenges are the most important if someone is able to cope with these challenges the business become easier but with an increased competition in the marketplace it is very difficult for other players to make competitive advantages

Table 2.2: List of E-Commerce Supply Chain Performance Measurement Models (Taticchi et al., 2010 and Morgan, 2007)

Name of the model	Period of introduction
The ROI, ROE, ROCE and derivates	Before 1980s
The economic value added model (EVA) The activity based costing (ABC) – the activity based management (ABM,1988) The strategic measurement analysis and reporting technique (SMART,1988) The supportive E-Commerce Supply Chain Performance Measures (SPA,1989) The customer value analysis (CVA,1990) The E-Commerce Supply Chain Performance Measurement questionnaire (PMQ,1990)	1980-1990
The results and determinants framework (RDF,1991) The balanced Supply Chain Council's SCOR modelecard (BSC,1992) The service-profit chain (SPC,1994) The return on quality approach (ROQ,1995)	1991-1995
The Cambridge E-Commerce Supply Chain Performance Measurement framework (CPMF,1996) The consistent E-Commerce Supply Chain Performance Measurement system (CPMS,1996) The integrated E-Commerce Supply Chain Performance Measurement system (IPMS,1997) The comparative business Supply Chain Council's SCOR modelecard (CBS) The integrated E-Commerce Supply Chain Performance Measurement framework (IPMF,2000) The business excellence model (BEM,2002) The dynamic E-Commerce Supply Chain Performance Measurement system (DPMS,2004)	1996-2005
The action-profit linkage model (APL,2006) The manufacturing system design decomposition (MSDD,2006) The performance prism (PP,2006) The performance planning value chain (PPVC,2007) The capability economic value of intangible and tangible assets model (CEVITA,2009)	2005-2010
The performance, development, growth benchmarking system (PDGBS,2012) The unused capacity decomposition framework (UCDF,2014)	2010-onwards

2.4 Classification of Performance Management Literature

The literature related to E-COMMERCE SCPMS belongs to two major orientations. They are: (i). Conceptual articles and (ii). Empirical articles. As shown in the table 2.3 below the complete work was divide in the five phases 1980-90 the supply chain performance measurement system was discussed, the weaknesses and the strength of the system was try to eliminated. In the second phase the framework was modified more balanced approaches were taken in the account the BSC was propsed to eliminated the previously identified problems. In the third phase which was consider to be till 2000. The search for the performance framework was happen and Methodologies for population framework was developed. In the next phase e-Commerce was in the context and the performance measurement for the global

prospective were developed. Te global focus on the organizational performance and organizational management is happen.

Table 2.3: Phases in Supply Chain Performance Measurement Literature (Neely, 2005)

Category	Period	Characteristics
Phase 1	1980 -1990	Dominant theme was a discussion of the problems of Supply Chain Performance Measurement systems; recognising and discussing the weaknesses of measurement systems and their organisational impact.
Phase 2	1990 -1995	Potential solutions – e.g. measurement frameworks such as the BSC were being proposed; search for "frameworks" that might provide useful ways of addressing the previously identified problems.
Phase 3	1996 - 2000	The search for ways in which the proposed frameworks could be used; processes and methodologies for populating measurement frameworks were being developed and discussed.
Phase 4	2000 - 2005	Robust empirical and theoretical analysis of E-Commerce Supply Chain Performance Measurement frameworks and methodologies; analysis of impact of PMS on organisations
Phase 5	2005 onwards	Theoretical verification of frameworks; application and impact on E-Commerce Supply Chains; focus on multi-firm performance.

2.5 E-Commerce Supply Chain Performance Measures and Metrics in SCPMS

The Supply chain challenges are the most important if someone is able to cope with these challenges the business become easier but with an increased competition in the marketplace it is very difficult for other players to make competitive advantages. This leads to shorter product life cycles for the products those were taking lot of time to coming to the market. The major challenge for the online companies are The supply chain need to be efficient and responsive on the frontier.

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the

marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

The cost of delivery of the goods is a considerable factor for the performance of the logistic partners. The cost have direct impact on the overall cost of the product and most of the time it is to be bear by the vendor or the customer. The customer service is directly impacted and his expectation from the marketplace is more if he is paying the cost for delivery as it is the additional cost to the product. If the cost is to be born by the vendor his profitability is impacted.

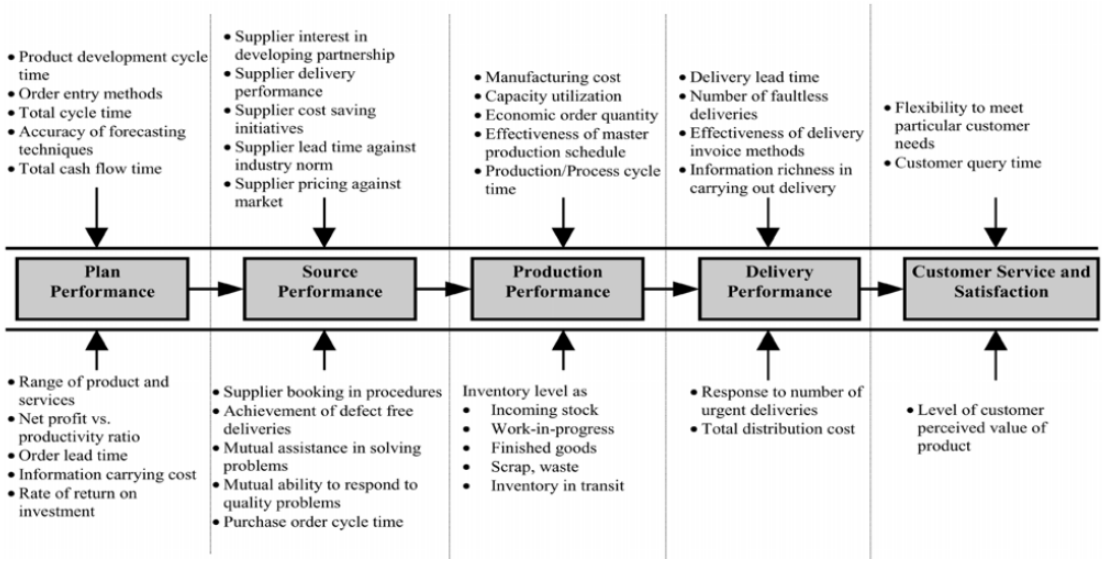


Figure: 2.1: Measures and metrics at four basic links in a SC (Gunasekaran et al., 2001)

2.5.1: Balanced Model:

In these models several separate E-Commerce Supply Chain Performance Measures As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

2.5.2 Quality Models:

As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

2.5.3 Questionnaire-based Models:

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of

ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers.

2.5.4 Hierarchical Models:

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers.

2.6.1 Balanced Score Card (BSC):

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point

which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers.

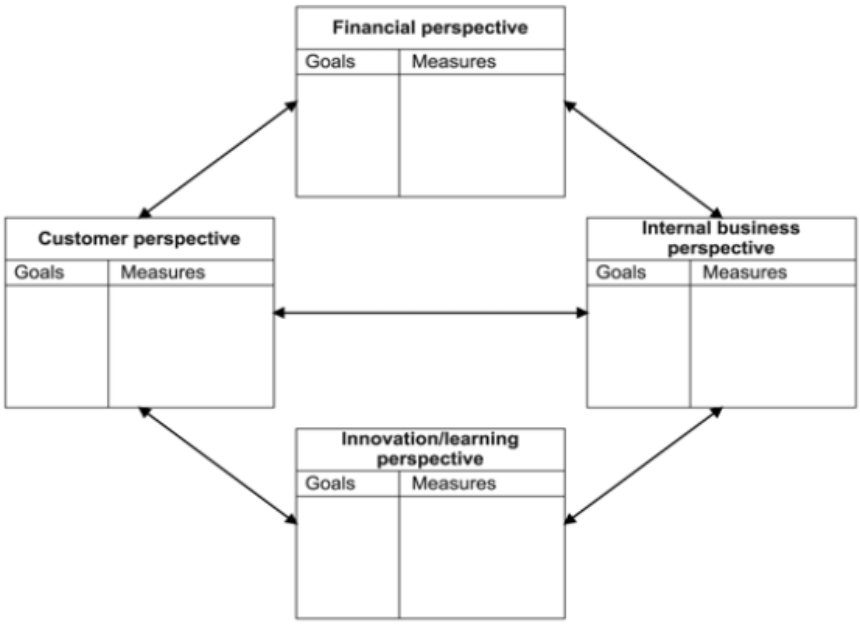


Figure 2.2: Balanced Supply Chain Council's SCOR modele Card (Source: Tangen, 2004)

2.6.2Performance Prism:

supply chain performance related to the e-commerce to maintain and develop those capabilities?) When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers.

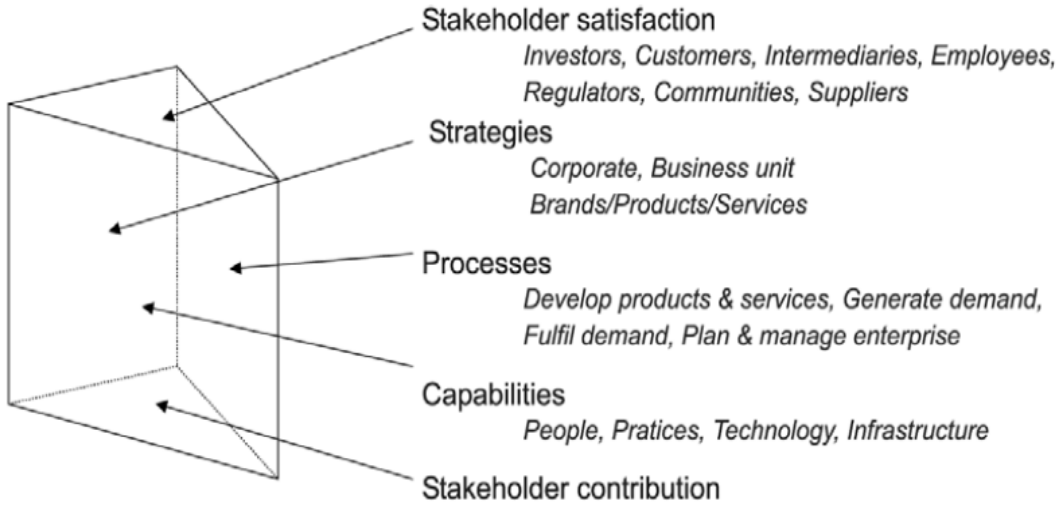


Figure: 2.3: Performance Prism (Tangen, 2004)

As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters (Medori et al., 2000).

