Role of Logistics Service Providers in Building Competitive Advantage and Logistics Excellence of firms in Selected Industries in Kerala

Thesis submitted to the University of Calicut
for the award of the Degree of
Doctor of Philosophy in Commerce

By

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May 2018

Declaration

I, Rahul. K., hereby declare that the thesis entitled **"Role of Logistics Service Providers in Building Competitive Advantage and Logistics Excellence of firms in Selected Industries in Kerala"** is a bonafide research work done by me under the supervision of Dr. P. Mohan, Pro-Vice Chancellor, University of Calicut. I further declare that no part of this thesis has been presented before for the award of any degree, diploma or other similar title or recognition in any university.

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Date: 14.01.2019 — (Name with Seal)

Dedicated To

My Mother
Smt. Rukmini. K.M

My Father
Sri. K. Rajan

My Guide
Dr. P Mohan

And

The Goddess Saraswati

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University of Calicut

May 05, 2018 **Rahul K**

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List of Abbreviations

3PL	Third Party Logistics
4PL	Fourth Party Logistics
AGFI	Adjusted Goodness of Fit Index
AHP	Analytical Hierarchy Processing
ANOVA	Analysis of Variance
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EFA	Exploratory Factor Analysis
FAHP	Fuzzy Analytical Hierarchy Processing
GFI	Goodness of Fit Index
GL	Green Logistics
GoF	Goodness of Fit
K-S	Kolmogorov–smirnov
LPI	Logistics Performance Index
LSP	Logistics Service Provider
NFI	Normed Fit Index
RFID	Radio Frequency Identification
RL	Reverse Logistics
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
TLI	Tucker Lewis Index
TMS	Transport Management System.
WMS	Warehouse Management System

Chapter 1
Introduction

“Role of Logistics Service Providers in Building Competitive Advantage and Logistics Excellence of Firms in Selected Industries in Kerala”

“A journey of a thousand miles begins with a single step” – Confucius

1.1.Introduction

In today’s challenging competitive environment in the consumer goods industry of the country, the manufacturers strive for their products to reach the final customers before they turn to their rival’s products. This challenge is influenced by factors like globalization, deregulation, new business entrants, and convergence of the industries. Competition has outgrown companies to supply chain level as cost control hits the ceiling very soon and further efforts to reduce cost do not bear proportionate gains. Logistics has potential to reduce transaction and inventory costs. It plays a very critical role in gaining and retaining competitive advantage of enterprises in any industry.

Logistics is the process of planning, implementing and controlling efficient, cost-effective flow and storage of raw materials, in- process inventory, finished goods and related information from point of origin to point of consumption for the purpose of conforming to customer requirements. The mission of logistics is to get the right goods or services to the right place, at the right time, and in the desired condition and quantity in relation to customers order (Risch, 1991).

The Indian logistics sector comprises inbound and outbound segments of the manufacturing and service supply chains. Of late, the logistics infrastructure has gained a lot of attention both from business firms and policy makers. The role of managing logistics infrastructure to effectively compete has been under-emphasized. Inadequate logistics infrastructure has an effect of creating bottlenecks in the growth of an economy. The logistics management regimen has the capability of overcoming the disadvantages of the infrastructure in the short-run while providing cutting edge competitiveness in the long term.

Demand for logistics services in India has been largely driven by the remarkable growth of the economy. The growth is being projected at 9-10 percent in the next few years, with the compounded annual growth rate (CAGR) expected to grow at a rate of 7-8 per cent. This growth is expected to gain greater momentum due to the exponential growth of the Indian economy (Amit Maheshwari, CEO, Softlink). Logistics management is an important way for companies to reduce their costs and to improve their overall customer service (Fernie and Sparks (1998)). However, these benefits can only be gained when the company in question makes decisions regarding its shipping and delivering methods based on all factors, and not just price alone.

Role of logistics providers is continuously evolving in India. In the last two decades, concept of logistics outsourcing has been widely accepted where the logistics providers act as single point of contact for customers various logistics needs. Now companies are moving to 4 PL & 5PL formats as well where the logistics provider will act as extended logistics arm of the customer and will act as single point of contact. At present, logistics outsourcing become relevant for the companies to achieve better competitive potential. Generally, logistics service providers do contribute to the improvement of their customer's performances in various ways such as logistics or supply chain optimization, cost reduction, value creation, competitive potential, strategy development (Fabbe-costes et al., 2009).

1.2. Statement of the Research Problem

Logistics deals with effective management of time and place utility. It can be regarded as the flow of material from the origin to the destination. The logistics activity primarily depends on the timeliness in which products are handed over to a destination. As deferred delivery can cause momentous losses to the recipient of the consignment in most cases, promptness is of utmost importance. Logistics forms a critical part of the supply chain and involves the planning, implementation, and effective forward and reverse flow of goods, services and related information from origin to recipient.

The success stories of every manufacturing as well as non-manufacturing organisation begin with its efficient supply chain management. As supply chains become more complex, it means dealing with multiple vendors to co-ordinate, allowing redundancy and inefficiency to creep in easily. This is where logistics service providers come into the picture, to provide a one-stop solution. A typical logistics service provider provides in depth logistics knowledge and experience that importers need to become leaner and most efficient to focus on core competencies. The role of logistics service providers today is not restricted to storing and distribution but rather to serve as a partner by identifying problems and implementing solutions that add value to supply chain. Logistics providers help big and small organisations to overcome various challenges in supply chain management like minimizing cost, ensuring efficient inventory management, assure speed to market, minimize wastage, minimize touch points, removal of unnecessary trade barriers etc.

It is a matter of speculation for companies as to the overall impact of logistics functions. Quantitative and qualitative benefits accrue to companies from their logistics function. In this context, it becomes necessary to look into the cost and benefits of logistics systems for companies and how much it influences their competitive potential and logistics excellence. The study has set a few questions to direct the course of exploration and measurement.