2.6.3: The Performance Pyramid:

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers , As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component

Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

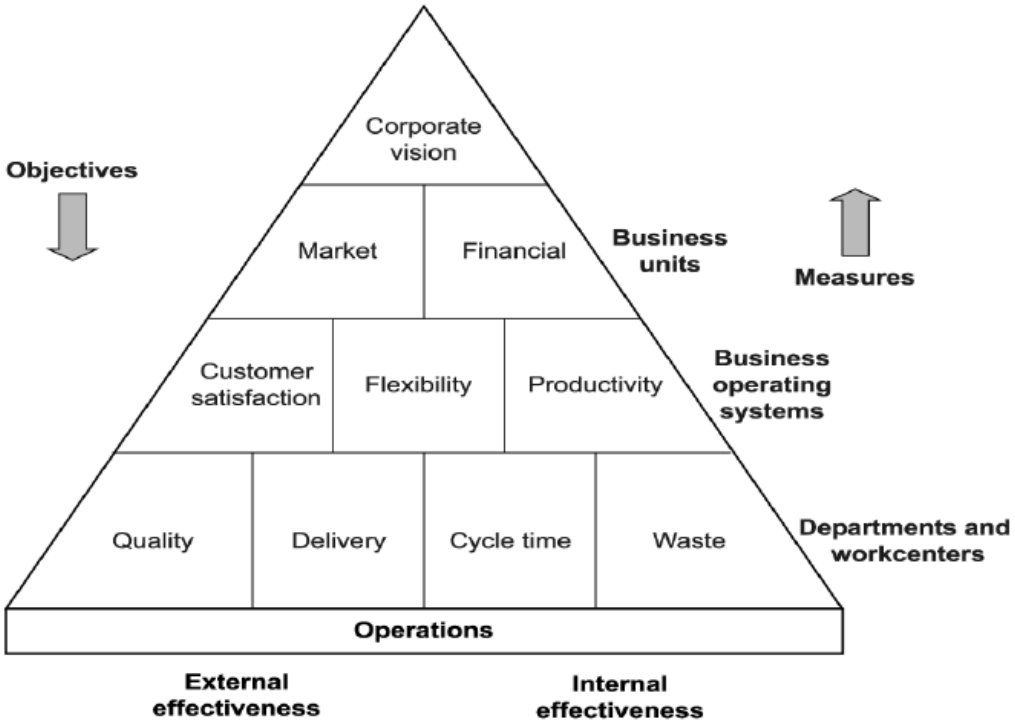


Figure 2.4: Performance Pyramid (Tangen, 2004)

2.6.4 Theory of Constraints:

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.TOC offers a systematic

and focused process that organizations use to pursue ongoing improvement successfully.

2.6.5 Medori and Steeple's Framework:

Similar to most of the frameworks prominent in the industry, the starting point begins with defining the company's full manufacturing strategy and success factors (stage 1). The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers. As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis.

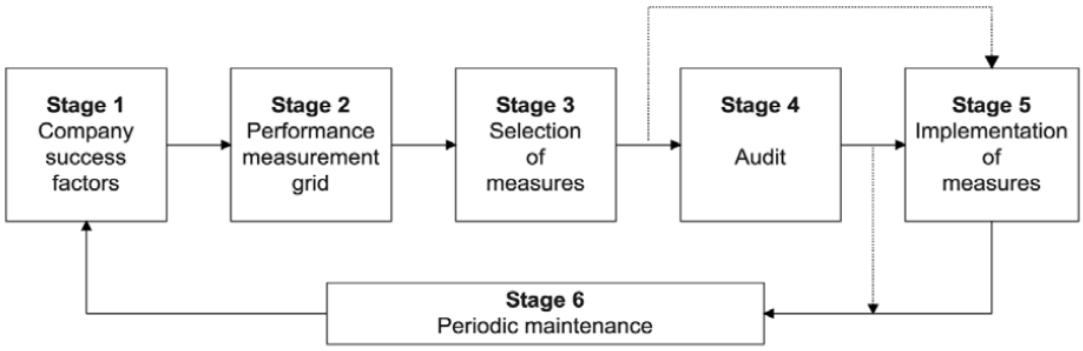


Figure 2.5. Medori and Steeple's framework (Medori et al., 2000)

2.6.6 The Supply-Chain Operations Reference (SUPPLY CHAIN COUNCIL'S SCOR MODEL) Model:

The SUPPLY CHAIN COUNCIL'S SCOR MODEL model provides a common process oriented language for communicating among supply-chain partners in the

following decision areas: PLAN, SOURCE, MAKE, and DELIVER. SUPPLY CHAIN COUNCIL'S SCOR model is designed as a tool to describe, measure and evaluate any supply chain configuration. The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of he Internet services by the service providers.

As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

2.6.7 Data Envelopment Analysis (DEA):

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis.

Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.DEA also suffers another disadvantage that only likeable units can be compared hence all the decision making units must have same strategic goals and objectives (Soni et al., 2010).

Chapter 3
RESEARCH METHODOLOGY

The methodology followed for conducting the research work is explained in the following sections:

3.1 Collection of Literature

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service.

As there are lot of E-Commerce Supply Chain factors in the industry all of them can't be focused. I have identified key performance parameters in this with the help of factor analysis- Principle Component Analysis. Finally the five key performance parameters are identified and the top five e-Commerce companies are compared on these parameters.

The keywords used for finding relevant articles were:

- E-Commerce Supply Chain Management
- E-Commerce Supply Chain Performance Measurement
- Performance Management
- E-Commerce Supply Chain Performance Measures
- Electronic marketplaces
- Electronic business
- Electronic commerce

- E-commerce performance assessment model
- Performance assessment indicators
- Online relationship quality
- Business-to-customer e-commerce
- Consumer behavior
- E-Logistics
- E-Commerce Supply Chain Operations Reference Model

3.2 Variables & Design of Survey

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.The assumption considered in survey is that we believe the respondents know the process of e-Commerce and E-Commerce Supply Chain better than anybody else, as they are working in the practical field on daily basis.

3.3 Questionnaire Design

E-Commerce Supply Chain Management practitioners analyzing the work done by previous researchers. When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order

fulfillment, All the performance metrics are listed & grouped into following four categories:

i. Seller Performance Metrics
ii. Customer Service Metrics
iii. Marketplace Performance Metrics
iv. Logistics Performance Metrics

The questionnaire is divided into three parts:

1. The first part enquires basic information concerning the respondent, such as his/her name, organization, job position, function/department, involvement in e-Commerce, and work experience. On the basis of judgmental analysis the metrics are shortlisted and further divided into the performance metrics related to the vendor, customer service, logistics and marketplace.
2. Second part deals with the Performance metrics. The respondents were asked about the importance rating they perceive to each E-Commerce Supply Chain performance metrics related to their field. They were also required to provide the extent of implementation of that metrics in their organization. A 5-point likert scale (with 5 being 'not important at all; and 1 being 'very important') was used to collect responses on each SF pertaining to its level of importance & extent of implementation.
3. Third part dealing with the shortlisted key performance indicators on which different e-Commerce companies are compared through the online survey.

3.4 Organization of the Survey

The initial survery was done for the selection of key performance indicators and from this the less important and not at all important parameters are being removed from the final questionnaire, from this I also able to divide the parameters into the customer service, vendor performance, market place performance and in logistics performance parameters. In the second phase online survey was conducted relevant to the concerned people. The sector divided four performance metrices related parameters are being sent to the concerned respondents through mail.

3.5 Methodology

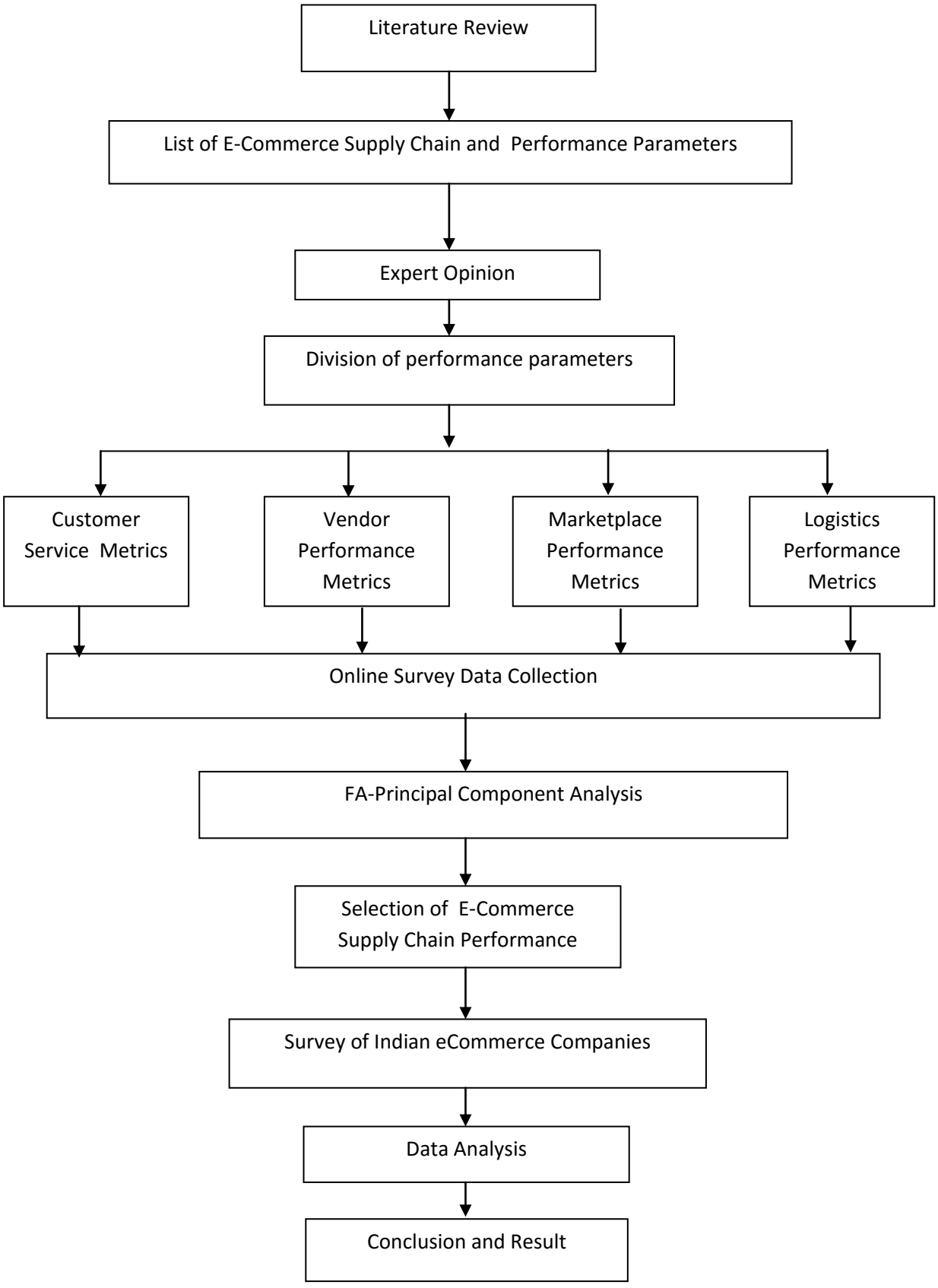


Figure: 3.1: Flow Chart

Chapter 4
ANALYSIS AND RESULTS

The quantitative analysis of the collected data for the research is done using Microsoft Excel, and SPSS software packages. The detailed analysis is discussed in following sections:

4.1 Principal Component Analysis:

This report is focused on evaluating the E-Commerce Supply Chain Performance Parameters those are relevant to the Indian e-Commerce industry. The stage wise analysis identified a group of e-Commerce Supply Chain parameters. Once those are identified they are being compared for the key players in the Indian B2C e-Commerce sector. Initially 42 performance parameters are identified and they are reduced to 30 after the personal interview from the industrial experts from the relevant industry. These 30 performance parameters are further divided into the different set of performance parameters. These are divided into four sets of Customer Performance Parameters, Vendor Performance Parameters, Marketplace Performance Parameters, and Logistics Partner Performance Parameters.

On applying PCA on Marketplace Performance Metrics one component is extracted customer returns. On applying PCA on Logistics Partner Performance Metrics one component is extracted that is order delivery and return cost. We use the factor analysis for data reduction. Principle Component Analysis is applied on each set of performance parameters separately.

4.2 Data Collection:

Table: 4.1: E-Commerce Supply Chain Performance Parameters

S. No.	Metric
1	Delivery item accuracy(VPM)
2	Delivery quantity accuracy(VPM)
3	Delivery performance to customer commit date(LPM)
4	Documentation accuracy(MPM)
5	Damage in transit(LPM)
6	Warranty(CSM)
7	Returns(CSM)
8	Source cycle time(VPM)
9	Payment cycle time(Vendor)(MPM)
10	Product delivery cycle time(LPM)
11	Ordering cycle time(Customer)(MPM)
12	Return cycle time(LPM)
13	Suppliers risk rating(VPM)
14	Customer's risk rating(CSM)
15	Product's risk rating(CSM)
16	Sourcing cost(Vendor)(VPM)
17	Material Transportation cost(LPM)
18	Return cost(LPM)
19	Inventory(VPM)
20	Customer Returns(MPM)
21	Order Fill rate(CSM)
22	Ease of ordering(MPM)
23	Product quality(CSM)
24	Warehouse space utilization(MPM)
25	Supplier delivery performance(VPM)
26	Percent of products presenting 80% of sales(MPM)
27	Repeat versus new customer sales(CSM)
28	Backorders/stock out(CSM)
29	Competitive Pricing(CSM)
30	Cash-to-cash cycle time(MPM)

There are 30 E-Commerce Supply Chain parameters has been identified from the literature and after personal interaction with industrial professionals. These parameters are further divided into the

- Customer Service Metrics(9)
- Vendor Performance Metrics(7)
- Marketplace Performance Metrics(8)
- Logistics Performance Metrics(6)

Table: 4.3 Correlation Matrix-Customer Service[a]

		VAR_C1	VAR_C2	VAR_C3	VAR_C4	VAR_C5	VAR_C6	VAR_C7	VAR_C8	VAR_C9
Correlation	VAR_C1	1.000	-.026	-.245	.038	-.134	-.179	.207	.038	.213
	VAR_C2	-.026	1.000	.176	-.376	-.119	.199	-.073	-.038	.064
	VAR_C3	-.245	.176	1.000	-.145	-.019	-.040	-.269	-.074	-.037
	VAR_C4	.038	-.376	-.145	1.000	.263	-.122	.136	.132	.087
	VAR_C5	-.134	-.119	-.019	.263	1.000	-.177	-.037	-.106	.012
	VAR_C6	-.179	.199	-.040	-.122	-.177	1.000	-.188	.347	.024
	VAR_C7	.207	-.073	-.269	.136	-.037	-.188	1.000	-.169	.172
	VAR_C8	.038	-.038	-.074	.132	-.106	.347	-.169	1.000	.195
	VAR_C9	.213	.064	-.037	.087	.012	.024	.172	.195	1.000
Sig. (1-tailed)	VAR_C1		.381	.002	.330	.058	.018	.007	.328	.006
	VAR_C2	.381		.020	.000	.083	.010	.196	.329	.226
	VAR_C3	.002	.020		.045	.412	.320	.001	.193	.333
	VAR_C4	.330	.000	.045		.001	.076	.056	.061	.157
	VAR_C5	.058	.083	.412	.001		.019	.333	.108	.446
	VAR_C6	.018	.010	.320	.076	.019		.014	.000	.388
	VAR_C7	.007	.196	.001	.056	.333	.014		.024	.022
	VAR_C8	.328	.329	.193	.061	.108	.000	.024		.011
	VAR_C9	.006	.226	.333	.157	.446	.388	.022	.011	

a. Determinant = .377

These metrics has been separately analyzed after the online survey. All the four metrics are further divided into a set of metrics relevant to the area. These are to be tested for the feasibility and accuracy.

4.3 PCA-Customer Service:

Table: 4.2: Customer Service Metrics

Variable Name	Variable
VAR_C1	Warranty(CSM)
VAR_C2	Returns(CSM)
VAR_C3	Customer's risk rating(CSM)
VAR_C4	Product's risk rating(CSM)
VAR_C5	Order Fill rate(CSM)
VAR_C6	Product quality(CSM)
VAR_C7	Repeat versus new customer sales(CSM)
VAR_C8	Backorders/stock out(CSM)
VAR_C9	Competitive Pricing(CSM)

Table 4.4: KMO and Bartlett's Test-Customer Service

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.525
Bartlett's Test of Sphericity	Approx. Chi-Square	130.066
	df	36
	Sig.	.000

Table 4.5 Communalities-Customer Service

	Initial	Extraction
VAR_C1	1.000	.546
VAR_C2	1.000	.620
VAR_C3	1.000	.620
VAR_C4	1.000	.670
VAR_C5	1.000	.593
VAR_C6	1.000	.660
VAR_C7	1.000	.530
VAR_C8	1.000	.735
VAR_C9	1.000	.819

Extraction Method: Principal Component Analysis.

Table 4.6 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	1.863	20.697	20.697	1.863	20.697	20.697	1.559
2	1.519	16.875	37.572	1.519	16.875	37.572	1.505
3	1.383	15.371	52.943	1.383	15.371	52.943	1.639
4	1.029	11.435	64.378	1.029	11.435	64.378	1.156
5	.876	9.733	74.111				
6	.770	8.556	82.667				
7	.590	6.553	89.220				
8	.503	5.592	94.812				
9	.467	5.188	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

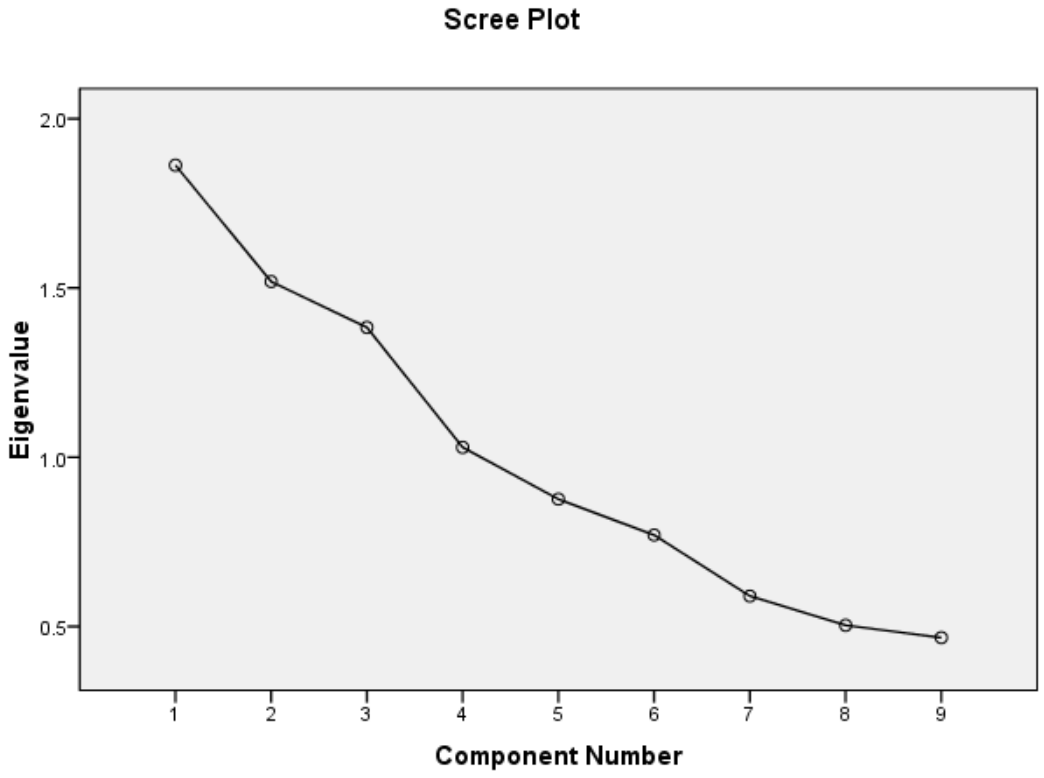


Figure 4.1: Scree Plot- Customer Service

Table 4.7 Component Matrix- Customer Service[a]

	Component			
	1	2	3	4
VAR_C1	.428	.443	-.407	
VAR_C2	-.566		-.416	
VAR_C3	-.497			.481
VAR_C4	.607		.540	
VAR_C5		-.453		.401
VAR_C6	-.513	.491		
VAR_C7	.568		-.424	
VAR_C8		.632	.564	
VAR_C9		.528		.700

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

4.4 PCA- Vendor Performance:

Table 4.8: Vendor Performance Metrics

Variable Name	Variable
VAR_V1	Delivery Item Accuracy(VPM)
VAR_V2	Delivery Quantity Accuracy(VPM)
VAR_V3	Source Cycle Time(VPM)
VAR_V4	Suppliers Risk Rating(VPM)
VAR_V5	Sourcing Cost(Vendor)(VPM)
VAR_V6	Inventory(VPM)
VAR_V7	Supplier Delivery Performance(VPM)

Table 4.9 Correlation Matrix-Vendor Performance[a]

		VAR_V1	VAR_V2	VAR_V3	VAR_V4	VAR_V5	VAR_V6	VAR_V7
Correlation	VAR_V1	1.000	-.117	.112	.200	-.154	.008	.026
	VAR_V2	-.117	1.000	.024	.069	.140	.060	.019
	VAR_V3	.112	.024	1.000	-.100	.008	-.133	-.077
	VAR_V4	.200	.069	-.100	1.000	.276	.029	-.052
	VAR_V5	-.154	.140	.008	.276	1.000	-.059	-.185

	VAR_V6	.008	.060	-.133	.029	-.059	1.000	-.194
	VAR_V7	.026	.019	-.077	-.052	-.185	-.194	1.000
Sig. (1-tailed)	VAR_V1		.220	.229	.091	.153	.479	.431
	VAR_V2	.220		.438	.323	.177	.345	.451
	VAR_V3	.229	.438		.254	.480	.189	.307
	VAR_V4	.091	.323	.254		.032	.425	.367
	VAR_V5	.153	.177	.480	.032		.349	.109
	VAR_V6	.479	.345	.189	.425	.349		.098
	VAR_V7	.431	.451	.307	.367	.109	.098	

a. Determinant = .696

Table 4.10 KMO and Bartlett's Test-Vendor Performance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.412
Bartlett's Test of Sphericity	Approx. Chi-Square	15.164
	df	21
	Sig.	.000

Table 4.11 Communalities-Vendor Performance

	Initial	Extraction
VAR_V1	1.000	.775
VAR_V2	1.000	.326
VAR_V3	1.000	.794
VAR_V4	1.000	.802
VAR_V5	1.000	.704
VAR_V6	1.000	.730
VAR_V7	1.000	.757

Extraction Method: Principal Component Analysis.