1.3. Research Questions

1. What are the reasons for logistics outsourcing?
2. What are the factors behind the selection of a logistics service provider?
3. How the customers are accommodated through logistics service outsourcing?
4. How does a company create value through logistics?
5. What is the role of a logistics service provider in achieving competitive advantage and logistics excellence?

1.4. Objectives of the Study

The objectives of the study are divided into two categories as primary and secondary objectives.

i. Primary Objectives

The primary objective of this study is to assess the role of logistics service providers in achieving competitive advantage and logistics excellence.

ii. Secondary Objectives

1. To assess the reasons for logistics outsourcing and to assess the factors considered while selecting a logistics service provider
2. To assess how the customers are accommodated through logistics service outsourcing
3. To explore how a company can create value through logistics
4. To assess the role of logistics service providers in achieving competitive advantage and logistics excellence

1.5. Hypotheses

The hypotheses in this study have been classified into three groups based on the objectives of the study. No hypothesis is set for the first objective. Hypotheses set for objective two of the study are:

1. H_0= There is no significant difference in customer service among the three industries.
2. H_0= There is no significant difference in customer satisfaction among the three industries.
3. H_0= There is no significant difference in customer success among the three industries.

For objective three of the study, three hypotheses were formulated and tested.

4. H_0= There is no significant relationship between efficiency and value creation
5. H_0= There is no significant relationship between effectiveness and value creation
6. H_0= There is no significant relationship between differentiation/ relevance and value creation.

For objective four of the study, the following hypotheses were formulated.

7. H_0= There is no significant relationship between customer service and customer satisfaction
8. H_0= There is no significant relationship between customer satisfaction and customer success.
9. H_0= There is no significant relationship between customer service and customer accommodation.
10. H_0= There is no significant relationship between customer satisfaction and customer accommodation.
11. H_0= There is no significant relationship between customer success and customer accommodation.
12. H_0= There is no significant relationship between customer accommodation and value creation.
13. H_0= There is no significant relationship between value creation and competitive advantage
14. H_0= There is no significant relationship between competitive advantage and logistics excellence.

1.6. Scope and Significance of the Study

Every business firm has to move stock of materials and finished goods. Manufacturers have factories that collect raw materials from suppliers and deliver finished goods to wholesalers and retail shops receive deliveries from wholesalers (Risch, 1991). Logistics includes all of the shipping and delivering involved in the production process, including getting raw materials from vendors to the manufacturer and taking the finished products from the manufacturer to the distributors (Christopher, M., 1998,). Since logistics is so critical to the success of a business, managing these transportation decisions effectively is vital. Logistics has played a major part in the development of the principles of supply chain management, mainly because of the importance of maintaining low inventory levels, but at the same time providing stock availability (Min and Mentzer, 2000).

This study analyses the role of logistics service providers in building competitive advantage and logistics excellence of firms in selected industries in Kerala. Firstly, the study developed a theoretical framework to examine the concept of logistics management and third party logistics within the context of Indian business environment. It explored various aspects and practices of logistics systems implemented in companies. Secondly, in addition to the theoretical framework, the study investigated the concept and dimensions of logistics service outsourcing industry. Thirdly, the study explores the reasons for logistics outsourcing and the factors considered while selecting a logistics service provider. Fourthly, the study identified metrics for evaluation of logistics system and carry out a detailed analysis of the performance of logistics system maintained by the sample companies. Finally, the study carried out a detailed analysis of the value addition process, competitive advantage and logistics excellence of logistics systems and how companies exploit such potential.

1.7. Conceptual Model

A conceptual model is a representation of a system, made of the composition of concepts which are used to help people know, understand, or simulate a subject the model represents. The following conceptual model has been used in this study

(See figure 1.1). It consists of seven constructs, i.e, customer service, customer satisfaction, customer success, customer accommodation, value creation, competitive advantage and logistics excellence.

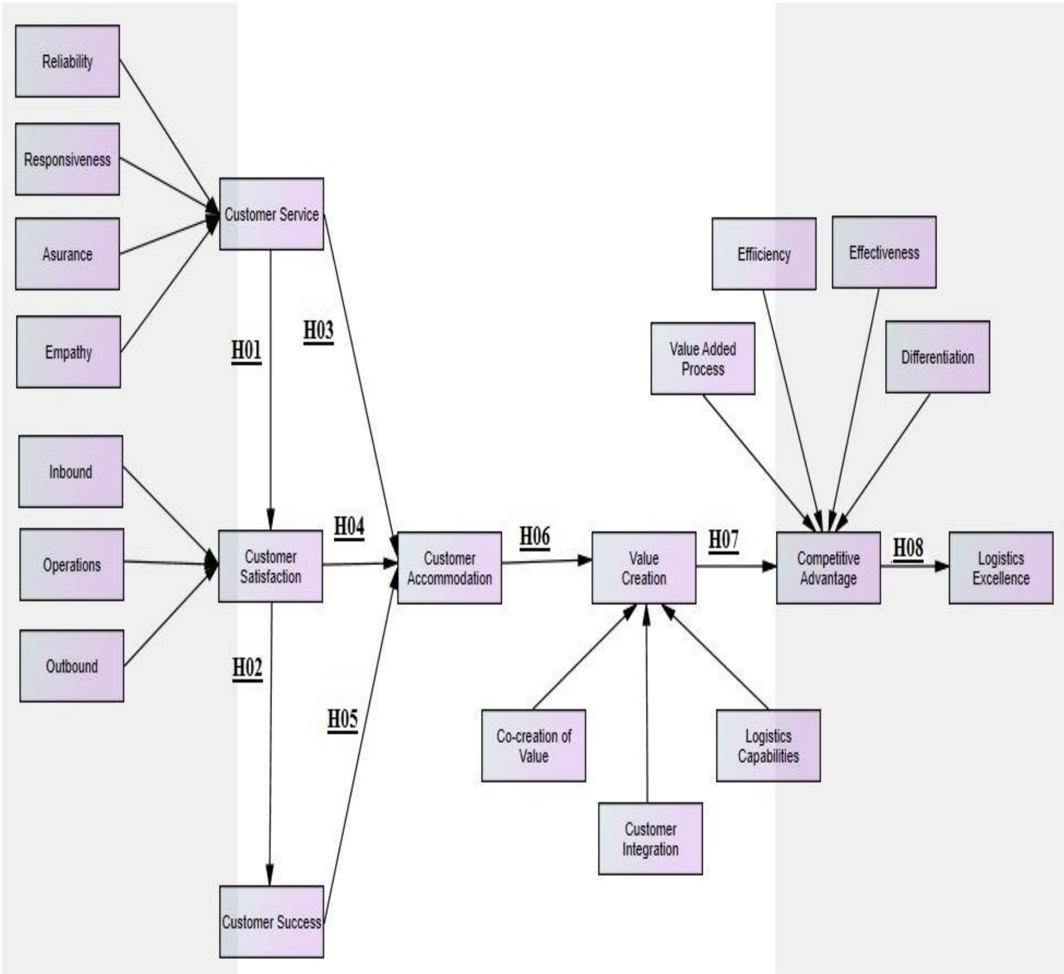

Fig 1.1: Structural Equation Model (SEM) for the study.

1.8. Research Methodology

Research methodology not only describes the steps involved in conducting the research, but also justifies the choice of various methods, states the limitations of research and also brings out the pre-suppositions of consequences of conducting the research. The intention is to elaborate the conceptual framework and test the relationships through collection and analysis of data.

i. Research Design/ Types of Research

Depending on the purpose, logic, and outcome of the research, research can be classified in different names (Hussey et al, 1997). The table below explains the types of research with its basics of classification.

Table 1.1

Types of Research

Types of research	Basics of classification
Exploratory, descriptive, analytical and predictive	Purpose of the research
Quantitative or qualitative research	Process of the research
Deductive or inductive research	Logic of the research
Applied or basic research	Outcome of the research

The descriptive research design is most suitable for the study. The descriptive design is used when the purpose of study is to learn Who, What, When, Where and How about a topic. It attempts to examine situations in order to establish what is the norm, i.e. what can be predicted to happen again under the same circumstances. The present study attempts to identify the role logistics service providers in building competitive advantage and logistics excellence of firms in selected industries in Kerala.

ii. Pilot Study:

In order to test the reliability, variability and efficiency of the research instrument developed, a pilot study was conducted. For the pilot study, the data was collected from 50 companies. Based on the result derived, the questionnaire was changed accordingly.

iii. Population

Population of the study comprises the companies from three industries which outsource logistics to logistics service providers. The selected three industries were food processing industry, apparels and textiles industry, and rubber and agro products industry, because, the ingredients of these three industries come from different geographical locations and logistics plays an important role in ensuring the success of these industries.

iv. Respondents

The researcher selected managers or unit heads of the sample companies as the respondents for the study

v. Sample Size Criteria

The very heart of sampling concept is representativeness. A sample must be representative of the whole population. To get an appropriate sample size, three criteria usually need to be considered, i.e. the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured (Miaoulis and Michener, 1976).

a. **The level of precision:** The level of precision, sometimes called sampling error, is the range in which the true value of the population is estimated to be. Very often, it is expressed in percentage points (e.g. 5%).
b. **The confidence level:** The confidence level is an idea based on the central limit theorem. Central limit theorem explains that when a population is being used for sampling repeatedly, the average value obtained is equal to the true population value. In addition, the value derived from these samples is normally distributed to the true value, with having some higher or lower value than the true population value. Suppose 95% confidence level is selected, 95 out of 100 samples will have the true population value within the range.

c. **Degree of variability:** Degree of variability refers to the nature of distribution of attributes in the population. The more heterogeneous the population, the larger the sample size required to obtain a given level of precision.

vi. Calculation of Sample Size

Based on the investigation, it is found that the population for the study is 256. By applying the following formula, propounded by Krejcie and Morgan in an article titled “Determining sample size for research activities”, it derived a sample size of 154. The researcher took 180 as size of sample.

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

Where, **n=** required sample size

X^2= Chi-square for the desired confidence level at 5 degree of freedom

N= Population Size

P= Population Proportion (0.50)

ME= Desired Margin of Error (Expressed as proportion)

vii. Tools of Data Collection

The study has used both primary and secondary data

a. **Primary Data Collection Tools:** Primary data were collected from the logistics managers, general managers, officers and employees of the sample companies.

1. Interviews **2. Case study**

Personal Interview **Telephone Interview** **Sample Survey.** **Focus group Discussion**

The study employed personal interview, focus group discussion, questionnaire and observation to collect primary data. For this, the researcher approached logistic managers, general managers and other officers and employees of the selected companies.

b. Secondary Data: The secondary data for five years from 2009-10 to 2014-15 were compiled. The secondary data were collected from;

- Reports of Department of Industries and Commerce, Government of Kerala
- Reports of department of commerce, Government of India
- Reports of department of Textiles, Government of India
- Books, periodicals, theses and dissertations
- Other web sites

1.9.Tools of Data Analysis.

Statistical tools like mean, standard deviation etc.., have been used for summarising the classified primary data. To compare means one way ANOVA, and post-hoc analysis using Least Significant Difference (LSD) were applied. Before deciding the statistical tests, normality was assessed using Kolmogrov–smirnov test.

a. Mean, Standard Deviation and Percentages: Mean is the average of the numbers: a calculated "central" value of a set of numbers. Standard deviation is a quantity expressing by how much the members of a group differ from the mean value of the group. Percentage is a rate, number, or amount in each hundred.

b. **Analysis of Variance (ANOVA):** Analysis of Variance (ANOVA) is a statistical technique that assesses potential differences in a scale-level dependent variable by a nominal-level variable having two or more categories.