Table 4.12 Total Variance Explained-Vendor Performance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.423	20.322	20.322	1.423	20.322	20.322
2	1.208	17.261	37.582	1.208	17.261	37.582
3	1.160	16.571	54.153	1.160	16.571	54.153
4	1.098	15.681	69.834	1.098	15.681	69.834
5	.952	13.604	83.437			
6	.625	8.933	92.370			
7	.534	7.630	100.000			

Extraction Method: Principal Component Analysis.

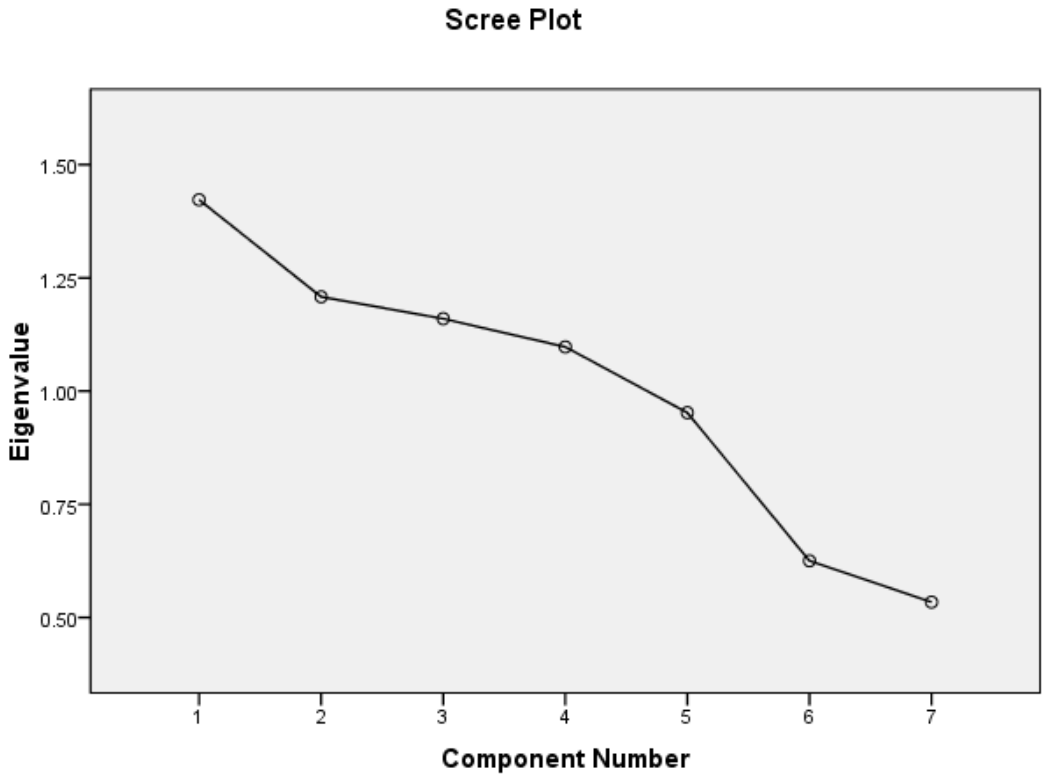


Figure 4.2 Screen Plot- Vender Performance

Table 4.13: Component Matrix-Vendor Performance[a]

	Component			
	1	2	3	4
VAR_V1		.857		
VAR_V2				
VAR_V3			.444	-.729
VAR_V4	.587	.565		
VAR_V5	.752			
VAR_V6			-.806	
VAR_V7	-.487			.642

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

4.5 PCA- Marketplace Performance:

Table 4.14 Marketplace Performance Metrics

Variable Name	Variable
VAR_M1	Documentation accuracy(MPM)
VAR_M2	Payment cycle time(Vendor)(MPM)
VAR_M3	Ordering cycle time(Customer)(MPM)
VAR_M4	Customer Returns(MPM)
VAR_M5	Ease of ordering(MPM)
VAR_M6	Warehouse space utilization(MPM)
VAR_M7	Percent of products presenting 80% of sales(MPM)
VAR_M8	Cash-to-cash cycle time(MPM)

Table 4.15 Correlation Matrix-Marketplace Performance[a]

		VAR_M1	VAR_M2	VAR_M3	VAR_M4	VAR_M5	VAR_M6	VAR_M7	VAR_M8
Correlation	VAR_M1	1.000	-.103	.003	.275	.077	.129	.059	.105
	VAR_M2	-.103	1.000	.166	-.161	-.106	.027	-.035	.072
	VAR_M3	.003	.166	1.000	-.027	.340	-.041	.302	-.150
	VAR_M4	.275	-.161	-.027	1.000	.031	-.035	-.216	-.152
	VAR_M5	.077	-.106	.340	.031	1.000	.065	.364	.042
	VAR_M6	.129	.027	-.041	-.035	.065	1.000	.021	.001
	VAR_M7	.059	-.035	.302	-.216	.364	.021	1.000	-.132
	VAR_M8	.105	.072	-.150	-.152	.042	.001	-.132	1.000
Sig. (1-tailed)	VAR_M1		.250	.492	.034	.307	.200	.349	.246
	VAR_M2	.250		.137	.146	.244	.429	.410	.320
	VAR_M3	.492	.137		.430	.011	.394	.022	.162
	VAR_M4	.034	.146	.430		.421	.409	.077	.159
	VAR_M5	.307	.244	.011	.421		.336	.007	.392
	VAR_M6	.200	.429	.394	.409	.336		.446	.497
	VAR_M7	.349	.410	.022	.077	.007	.446		.194
	VAR_M8	.246	.320	.162	.159	.392	.497	.194	

a. Determinant = .484

Table 4.16: KMO and Bartlett's Test-Marketplace Performance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.454
Bartlett's Test of Sphericity	Approx. Chi-Square	29.362
	df	28
	Sig.	.000

Table 4.17 Communalities-Marketplace Performance

	Initial	*Extraction*
VAR_M1	*1.000*	*.660*
VAR_M2	*1.000*	*.810*
VAR_M3	*1.000*	*.664*
VAR_M4	*1.000*	*.749*
VAR_M5	*1.000*	*.644*
VAR_M6	*1.000*	*.439*
VAR_M7	*1.000*	*.640*
VAR_M8	*1.000*	*.700*

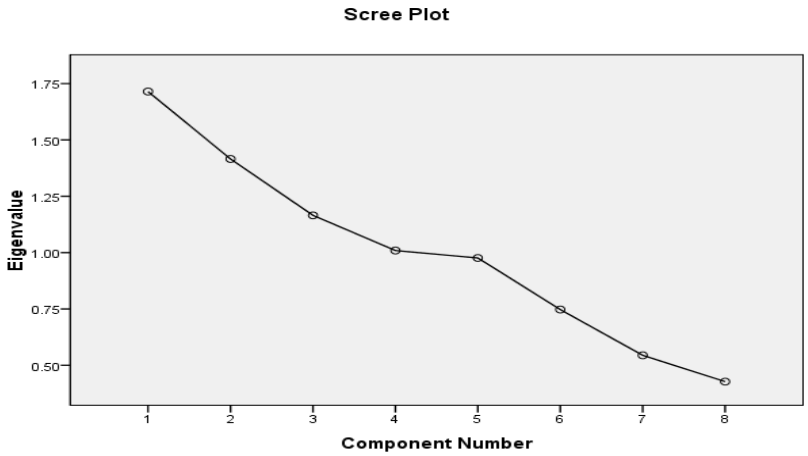


Figure 4.3-Scree Plot- Marketplace Performance

4.6 PCA- Logistics Performance:

Table 4.18: Logistics Performance Metrics

Variable Name	Variable
VAR_L1	Delivery performance to customer commit date(LPM)
VAR_L2	Damage in transit(LPM)
VAR_L3	Product delivery cycle time(LPM)
VAR_L4	Return cycle time(LPM)
VAR_L5	Material Transportation cost(LPM)
VAR_L6	Return cost(LPM)

Table4.19 Correlation Matrix-Logistics Performance[a]

		VAR_L1	VAR_L2	VAR_L3	VAR_L4	VAR_L5	VAR_L6
Correlation	VAR_L1	1.000	-.156	.274	.049	-.021	.140
	VAR_L2	-.156	1.000	-.104	-.166	.107	.427
	VAR_L3	.274	-.104	1.000	.037	-.346	-.307
	VAR_L4	.049	-.166	.037	1.000	-.192	.004
	VAR_L5	-.021	.107	-.346	-.192	1.000	-.018
	VAR_L6	.140	.427	-.307	.004	-.018	1.000
Sig. (1-tailed)	VAR_L1		.206	.071	.398	.456	.230
	VAR_L2	.206		.292	.191	.287	.009
	VAR_L3	.071	.292		.422	.030	.050
	VAR_L4	.398	.191	.422		.155	.491
	VAR_L5	.456	.287	.030	.155		.463
	VAR_L6	.230	.009	.050	.491	.463	

a. Determinant = .459

Table 4.20 KMO and Bartlett's Test-Logistics Performance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.348
Bartlett's Test of Sphericity	Approx. Chi-Square	20.378
	df	15
	Sig.	.000

Table 4.21 Communalities-Logistics Performance

	Initial	Extraction
VAR_L1	1.000	.657
VAR_L2	1.000	.586
VAR_L3	1.000	.680
VAR_L4	1.000	.697
VAR_L5	1.000	.588

VAR_L6	1.000	.836

Extraction Method: Principal Component Analysis.

Table 4.22 Total Variance Explained-Logistics Performance

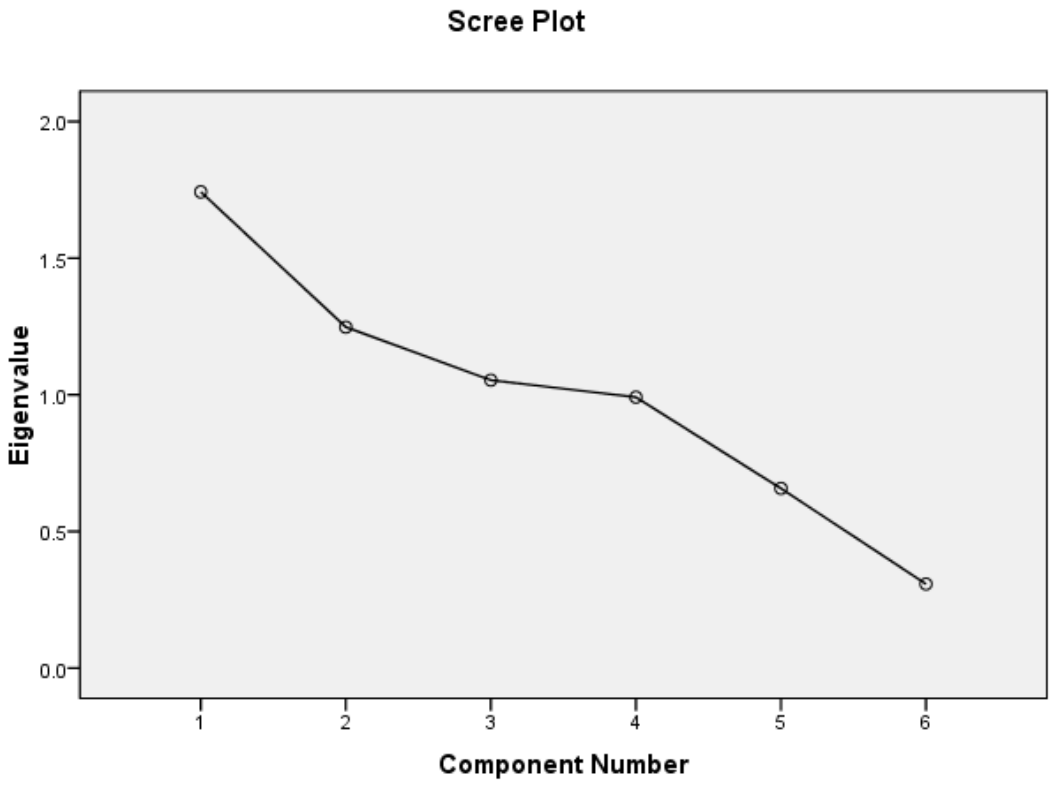
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	1.743	29.044	29.044	1.743	29.044	29.044	1.354
2	1.248	20.795	49.839	1.248	20.795	49.839	1.536
3	1.054	17.559	67.398	1.054	17.559	67.398	1.288
4	.991	16.519	83.918				
5	.657	10.958	94.876				
6	.307	5.124	100.000				

Extraction Method: Principal Component Analysis.

Table 4.22 Total Variance Explained-Logistics Performance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	1.743	29.044	29.044	1.743	29.044	29.044	1.354
2	1.248	20.795	49.839	1.248	20.795	49.839	1.536
3	1.054	17.559	67.398	1.054	17.559	67.398	1.288
4	.991	16.519	83.918				
5	.657	10.958	94.876				
6	.307	5.124	100.000				

a. When components are correl



ated, sums of squared loadings cannot be added to obtain a total variance.

Figure 4.4: Screen Plot- Logistics Performance

Table 4.23 Component Matrix-Logistics Performance[a]

	Component		
	1	2	3
VAR_L1		.514	.538
VAR_L2	.653		
VAR_L3	-.706		
VAR_L4			-.722
VAR_L5	.503	-.474	
VAR_L6	.593	.692	

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

The principal Component Analysis was carried out to find the relevant performance parameter for the e-Commerce supply chain.Below mentioned are the criterion for the sampling adequacy. And to the test performance.

Taken together, these tests provide a minimum standard which should be passed before a principal components analysis (or a factor analysis) should be conducted.

4.8 Component Loading:

As per the screen plot and the components correlations with the variables depending on the variations we perform the factor loading following components has been extracted. The component loading is done for the all the four kind of variables to find out the relevant factors those are affecting the e-Commerce supply chain performance for the particular variable. These can be called the key supply chain performance for the e-Commerce.

6. Order Fulfillment
7. Competitive Pricing
8. Order Delivery Accuracy
9. Customer Returns
10. Order Delivery and Return Cost

These components are further measured for the performance for the key players in the Indian e-Commerce industry, Mostly for the online marketplaces. The first component is order fulfillment the order fulfillment is the key to success. The customer places the order and the marketplace is not able to fulfill the requirement of the customer. These requirements may be the on time delivery, delivery accuracy, the vendor don't have enough inventory or because of some reason the vendor was not able to fulfill the requirement. The mentioned criterion are combined to called it order fulfillment and it is the key for the success of the online marketplaces. When we compared the performance of the five major players in the Indian e-commerce sector we find out that the Amazon India is ranked number one in the order fulfillment with the 40% of the customer are favouring this, and the Flipkart is second when the comparison is drawn, Snapdeal ranked 3rd with th 17% and Shopcluses and the e-Bay india is last place.

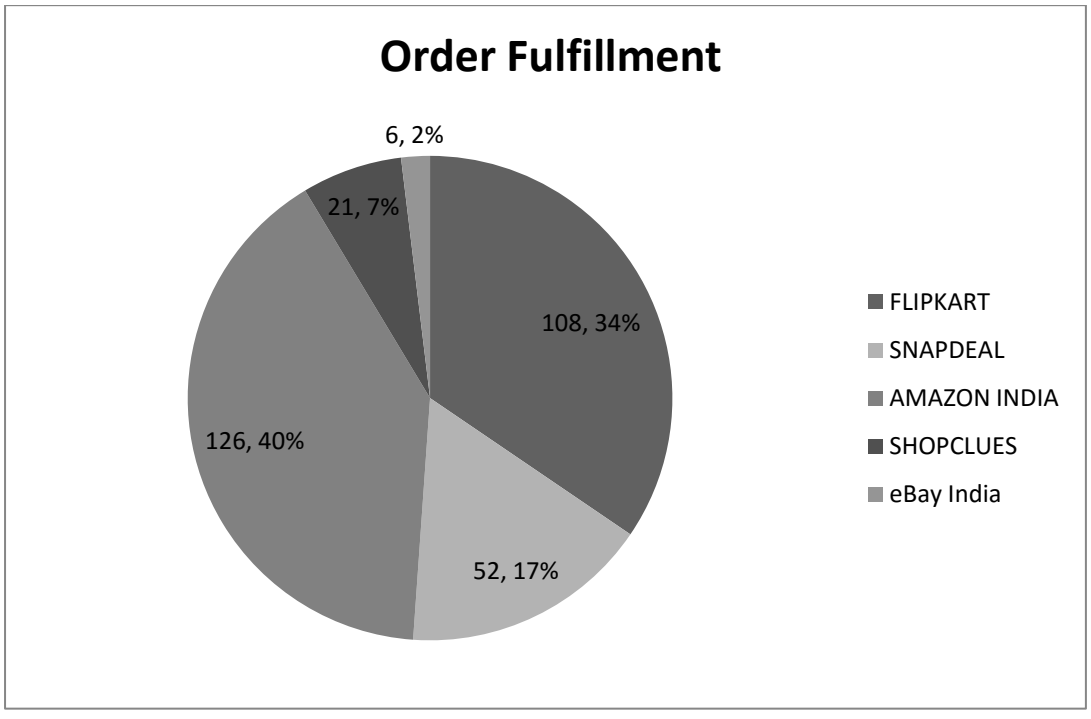


Figure 4.4: Pie Chart Order Fulfillment

The similar study was conducted for the Competitive Pricing. The survey was sent to 500 customers those are regular online buyers. Out of these 325 are given response for competitive pricing. The data has been collected and analyzed. A pie chart was plotted. Pricing is a major factor for the marketplace selection, from the chart Amazon India is 47% customers are satisfied, for flipkart and Snapdeal 26% and 20% respectively.

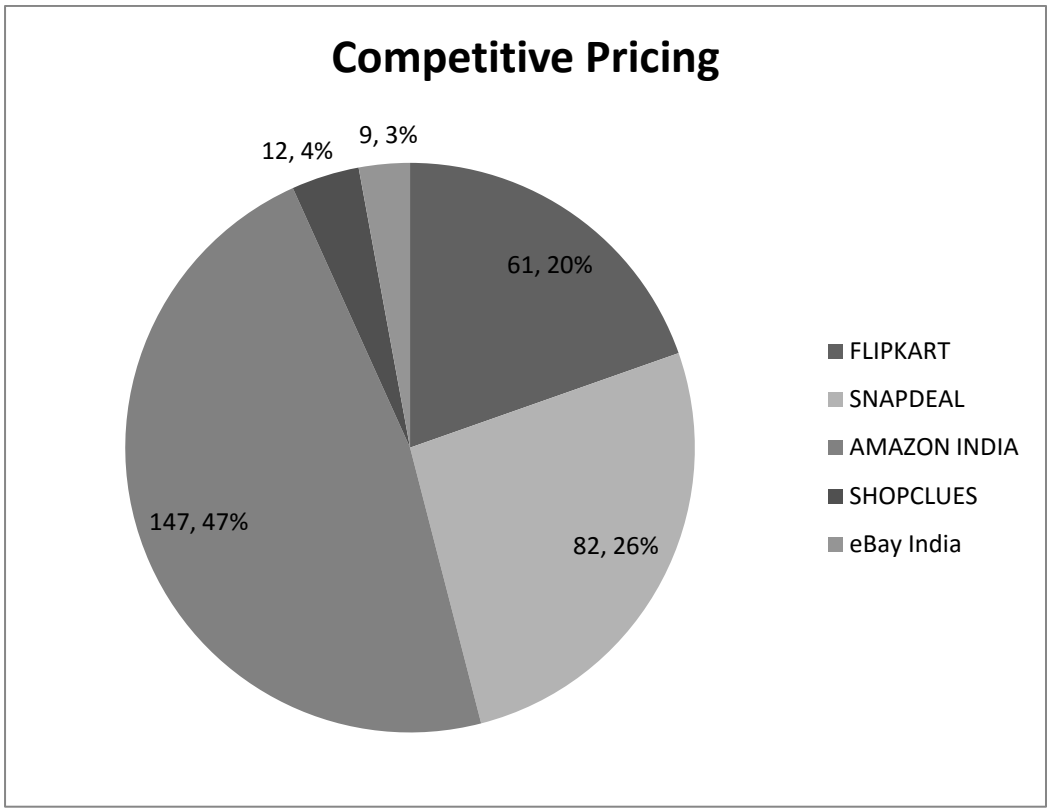


Figure 4.5: Pie Chart Competitive Pricing

The third factor is order delivery accuracy is the measure of how effetely the vendor is able to process the order. A total of 46 vendor was surveyed for this and 37% favored Amzaon India, 30% Flipkat, 25% Snapdeal and 7% Shopcluses and rest are of eBay India. The vendor performance is very important as this is also defining the marketplace performance. If vendor is not able to deliver the order correctly the

ultimately the customer remain in contact with marketplace, he is not directly related to vendor.