c. **Post-hoc analysis- Least Significant Difference (LSD):** This technique was developed by Ronald Fisher in 1935 and is used most commonly after a null hypothesis in an analysis of variance (ANOVA) test is rejected (assuming normality and homogeneity of variances). A significant ANOVA test only reveals that not all the means compared in the test are equal. Fisher's LSD is basically a set of individual *t*-tests, differentiated only in the calculation of the standard deviation. In each *t*-test, a pooled standard deviation is computed from only the two groups being compared, while the Fisher's LSD test computes the pooled standard deviation from all groups - thus increasing power. Fisher's LSD does not correct for multiple comparisons.

d. **Homogeneity of Variance:** The assumption of homogeneity of variance is that the variance within each of the populations is equal. This is an assumption of analysis of variance (ANOVA). ANOVA works well even when this assumption is violated except in the case where there are unequal numbers of subjects in the various groups.

e. **Exploratory Factor Analysis (EFA):** In multivariate statistics, exploratory factor analysis(EFA) is a statistical method used to uncover the underlying structure of a relatively large set of variables. EFA is a technique within factor analysis whose overarching goal is to identify the underlying relationships between measured variables.

f. **Confirmatory Factor Analysis (CFA):** In statistics, confirmatory factor analysis (CFA) is a special form of factor analysis, most commonly used in social research. It is used to test whether measures of a construct are consistent with a researcher's understanding of the nature of that construct (or factor)

g. **Structural Equation Modeling (SEM):** Structural equation modeling is a multivariate statistical analysis technique that is used to analyze structural relationships. This technique is the combination of factor analysis and multiple regression analysis, and it is used to analyze the structural relationship between measured variables and latent constructs

1.10. Scale Development

To get valid and reliable results, the scale must be well constructed and pre tested. The figure below depicts the various stages of scale development process. The scale once decided must be error free or with minimum possible error.

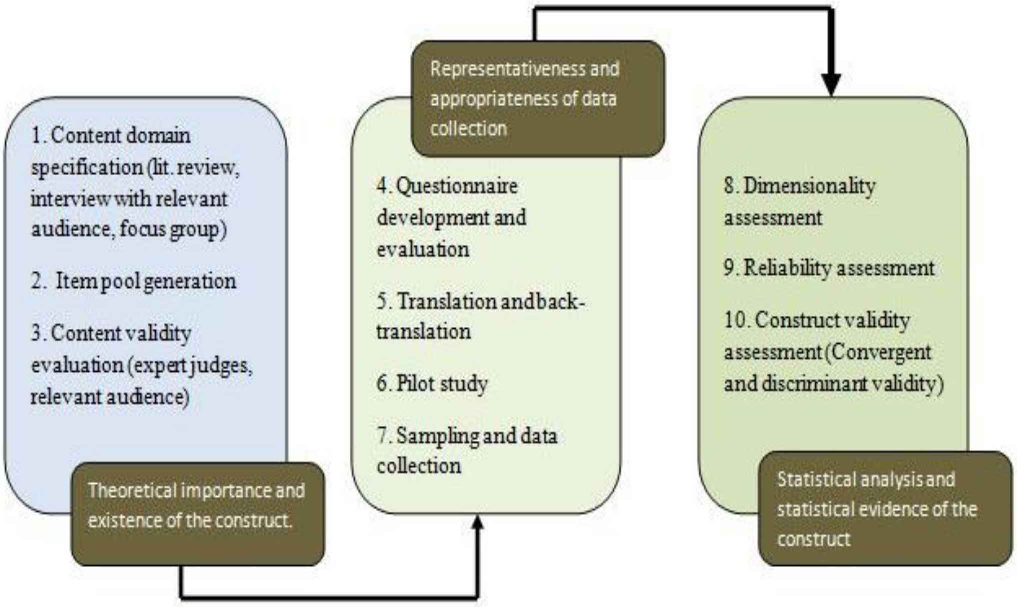

Fig 1.2: Ten stages of scale development adopted from Alenka Slavec, Mateja Drnovsek (2012)

Measurement items were developed from literature review and field visit. Scale development process has eight stages as suggested by Churchill (1979), which are illustrated below; (See **Chapter 4)**.

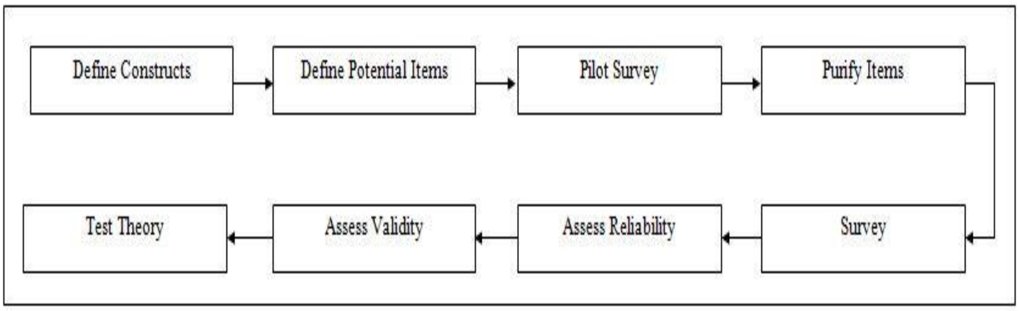

Fig 1.3: Scale development process

1.10.1. Validity

Research validity in surveys relates to the extent to which the survey measures right elements that needs to be measured. In simple terms, validity refers to how well an instrument measures what it is intended to measure. In this study, the researcher mainly tested three types of validity.

i. Content Validity and Face Validity

Content validity is the extent to which the elements within a measurement procedure are relevant and representative of the construct that they will be used to measure (Haynes et al., 1995). Establishing content validity is a necessarily initial task in the construction of a new measurement procedure (or revision of an existing one).

Face Validity is the most basic type of validity and it is associated with a highest level of subjectivity because it is not based on any scientific approach. In other words, in this case a test may be specified as valid by a researcher because it may seem as valid, without an in-depth scientific justification.