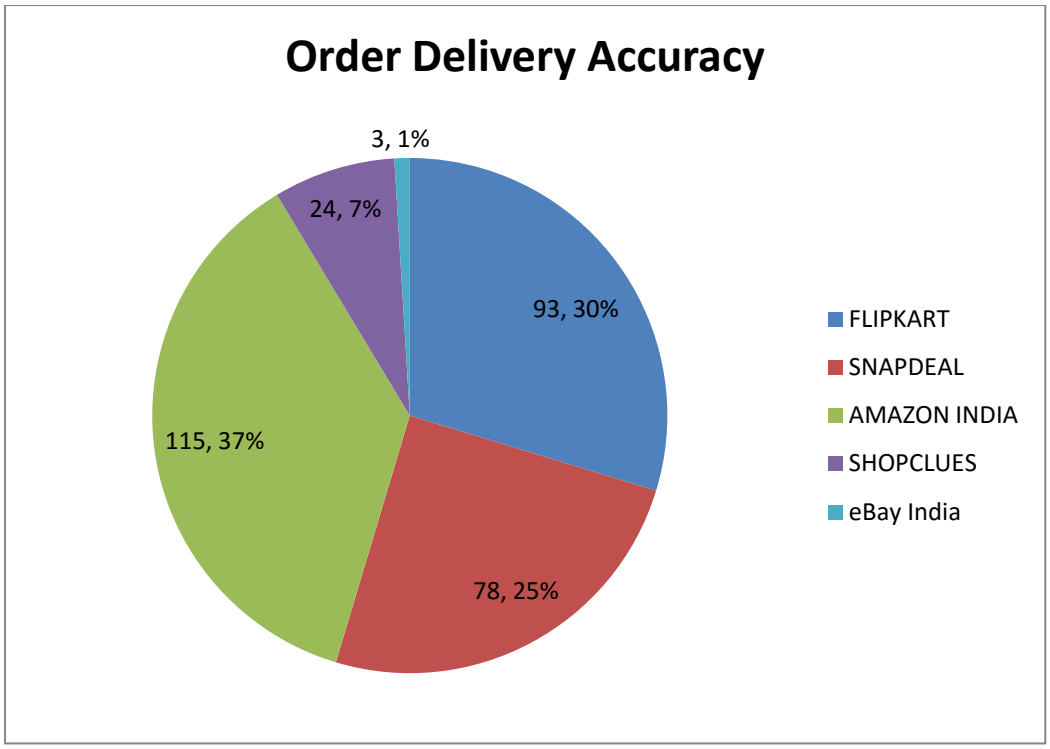


Figure 4.6: Pie Chart Order Delivery Accuracy

The orders can be delivered to the customer but if there are high chances are return it is directly correlated to the product quality, pricing and the damaged product delivery to the customer. The return has the impacts on the vendor, third part logistics and marketplace because they have to bear the cost of return, the process to manage the return and damage in return. Time to manage the return is crucial from the customer point of view and the process remain complicated then to deliver the product and most of the time refund or the correct delivery also need to manage for that the customer is not always ready to bear the cost.

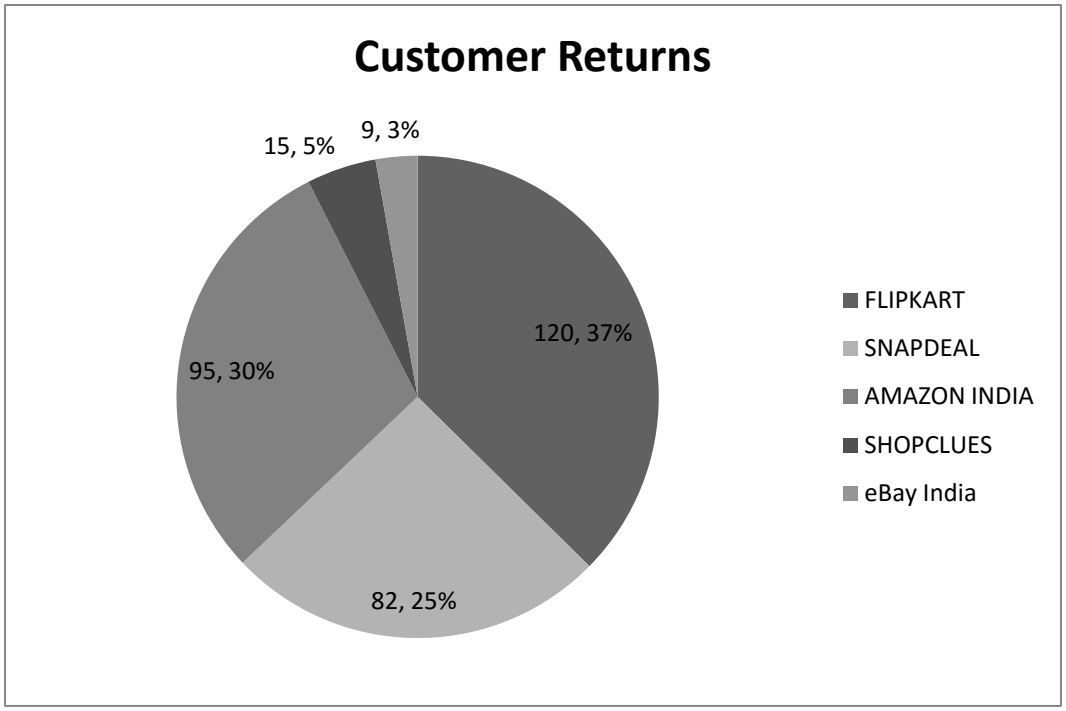


Figure 4.7: Pie Chart Customer Return

The cost of delivery of the goods is a considerable factor for the performance of the logistic partners. The cost have direct impact on the overall cost of the product and most of the time it is to be bear by the vendor or the customer. The customer service is directly impacted and his expectation from the marketplace is more if he is paying the cost for delivery as it is the additional cost to the product. If the cost is to be born by the vendor his profitability is impacted if it is higher then he may be attracted to other marketplace where the logistics cost are less and it is adding to his margins. Similarly it is also true for the return cost. The graph has been plotted and seen that the logistics cost is lowest in case of Flipkart and that's why most of the vendors are associated with flipkat on the other hand Amazon India has very high cost of delivery and return, Snapdeal is at 33%.

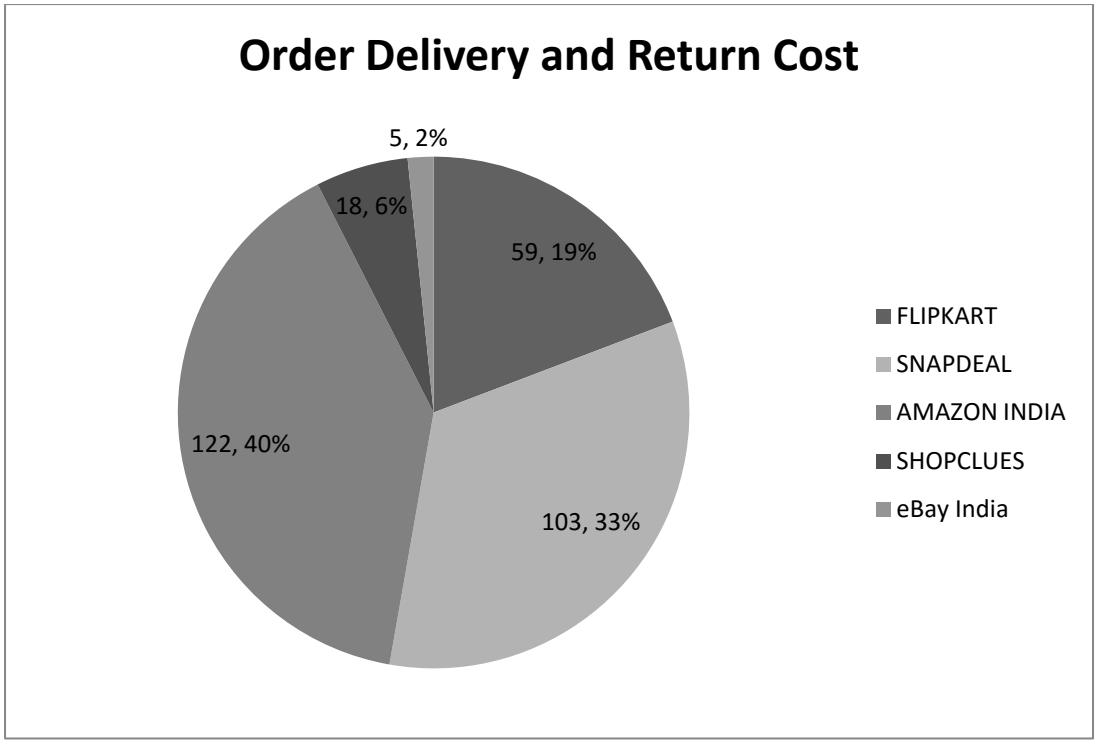


Figure 4.8: Pie Chart Logistics Cost(Order Delivery and Return)

Chapter 5

DISCUSSION AND CONCLUSION

5.1 Selection of Performance Parameters

This report is focused on evaluating the E-Commerce Supply Chain Performance Parameters those are relevant to the Indian e-Commerce industry. The stage wise analysis identified a group of e-Commerce E-Commerce Supply Chain parameters. Once those are identified they are being compared for the key players in the Indian B2C e-Commerce sector. Initially 42 performance parameters are identified and they are reduced to 30 after the personal interview from the industrial experts from the relevant industry. These 30 performance parameters are further divided into the different set of performance parameters. These are divided into four sets of Customer Performance Parameters, Vendor Performance Parameters, Marketplace Performance Parameters, and Logistics Partner Performance Parameters.

Table5.1: E-Commerce Supply Chain Performance Metrics

Customer Service Metrics	**Vendor Performance Metrics**	**Marketplace Performance Metrics**	**Logistics Partner Performance Metrics**
Warranty	Delivery Item Accuracy	Documentation Accuracy	Delivery Performance to Customer Commit Date
Returns	Delivery Quantity Accuracy	Payment Cycle Time(Vendor)	Damage in Transit
Customer's Risk Rating	Source Cycle Time	Ordering Cycle Time(Customer)	Product Delivery Cycle Time
Product's Risk Rating	Suppliers Risk Rating	Customer Returns	Return Cycle Time
Order Fill Rate	Sourcing Cost(Vendor)	Ease of Ordering	Material Transportation Cost
Product Quality	Inventory	Warehouse Space Utilization	Return Cost
Repeat Versus New Customer Sales	Supplier Delivery Performance	Percent of Products Presenting 80% of sales	
Backorders/Stock Out		Cash-to-cash Cycle Time	
Competitive Pricing			

5.2 Identification of Key Performance Parameters

The four set of identified performance metrics are further reduced to identification of key performance parameters. We use the factor analysis for data reduction. Principle Component Analysis is applied on each set of performance parameters separately. We identified the components from this. On applying PCA on nine customer service metrics, we extract two components that is order fulfillment, and competitive product and pricing. On application of PCA on 7 factors of Vendor Performance Parameters one component is extracted that is Order delivery accuracy. On applying PCA on Marketplace Performance Metrics one component is extracted customer returns. On applying PCA on Logistics Partner Performance Metrics one component is extracted that is order delivery and return cost.

5.3 Comparative Study of B2C e- Commerce Companies

Five key players in the Indian B2C eCommerce sector are compared on the selected E-Commerce Supply Chain parameters based on customer survey. This has been identified that Amazon India is good in Order Fulfillment, Competitive Pricing and Order Delivery Accuracy but they have very high order delivery and return cost. Flipkart is good in order fulfillment and Delivery item accuracy their shipping cost is also low but they have very high returns. Snapdal is good in order item accuracy and competitive pricing but they are weak in order fulfillment. ShopClues and eBay India don't have significant presence to have enough of data.

These components are further measured for the performance for the key players in the Indian e-Commerce industry, Mostly for the online marketplaces. The first component is order fulfillment the order fulfillment is the key to success. The customer places the order and the marketplace is not able to fulfill the requirement of the customer. These requirements may be the on time delivery, delivery accuracy, the vendor don't have enough inventory or because of some reason the vendor was not able to fulfill the requirement. The mentioned criterion are combined to called it order fulfillment and it is the key for the success of the online marketplaces. When we compared the performance of the five major players in the Indian e-commerce sector we find out that the Amazon India is ranked

number one in the order fulfillment with the 40% of the customer are favouring this, and the Flipkart is second when the comparison is drawn, Snapdeal ranked 3rd with th 17% and Shopcluses and the e-Bay india is last place.

The similar study was conducted for the Competitive Pricing. The survey was sent to 500 customers those are regular online buyers. Out of these 325 are given response for competitive pricing. The data has been collected and analyzed. A pie chart was plotted. Pricing is a major factor for the marketplace selection, from the chart Amazon India is 47% customers are satisfied, for flipkart and Snapdeal 26% and 20% respectively.

The third factor is order delivery accuracy is the measure of how effetely the vendor is able to process the order. A total of 46 vendor was surveyed for this and 37% favored Amzaon India, 30% Flipkat, 25% Snapdeal and 7% Shopcluses and rest are of eBay India. The vendor performance is very important as this is also defining the marketplace performance. If vendor is not able to deliver the order correctly the ultimately the customer remain in contact with marketplace, he is not directly related to vendor.

The orders can be delivered to the customer but if there are high chances are return it is directly correlated to the product quality, pricing and the damaged product delivery to the customer. The return has the impacts on the vendor, third part logistics and marketplace because they have to bear the cost of return, the process to manage the return and damage in return. Time to manage the return is crucial from the customer point of view and the process remain complicated then to deliver the product and most of the time refund or the correct delivery also need to manage for that the customer is not always ready to bear the cost.

The cost of delivery of the goods is a considerable factor for the performance of the logistic partners. The cost have direct impact on the overall cost of the product and most of the time it is to be bear by the vendor or the customer. The customer service is directly impacted and his expectation from the marketplace is more if he is paying the cost for delivery as it is the additional cost to the product. If the cost is to be born by the vendor his profitability is impacted if it is higher then he may be attracted to other marketplace where the logistics cost are less and it is adding to his margins.

Similarly it is also true for the return cost. The graph has been plotted and seen that the logistics cost is lowest in case of Flipkart and that's why most of the vendors are associated with flipkat on the other hand Amazon India has very high cost of delivery and return, Snapdeal is at 33%.

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers , and attendant information technologies and their application to business. It has also completely altered in the methods used in the demand and E-Commerce Supply Chain process. e-Business has focused on new information products. e- Business has emphasized the cost saving significance of the Internet and the attendant technologies when doing business.

Chapter 6

LIMITATIONS AND FUTURE SCOPE

There were lot of efforts been done in the area of E-Commerce Supply Chain performance management but little efforts been done in the sector of eCommerce. Such study will facilitate the evaluation of E-Commerce Supply Chain related parameters with related to ecommerce industry with time. However, There are some issues in its implementation, such as response rate and getting response from same respondents. These will be handled by contacting the prior respondents to make them aware about the follow-up study.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers , and attendant information technologies and their application to business. It has also completely altered in the methods used in the demand and E-Commerce Supply Chain process. e-Business has focused on new information products. e- Business has emphasized the cost saving significance of the Internet and the attendant technologies when doing business, these factors those are affecting the costs this affects the costs of transactions, internal management, and marketing of products. Reactions to the opportunities and challenges of the Internet have embraced every detail of the business environment.

When it comes to manage the supply chain related issues in the e-Commerce business. The major players are the customer who is always a king in this market, The vendor

who is always a point to supply the products to the customers but the whole business is dependent on him. He is the key point for the order fulfillment, He is the point which is managing the physical inventory, It is the point which is giving clarity to the marketplace for the availability of the stock and the products. It is not only responsible for the quantity and quality of the product which is representing the reputation of the marketplace. Packaging of the product is also done at the vendor's end and the return and replacement is also managed by him. Lot of money involvement is their of the vendor as his stock remain in transit and till the customer don t get delivery of the product he don't gets the amount for his products.

The logistics partner is responsible for the safe and timely delivery of the product. In case of the cash on delivery they are also responsible for collection of amount from the customer and in case of the return they are also responsible for collection of goods and return of money. The faster and timely delivery is key for the customer satisfaction.

The marketplace is responsible for managing the system behind this online process. Cataloguing of the products the customer attention the easy product search, The effective management of the categories and promotion of the product. Ease of ordering and ease of payment makes the process easier for the customer. The rise of the Internet services by the service providers.

The work has been done in the space of survey related to the different sectors by many research agencies like PWC, AT&T, The Postal department of Railway but little work has been done in the integrated approach related to the performance of all the key components in the supply chain. Intergrated approach is needed which can bring the flexibility, agility and responsiveness of the supply chain in the area of e-Commerce.

REFERENCES

[1] Gunjan Soni and Rambabu Kodali (2014), " An empirical investigation of E-Commerce Supply Chain management excellence framework in Indian Manufacturing Industry, Proc IMechE, Part-B: J Engineering Manufacture.

[2] A. Gunasekaran, C. Patel and Ronald E. McGaughey, (2004), "A framework for E-Commerce Supply Chain E-Commerce Supply Chain Performance Measurement" Int. J. Production Economics 87 pp. 333–347.

[3] De Toni, A., Tonchia, S., (2001). "E-Commerce Supply Chain Performance Measurement Systems: Models, characteristics and measures". International Journal of Operations & Production Management 21(1/2), pp.46–70.

[4] Kaplan, R.S., Norton, P.D.(1992). "The balanced Supply Chain Council's SCOR modeleboard measures that drives performance". Harvard Business Review 70 (1),pp. 71–79.

[5] Lee, H.L., Billington, C., (1992). "Managing E-Commerce Supply Chain inventory: Pitfalls and opportunities". Sloan Management Review 33 (3),pp. 65–73.

[6] Jinghua Huang, Ximin Jiang, and Qian Tang(2009), "An e-commerce performance assessment model: Its development and an initial test on e-commerce applications in the retail sector of China", Information & Management 46, pp. 100–108.

[7] W. Hong, K. Zhu,(2006)."Migrating to internet-based e-commerce: factors affecting ecommerce adoption and migration at the firm level", Information & Management"43 (2), pp. 204–221.

[8] Goknur Arzu Akyuz, and Turan Erman Erkan(2010), "E-Commerce Supply Chain E-Commerce Supply Chain Performance Measurement: a literature review" International Journal of Production Research, Vol. 48, No. 17, 1 September 2010, 5137–5155

[9] Akyu¨ z, G.A. and Rehan, M.,(2009). "Requirements for forming an 'e-E-Commerce Supply Chain". International Journal of Production Research, 47 (12), 3265–3287.

[10] Gunasekaran, A. and Ngai, E.W.T., (2004). “Information systems in E-Commerce Supply Chain integration and management”. European Journal of Operations Research, 159 (2), pp.269–295.

[11] Gunasekaran, A. and Kobu, B., (2007). “E-Commerce Supply Chain Performance Measures and metrics in logistics and E-Commerce Supply Chain management: a review of recent literature (1995–2004) for research and applications”. International Journal of Production Research, 45 (12), 2819–2840.

[12] Yao, K. and Liu, C.,(2006). An integrated approach for measuring E-Commerce Supply Chain performance. Journal of Modern Accounting and Auditing, 2 (10), pp. 17-21.

[13] Kuo-chung Chang, Joyce Jackson, and Varun Grover, (2003), “E-commerce and corporate strategy: an executive perspective”, Information & Management 40 (2003) pp.663–675.

[14] Jungpil Hahn, and Robert J. Kauffman(2001), “ EVALUATING WEB SITE PERFORMANCE IN INTERNET-BASED SELLING FROM A BUSINESS VALUE PERSPECTIVE”, Submitted to 2001 International Conference on Electronic Commerce, October 2001, Vienna, Austria.

[15] Yixiang Zhang, Yulin Fang, Kwok-Kee Wei, Elaine Ramsey, Patrick McCole, Huaping Chen(2011), “Repurchase intention in B2C e-commerce—A relationship quality perspective”, Information & Management 48, pp. 192–200.

[16] Xiaobing Yu, Shunsheng Guo, Jun Guo, and, Xiaorong Huang(2011), “Rank B2C e-commerce websites in e-alliance based on AHP and fuzzy TOPSIS”, Expert Systems with Applications 38, 3550–3557.

[17] Pece J. Mitrevski, and Ilija S. Hristoski(2014), “Behavioral-based performability modeling and evaluation of e-commerce systems”, Electronic Commerce Research and Applications 13, pp. 320–340.

[18] Liwei Bao, Yuchi Huang, Zengjun Ma, Jie Zhang, Qingchu Lv,(2012), “On the E-Commerce Supply Chain Management Supported by E-Commerce Service Platform for Agreement based Circulation of Fruits and Vegetables”, Physics Procedia 33, 1957 – 1963.

[19] Marta Kadłubek*(2015), “The Selected Areas of E-logistics in Polish E-commerce”, Procedia Computer Science 65, pp. 1059 – 1065.

[20] Anke Thede, Albrecht Schmidt, and, Christian Merz, (2015), "Integration of goods delivery supervision into E-Commerce E-Commerce Supply Chain" Research gate.

[21] Deepak Hajoary, (2015), " Analysis of E-Business E-Commerce Supply Chain Management Strategies in Modern World", International Journal of Advance Research in Computer Science and Management Studies, Volume 3, Issue 10, pp. 77-81.