Application of content validity and face validity can be effectively facilitated with the involvement of panel of 'experts' closely familiar with the measure and the phenomenon. For this study, the experts strictly reviewed the objectives and questionnaire of the study. From the result of their analysis, Content validity and face validity were established..

ii. Construct Validity

Construct Validity relates to assessment of suitability of measurement tool to measure the phenomenon being studied. There are two types of construct validity.

a. **Convergent validity:** Convergent validity refers to the degree to which two measures of constructs that theoretically should be related are in fact related (Campbell & Fiske, 1959). Convergent validity can be established if two similar constructs correspond with one another, while discriminant validity applies to two dissimilar constructs that are easily differentiated (Hair et al., 2009). In this study, all the constructs were established convergent validity (See **Chapter 4)**.
b. **Discriminant validity:** Discriminant Validity is the degree to which measures of different traits are unrelated. Discriminant validity is assessed by comparing the shared variance (squared correlation) between each pair of constructs against the average of the AVEs for these two constructs (Shiu, E, Pervan, SJ, Bove, LL & Beatty, SE 2011,). In this study, all the constructs were established convergent validity (See **Chapter 4)**.

1.10.2. Reliability

Reliability in statistics and psychometrics is the overall consistency of a measure. A measure is said to have a high reliability if it produces similar results under consistent conditions. Two types of reliability were checked in this study, i.e.., Cronbach's alpha and composite reliability.

i. Cronbach's Alpha

Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items. In other words, the reliability of any given measurement refers to the extent to which it is a consistent measure of a concept, and Cronbach's alpha is one way of measuring the strength of that consistency.

The resulting α coefficient of reliability ranges from 0 to 1 in providing this overall assessment of a measure's reliability. If all of the scale items are entirely independent from one another (i.e., are not correlated or share no covariance), then $\alpha = 0$; and, if all of the items have high covariances, then α will approach 1 as the number of items in the scale approaches infinity. In other words, the higher the α coefficient, the more the items have shared covariance and probably measure the same underlying concept.

In this study, all the constructs scored Cronbach's alpha more than 0.7. Hence, it is concluded that the measurement constructs are reliable (See **Chapter 4**).

ii. Composite Reliability

The composite reliability estimates the extent to which a set of latent construct indicators share in their measurement of a construct, whilst the average variance extracted is the amount of common variance among latent construct indicators (Hair et al., 1998). In this study, all the construct achieved composite reliability (See **Chapter 4)**.

1.10.3. Normality

In statistics, normality tests are used to determine if a data set is well-modelled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. In this study, One-sample K-S test was used to assess the normality of data. The one sample K-S test revealed that the data are not normal. Then the researcher tried skewness and kurtosis for assuming normality. Skewness and Kurtosis values should be in the range of ± 2.58 and ±1.96. (Hair, Black, Babin, Anderson, & Tatham, 2006). The values of skewness and kurtosis were in limits. Hence, normality can be assumed. Hence the researcher can use parametric tests assuming normal distribution.

1.11. Definitions of the Variables Used for the Study

The definitions of the variables used in the study are given in the table below

Table 1.2

Definitions of Study Variables

Sl no	Variables	Definitions
1	Customer service	Customer service is a process for providing significant value added benefit to the supply chain in a cost effective way.
2	Reliability	Ability to perform the promised service dependably and accurately.
3	Responsiveness	Willingness to help customers and provide prompt service.
4	Assurance	Knowledge and courtesy of employees and their ability to convey trust and confidence.
5	Empathy	Caring, individualized attention the firm provides its customers.
6	Customer satisfaction	It is a measure of how products and services supplied by a company meet or surpass customer expectation.
7	Inbound	It is a measure of customer satisfaction during inbound phase of logistics.
8	Operations	It is a measure of customer satisfaction during operations phase of logistics.
9	Outbound	It is a measure of customer satisfaction during outbound phase of logistics.
10	Customer success	Customer success is the function at a company responsible for managing the technical and business relationships between a vendor and its customers with the intent of: (1) maximizing the value that customers generate from the solutions they acquired from the vendor by making them as profitable and productive as possible and (2) maximizing the value the vendor can in turn derive from the customers resulting in sustainable corporate profits and growth.

11	Customer accommodation	Customer accommodation is a value adding process which comprises of three concepts I.e, customer service, customer satisfaction and customer success.
13	Value creation	Value- an intangible concept that is frequently defined in terms of exceptional customer service that accompanies exceptional product quality and value based prices (Anderson and Vincze, 2000).
14	Co-creation of value	According to service-dominant logic (S-D Logic), value is defined and co-created by customers rather than being embedded in the output (Vargo and Lusch, 2004).
17	Customer integration	Customer integration involves identifying the long term requirements, expectations and preferences of current and /or potential customers and markets, and focusing on creating customer value.
18	Logistics capabilities	Capabilities or distinctive competencies have been defined in the literature as those attributes, abilities, organizational processes, knowledge and skills that allow a firm to achieve superior performance and sustained competitive advantage over competitors.
19	Competitive advantage	A condition or circumstance that puts a company in a favorable or superior business position.
20	Value added process	It describes the enhancement a company gives its product or service before offering the product to customers.
21	Efficiency	Efficiency is a measurable concept that can be determined by determining the ratio of useful output to total input.
22	Effectiveness	Effectiveness is the capability of producing a desired result.
23	Logistics excellence	Logistics excellence implies the quality of being outstanding or extremely good.

1.12. Definition of the Terms

- **Logistics:** Logistics is the positioning of resources at the right time, in the right place, at the right cot, at the right quality (Chartered Institute of Logistics and Transport (UK), 2005).
- **Competitive advantage:** Ability to gain through attributes and resources to perform at a higher level than others in the same industry or market (Christensen and Fahey (1984), Kay (1994), Porter (1980) cited by Chacarbaghi and Lynch (1999, pp.45).
- **Logistics innovations:** It means the way companies apply its assets, resources and capabilities to develop new ways to satisfy customer needs
- **Inbound logistics:** deals with the procurement and arrangement of the movement of the materials, parts, or finished materials from suppliers to manufacturing or assembly plants, warehouses or retail stores
- **Outbound logistics: Process R**elated to the storage and movement of the final product and the related information flow from end of the production line to the end user.
- **Logistics outsourcing:** it involves a relationship between a company and Logistics Service Providers (LSPs), which, compared with basic logistics services, has more customized offerings, encompasses a broad number of service activities, is characterized by a long-term orientation, and thus has a strategic nature (Baziotopoulos, 2008).
- **Third Party Logistics (3PL):** a firm that provides multiple logistics services for use by customers. Preferable, these services are integrated, or bundled together, by their provider. Among the services3PLs provide are transportation, warehousing, cross-docking, inventory management, packaging and freight forwarding (Council of Supply Chain Management Professionals).
- **Fourth Party Logistics (4PL):** an Integrator that assembles the resources, capabilities, and technology of its own organization and other organizations to design supply chain solutions (Accenture)

- **Green logistics:** Supply Chain management practices and strategies that reduce the environmental and energy footprint of freight distribution. It focuses on material handling, waste management, packaging and transport (Dr Jean-Paul Rodrique, Dr Brian Slack, and Dr Claude Comtois, 2006).
- **Reverse logistics:** The process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Re-manufacturing and refurbishing activities may be included in the definition of reverse logistics (Hawks, Karen, 2006).

1.13. Chapterization

The study will be presented in six chapters

- **Chapter 1. Introduction:** This Chapter presents the background of the research and the statement of the research problem. This chapter also explains the scope, significance and limitations of the study. Finally, it provides the definitions and descriptions of the terms used in this report.
- **Chapter 2. Review of Literature**: Chapter Two discusses the review of literature and studies relevant to the work.
- **Chapter 3. Theoretical Framework**: This chapter presents the theoretical framework related to the subject taken for the study.
- **Chapter 4. Research Methodology**: The chapter explains the methodologies used in the study.
- **Chapter 5. Data Analysis and Interpretation**: This chapter presents data analysis and interpretations.
- **Chapter 6. Summary, Findings and Recommendations**: This is the last chapter and it presents a summary of the study, findings and recommendations.

1.14. Limitations

- **Limited to Kerala and limited to three industries**.

The study is limited by geography to Kerala. Three industries, viz., ‘food processing’, ‘apparels and textiles’ and ‘rubber and agro products’, were chosen for the study.

- **Logistics services may vary among companies.**

The compositions of logistics activities tend to be varying from firm to firm. Therefore the research results in logistics context may not be valid for some companies with different logistics set up.

- **Wider concepts, narrow applications**

The concepts employed in this study like.., customer service, customer satisfaction, customer accommodation, value creation and competitive advantage, are wide but only a few of their features were applied for the study.

- **Relationship with LSP**

Presence of multiple logistics service providers, duration of relationship between the respondents and the logistics service providers were ignored. The respondents may employ more than one logistics service provider at a time for meeting their needs.

1.15. Scope for Further Research

1. Role of a logistics service provider in achieving sustainable business performance
2. A comparative study between logistics and green logistics.
3. Own logistics V/s Logistics outsourcing: a comparative study
4. Role of a logistics service provider in reverse logistics practices.

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Chapter 2

Review of Literature

REVIEW OF LITERATURE

2.1. Introduction

This chapter presents an overview of previous work on related literature and studies done by the researchers that provide the necessary background for the purpose of this research. This chapter includes four sections. In the first section, period of the thesis, and the source of the thesis are described. Review of related literature has been presented in part two. Section three describes dimension wise participation of theses. Finally, this chapter concludes by identifying the research gap and formulating the research question as the starting point for further analysis.

Section 1

2.2. Year Wise Classification of Literature Review

The table below (Table 2.1) depicts the year wise representation of studies. The studies of 25 years have been included, starting from 1991 to 2015.

Table 2.1

Year Wise Classification of Studies

S.no	Period	Number of studies
1	1991-95	06
2	1996-00	04
3	2001-05	18
4	2006-10	44
5	2011 onwards	36
	Total	**108**

108 relevant studies have been included in the literature review. Based on the information depicted in table 2.1, it is found that about 90 percent of the studies were happened after the year 2000. Only 10 studies were found before the year 2000. It may be inferred from the statistics that logistics and allied disciplines are still in an infancy stage.

2.3. Sources of Review

Table 2.2 explains the source in which studies have been taken for the review of literature. Mainly six sources were considered.

Table 2.2

Sources of Review

S.no	Sources/ web portal	Web address	Number of studies
1	ShodhGangotri	shodhganga.inflibnet.ac.in	15
2	Wiley online library	onlinelibrary.wiley.com	12
3	Diva portal	diva-portal.org	32
4	Jstor online library	jstor.org	12
5	science direct	sciencedirect.com	15
6	Other online web portals		16
7	Hard Copy from various library		6
	Total		**108**

It is found from the table 2.2 that majority of the studies were taken from online sources. Six of offline studies were identified from university libraries. Most foreign studies were taken from diva portal and major Indian studies were from Shodhganga.

Section 2

2.3. Literature Review

Reviews of 108 studies have been included in this section (See Table 2.3). Each study has been reviewed in four dimensions. I.e.., the objectives of the study, methodology adopted, dimensions of the study and major findings of the study.

Table 2.3

Review of Literature

Title	Author (Year)	Objectives of the study	Methodology	Dimensions of the study	Findings of the study
Effect of logistical operation relationship on the performance of supply chain management	Avinash D. Sarode (2010)	1. Identification of performance measures &sub measures, 2.Formulation of a procedure for evaluation of supply chain, 3. Evaluation of different links of supply chain & 4. Find out the weaker links in the SC.	Analytical hierarchy process (AHP)	Logistics, Supply chain management, performance measures and dub measures	1. Identified inbound logistics as the weakest link, 2. Sub measures of ‘cost’ like ‘defect’, ‘distribution cost’, ‘inventory’ and ‘intangible cost’ are needed to be improved

Some investigations on multi commodity reverse Logistics network modeling	CH. Kajendira Kumar (2008)	1. To form the framework for the multi-commodity reverse logistics network.	Genetic Algorithm Approach	Logistics, Reverse Logistics network, Multi-commodity RL network	1. Overall profit of the network increases with satisfied customer service level, 2. Vehicle routing saves logistics cost and time.
A comprehensive framework on study of logistics management in automobile transportation system in south India	R. Vijayan Pillai	1. To learn the logistics practices by the automobile companies in India, 2. To suggest an optimal logistics model for the industry, 3. To develop a model for inventory management.	Descriptive Research design, case study.	Logistics management, Demand forecast, warehouse shifting, Transportatio-n problems and modes	1. Develops demand forecasting model, 2. Optimum transportation model saves huge amount.
Evaluating logistics: the development of a method for examining a logistics system and its performance.	Anna Berg, Konrad von Otter Choroszy-nski (2008)	To Develop a method for examining logistics system and evaluating its performance.	Descriptive Workshops and case studies	Logistics, logistics evaluation, total cost, customer service	Suggest following areas to be improved: Administration cost, undersized facilities, Strong customers, procurement issues,

Third party logistics in Chinese automotive industry: a case study of a Chinese automotive manufacturer- shanghais general motors.	Luying Zhang, Zhaoyu Hou and Xiaoying Qiu (June 2012)	1. To study the factors affecting the conversion of self made logistics to third party logistics, 2. To find out the positive impact of third party logistics, 3. To assess the unique benefits of applying milk run system for the Chinese automotive manufacturers.	Qualitative method, Case study	Logistics, third party logistics, core competence, supply chain integration, and milk run.	Milk run system optimizes each of the logistics activities, and it enables to cut risk and cost.
Logistics outsourcing and selection of third party logistics service provider (3PL) Via FUZZY AHP	Erdal Cakir (2009)	Design, implement and deploy a decision support system for logistics service provider selection via fuzzy AHP model.	Analytical hierarchy process (AHP)	Logistics service provider selection, Fuzzy AHP, and 3PL	It needs care & support to defining the objectives & 3PL requirements of the company, suggests the adoption of qualitative& quantitative techniques to improve efficiency& the visibility in the managerial decisions

Returnable plastic packaging flow in the automotive industry: An evaluation of the washing from a green logistics perspective.	Aaron D. Castillejo T, Fredrik Stensson (2011)	1. To explore the scope for re design of the current supply chain to reduce washing of the boxes, 2. To find the environmental impact of washing of one plastic box.	Case study, Life Cycle Assessment (LCA)	Returnable packaging, reverse logistics, life cycle assessment, material flow mapping, and lean.	Eliminating unnecessary washing of returnable plastic boxes, introduction of new washing process.
Factors affecting logistics service competencies: An empirical study of logistics providers in china	Ming Juan Ding (August 2011)	To understand how routinised operation processes and HRM practices impact on L&SC competencies of LSPs in China.	Explanatory	Logistics services, business processes, logistics and supply chain competencies, human resource management, resource based view.	It highlights the need of national & international access of extensive distribution network of the company as a primary resource for LSPs to compete in Chinese market. It touches the need of having modern logistics facilities in gaining positioning competency.

A study of customer service, customer satisfaction and service quality in the logistics function of the UK food processing industry.	David Bruce Grant (2003)	To assess the importance and sufficiency of current constructs of customer service, customer satisfaction and service quality in the logistics functions in the UK food processing industry.	Descriptive and analytical	Logistics, customer service, customer satisfaction, service quality.	It confirms that the customer service features in pre transaction, transaction and post transaction, it should increase the use of IT in operations,
The impact of real time IT-logistics solutions: implementation effects and consequences.	Daniel Abdiu, Mikael Strandberg, Martin Stridsberg (June 2005)	To describe and explain the effects and consequences of business processes when implementing real time IT-logistics solutions together with identifying the critical success factors. Da	Qualitative, Case study	Supply Chain management, vendor managed inventory, real-time solutions, IT-logistics solutions, business renewal.	It gain great advantage by adopting real time IT-logistics solutions like to act upon real time demand, production process, order and procurement,
The role of logistics service providers in the logistics firms' supply chain	Ojo Iseghohi-me Ajakaiye (June 2012)	To identify the role of logistics service providers within the logistics firms supplychain, and to assess how the expected roles are performed	Qualitative and exploratory method	3PL, LSP, supply chains, network, carriers and logistics intermediary	1. The LSPs are able to do vertical and horizontal cooperation with other firms, 2. LSPs adds value to their clients, it makes competitive strength too.

Logistics as a strategic role for the creation of customer value	Berky Kong, MaeFong Choe (2011)	To explore how logistics impact customer value.	Explanatory, Case study	Logistics, capabilities, customer value, service quality, customer accommodation, customer service, value co-creation, integration	Logistics plays a strategic role to create customer value through customer accommodation, value-co creation, &customer integration. Superior logistics service composed of efficiency, effectiveness& differentiation that generate customer value
Customer tailored logistics- A case study of Volvo construction equipment in south east Asia and Australia	Christoff-er Jonsson, Junyi Wang (Dec 1999)	To describe the supply chain and to explain how to solve logistics issues and increase sales by focusing on customer needs.	Case study	Customer satisfaction, competitive positions, order-to delivery logistics, bench marking	The study concludes with following areas to be improved in order to improve competitive potential: 1. parts availability, 2. Product availability, 3. Price, 4. After-sale service.

How collaborative logistics management increases supply chain efficiency.	Nazila Kaveh, Navid Khosravi Samani (June 2009)	To introduce and describes the collaborative logistics management and to explore its consequences on the supply chain	Case study	Supplychain, logistics, collaboration, complexity, innovation	Collaboration lowered inventory risk, ware - housing, distribution & transportation cost. In addition, collaboration improves customer responsive-ness, ability to meet changing market conditions, customer service & satisfaction.
Utilizing e-logistics: case studies in Sweden and China	Cheng Wang, Yue Chen (Jan 2006)	To provide a better framework of how organization can incorporate e-logistics within the supply chain.	Qualitative, Case study	Logistics, e-logistics,	1. Reliability factors, maintainability factor, software factors & facility & transportation influence e-logistic system. 2. Availability factor, economic factors, organizational factors, test & support equipment factors are of least significant for logistics system.

The impact of relationship duration and logistics performance on relational norms in wholesaler-retailer relationships.	Muhamm-ad Hassan (May 2009)	To study the dynamics of buyer-seller relationships in Pakistan	Applied research design	Logistics service and relational norms, Relational contracting, relational duration and norms.	The endurance of the relationship is dependent on the quality of logistics service performance
The strategy for integrating the logistics industry of Yangtze river delta of China.	Yin Jun, Li An (May 2011)	To explore how to integrate logistics of Yantze river delta.	Exponential Smoothing	economic development, logistics integration, counters measures	1. Optimize regional logistics network. 2. Strengthen the position and role of logistics industry association. 3. Train logistics talents.
Packaging effects on logistics activities: A study at ROL international.	Johan Hassel, Tobias Leek (May 2006)	To explain the two alternative packaging methods, and to assess its impact on outbound logistics at ROL international	Qualitative Case study	Packaging, Logistics, material handling, lean thinking, and activity based costing.	1. Two packaging alternatives are efficient for implementation in the present situation. 2. To improve customer order processing and warehouse operations

Sustainable logistics: towards the development of environment conscious supply chains	Paul Ryans (June 2010)	1. To study the current scenario of implementing environmental conscious supply chain 2. To explain the insight into the tradeoff between environmental impact and various cost levels.	Case study	Total cost, logistics cost, on time delivery, storage costs, carbon output, vehicle utilization	1. Large impact of outsourcing limiting the scope of sustainable practices. 3. Cost reduction becomes the prime reason for companies to implement sustainable practices.
Logistics management in retail industry: A case study of 7-eleven in Thailand.	Latika Supasan-sanee, Patthave-ekarn Kasipho-ngphaisan (June 2009)	To study how 7-eleven manage and operates its convenience business.	Qualitative single case study.	Logistics, retail convenience, distribution center,warehouse, IT application & competitive advantage	Synchronized strategies lead to supply chain benefits and competitive potential.
The development of a framework for an integrated logistics support system within a high technology industry in a developing country	Keith Richard Lambert (March 2008)	To develop a framework for an integrated logistics support system.	Quantitative, case study.	Integrated logistics support, high technology, reliability, availability and maintainability	There are challenges in supporting and maintaining a high technology complex system in a developing country.

Designing logistics support systems: level of repair analysis and spare parts inventories.	Rob Basten (2009)	To develop a set of quantitative techniques that can be applied for an integrated balancing of system availability& life cycle costs.	LORA model, case study.	Logistics support system, spare parts stocking.	None of the LORA models fit to the problem.
Effective methods to influence logistics cost- case: food services for elderly people in public homes.	Kariuki, Airine (Nov 2011)	To study the performance of existing logistics system and operators in order to explore better methods to influence food service logistical cost.	Qualitative	Logistics cost, elderly people, service homes, outsourcing, operation systems, and food service systems.	The study suggests innovative logistics solution to deliver food services for the elderly people in public homes.
Sustainable development and logistics in retail industry- multiple case study: Wal-mart & Carrefour	Ines Perrin (2008)	To explore the sustainable logistics practices that can be adopted for retail company.	Qualitative multiple case study	Sustainable development, green logistics, retail	1. Green logistics actions are concentrated on some areas that need time and money, 2. Different strategies for different companies.

TAMK logistics innovation laboratory, Logivo Project	Jaakko Hakala (Dec 2010)	To discuss the functions and importance of logistics innovation laboratory established in TAMK	Case study	Information communication technology, laboratory logistics, innovation logivo	Clearly define the various aspects of logistics, challenges, scope and future.
Insert modern logistics business into CCA	Yindong Jin (Feb 2013)	To describe how to insert modern logistics business into China's air cargo company.	Case study	Air freight, third party logistics, aviation logistics	1. Improvement on service combination, 2. Building the logistics network, 3.construction of freight network information platform.
Logistics customer service and the effect of distribution decisions on this in a case company.	Heidi Korhonen (2007)	To study the logistics customer service and to explore how the case company's distribution decision affects on the customer service.	Qualitative, case study	Logistics customer service, distribution decisions, customer value, availability, DC	The case company would have to improve: Communication, product availability, delivery accuracy and reliability, and transportation packaging

Supply chain management and logistics issues in retail industry: case study-company X, Sweden	Laukkanen Tatiana (2012)	To analyze supply chain management in the company X in order to develop supply chain presentation in terms of delivery level and logistics cost	Case study	SCM, logistics, retail, vertical integration, warehousing, warehouse management system	1. Continue with side inner activity&improve activity between main warehouse& retail stores.2.To improve WMS and thief protection
Logistics outsourcing: solutions for small and medium enterprises in Vietnam.	Nguyen Hoang Bao Khuyen (2009)	To describe the role of 3PL, 4PL and LSP in Vietnam and it role in SME's	Quantitative and qualitative.	Logistics outsourcing, SME's, LSPs, freight forwarding,	1. There are no complete logistics providers in local market. 2. Cost and size are the constraint for the LSPs to provide complete logistics solutions.
Developing the information flow of inbound logistics	Sini Nurmi (2011)	To investigate how to manage documentation and information flow to make perfect delivery.	Descriptive	Inbound logistics, information flow, EDI	EDI bring, time advantage, cost advantage and efficiency.

Australian logistics challenges and solutions to overcome them.	Neil Stewar (Novemb-er 2011)	To elaborate the present logistics status of Australia, challenges and make solutions.	Qualitative	Logistics, Australia, challenges, transport	Solutions: increased driver training, better forecasting and planning, improving transport networks and infrastructure and looking at different production methods.
Internal logistics as a part of supply chain- case: Nokia China, Dongguang branch	Tian Ran (2009)	To find out the possible solutions to improve the internal logistics on Nokia-China, Dongguang branch.	Case study.	Logistics