[22] Chao-Min Chiu,Eric T. G. Wang,Yu-Hui Fang, and Hsin-Yi Huang,(2014) "Understanding customers' repeat purchase intentions in B2C e-Commerce: the roles of utilitarian value, hedonic value and perceived risk", Info Systems J Vol. 24, pp. 85–114

[23] Hassan Golkar, and Sina Zeynali,(2014), " Reviewing the Role of Electronic Commerce (EC) on E-Commerce Supply Chain Management (SCM) of Corporations", International Journal of Operations and Logistics Management, Volume: 3, pp.: 269-274.

[24] Roel Gevaers, Eddy Van de Voorde, and Thierry Vanelslander,(2014), "Cost Modelling and Simulation of Last-mile Characteristics in an Innovative B2C E-Commerce Supply Chain Environment with Implications on Urban Areas and Cities" Procedia - Social and Behavioral Sciences 125, pp.398 – 411.

[25] Meng Yang,(2012), "E-Commerce Supply Chain Management under E-Commerce Environment", International Journal of Innovation, Management and Technology, Vol. 3, No. 3, pp. 210-212.

[26] Muhammad Awais, and Tanzila Samin,(2012), "Advanced SWOT Analysis of E-Commerce", IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 2, No 2, pp-569-574.

[27] G. P. Kurien1, and M.N. Qureshi,(2011)," Study of E-Commerce Supply Chain Performance Measurement practices in E-Commerce Supply Chain management", International Journal of Business, Management and Social Sciences, Vol. 2, No. 4, pp. 19-34.

[28] Robert Bucki; Petr Suchánek,(2011), "METHOD OF E-COMMERCE SUPPLY CHAIN OPTIMIZATION IN ECOMMERCE", Journal of Applied Economic

Sciences (JAES) (Journal of Applied Economic Sciences (JAES)), issue: 3(17) pp.257-263.

[29] Angappa Gunasekaran, Kee-hung Lai, and T.C. Edwin Cheng,(2008)," Responsive E-Commerce Supply Chain:Acompetitive strategy in a networked economy", Omega, The international Journal of Management Science, Vol. 36, pp.549 – 564.

[30] Lina Zhou, Liwei Dai and Dongsong Zhang,(2007), "ONLINE SHOPPING ACCEPTANCE MODEL — A CRITICAL SURVEY OF CONSUMER FACTORS IN ONLINE SHOPPING", Journal of Electronic Commerce Research, VOL 8, NO.1, pp. 41-62.

[31] A. Gunasekaran, C. Patel, Ronald, and E. McGaughey,(2004), "A framework for E-Commerce Supply Chain E-Commerce Supply Chain Performance Measurement", Int. J. Production Economics 87 , pp. 333–347.

[32] Fisher, L.M., (1997)." What is the right E-Commerce Supply Chain for your product?" Harvard Business Review 75 (2), pp. 105–116.

[33] Gunasekaran, A., Patel, C., Tirtiroglu, E.,(2001)." Performance measure and metrics in a E-Commerce Supply Chain environment", International of Operations & Production Management (1/2), pp.71–87.

[34] Yanping Ding , (2014), "The Main Affecting Factors of the B2B E-Commerce E-Commerce Supply Chain Integration and Performance ", International Journal of u- and e- Service, Science and Technology , Vol.7, No.1, pp.145-158

[35] Hamid Kazemkhanlou, Hamid Reza Ahadi,(2014), "Study of E-Commerce Supply Chain Performance Measurement Practices in E-Commerce Supply Chain Management", Proceedings of the 2014 International Conference on Industrial Engineering and Operations Management, Bali, Indonesia

[36] Manoj Pandey, Rajesh Kr Dubey , (2014), "E-Commerce Supply Chain Performance Measures in E-Commerce Supply Chain Management" Indian Journal of applied research, Vol. 4 , PP 14-17.

[37] Dr. Kh. Dhiren Meetei, O. Deepakkumar Singh, (2013), "E Commerce in Rural India", Indian Journal of applied research, Vol. 3 , PP 103-104.

[38] Ohidujjaman , Mahmudul Hasan, Mohammad Nurul Huda, (2013), "E-commerce Challenges, Solutions and Effectiveness Perspective Bangladesh",

International Journal of Computer Applications (0975 – 8887) Volume 70– No.9, PP 9-17.

[39] Zhengchi Liu*, Jennifer Shang Mingyong Lai (2015) "INCENTIVE MECHANISM FOR KNOWLEDGE SHARING IN E-COMMERCE SERVICE E-COMMERCE SUPPLY CHAIN: COMPLEMENTARITY, INTEGRATION AND RISK ATTITUDE ", Journal of Electronic Commerce Research, VOL 16, NO 3

[40] Gareth R. T. White, Ademola Afolayan and Eoin Plant(2014), "Challenges to the Adoption of E-commerce Technology for E-Commerce Supply Chain Management in a Developing Economy: A Focus on Nigerian SMEs, E. Lacka et al. (eds.), E-commerce Platform Acceptance,(PP: 23-39), Springer International Publishing Switzerland

[41] Shahzad Ahmad Khan1*, Yan Liang1, Sumaira Shahzad2,(2014), "Adoption of Electronic E-Commerce Supply ChainManagement and E-Commerce by Small and Medium Enterprises and Their Performance: A Survey of SMEs in Pakistan", American Journal of Industrial and Business Management, , 4, PP 433-441

[42] Yanping Ding , (2014), "The Main Affecting Factors of the B2B E-Commerce E-Commerce Supply Chain Integration and Performance ", International Journal of u- and e- Service, Science and Technology , Vol.7, No.1, pp.145-158

[43] Hamid Kazemkhanlou, Hamid Reza Ahadi,(2014), "Study of E-Commerce Supply Chain Performance Measurement Practices in E-Commerce Supply Chain Management", Proceedings of the 2014 International Conference on Industrial Engineering and Operations Management, Bali, Indonesia

[44] Manoj Pandey, Rajesh Kr Dubey , (2014), "E-Commerce Supply Chain Performance Measures in E-Commerce Supply Chain Management" Indian Journal of applied research, Vol. 4 , PP 14-17.

[45] Dr. Kh. Dhiren Meetei, O. Deepakkumar Singh, (2013), "E Commerce in Rural India", Indian Journal of applied research, Vol. 3 , PP 103-104.

[46] Ohidujjaman , Mahmudul Hasan, Mohammad Nurul Huda, (2013), "E-commerce Challenges, Solutions and Effectiveness Perspective Bangladesh", International Journal of Computer Applications (0975 – 8887) Volume 70– No.9, PP 9-17.

[47] Meng Yang,(2012), "E-Commerce Supply Chain Management under E-Commerce Environment", International Journal of Innovation, Management and Technology, Vol. 3, No. 3, June 2012

[48] Nisha Chanana, **Sangeeta Goele, FUTURE OF E-COMMERCE IN INDIA" International Journal of Computing & Business Research," Proceedings of 'I-Society 2012' at GKU

[49] Siamak Azadi, Elham Rahimzadeh, "DEVELOPING MARKETING STRATEGY FOR ELECTRONIC BUSINESS BY USING MCCARTHY'S FOUR MARKETING MIX MODEL AND PORTER'S FIVE COMPETITIVE FORCES " Emerging markets journal, Volume 2 (2012)

[50] Muhammad Awais, Tanzila Samin, "Advanced SWOT Analysis of E-Commerce" , IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 2, No 2, March 2012, PP 569-574

[51] Robert Bucki; Petr Suchánek , "METHOD OF E-COMMERCE SUPPLY CHAIN OPTIMIZATION IN ECOMMERCE ", Journal of Applied Economic Sciences (JAES) (Journal of Applied Economic Sciences (JAES)), issue: 3(17) / 2011, pages: 257-263

[52] "Innovation in e-Commerce", The Stanford Global E-Commerce Supply Chain Management Forum and International Post Corporation , 1 February 2011, Stanford University, Palo Alto, California

[53] Sarbapriya Ray, "Emerging Trend of E-Commerce in India: Some Crucial Issues, Prospects and Challenges", Computer Engineering and Intelligent Systems, ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online), Vol 2, No.5, 2011, PP 17-35

[54] Sherah Kurnia and Fei Peng, "Electronic Commerce Readiness in Developing Countries: The Case of the Chinese Grocery Industry" E-commerce, ISBN 978-953-7619-98-5, February, 2010, PP 203-228

[55] Ming-Chang Lee, Mei-Wen Han, "E-Business Model Design and Implementation in Supply-Chain Integration", Proceedings of the 2009 International Symposium on Web Information Systems and Applications (WISA'09), Nanchang, P. R. China, May 22-24, 2009, pp. 001-004

[56] Jorge R. León-Peña," eBUSINESS AND THE E-COMMERCE SUPPLY CHAIN MANAGEMENT", Business Intelligence Journal - July, 2008 Vol.1 No.1, PP 77-90

[57] Prof. Samir K. Srivastava, "COMPARATIVE ANALYSIS OF E-COMMERCE SUPPLY CHAIN MANAGEMENT PRACTICES OF A FEW SELECT FIRMS IN INDIA", Proceedings of the 17th POM Conference, Boston, Massachusetts, April 28 - May 1, 2006

[58] Katina Michael, Luke McCathie," The pros and cons of RFID in E-Commerce Supply Chain management" Proceedings of theInternational Conference on Mobile Business, 11-13 July 2005, 623-629. Copyright IEEE 2005.

[59] G.D. Karagiannopoulos, N. Georgopoulos and K. Nikolopoulos," Fathoming Porter's five forces model in the internet era", VOL. 7 NO. 6 2005, pp. 66-76, Q Emerald Group Publishing Limited, ISSN 1463-6697

APPENDICES

Appendix A- *Survey Questionnaire*

How do you personally evaluate the importance of the following e-Commerce performance parameter?

How important is…?	**Very Important(1)**	**Important(2)**	**So-so(3)**	**Less Important(4)**	**Not Important(5)**
Delivery item accuracy					
Delivery quantity accuracy					
Delivery performance to customer commit date					
Documentation accuracy					
Damage in transit					
Warranty					
Returns					
Source cycle time					
Payment cycle time(Vendor)					
Product delivery cycle time					
Package cycle time(Vendor)					
Stock shelf cycle time					
Ordering cycle time(Customer)					
Return cycle time					
Suppliers risk rating					
Customer's risk rating					
Product's risk rating					
Sourcing cost(Vendor)					
Material Transportation cost					
Order management cost					
Return cost					
Cost of goods sold					
Accounts payable					
Accounts Receivable					
Inventory					
Customer Returns					
Order Fill rate					
Ease of ordering					
Product quality					
New product time to market					
Market share					
Warehouse space utilization					
In transit inventory					
Employee Turnover					
Supplier delivery					

performance					
Percent of products presenting 80% of sales					
Repeat versus new customer sales					
Backorders/stock out					
Competitive Pricing					
Cash-to-cash cycle time					
Asset Value					
Return on Investment					

Name:

Designation: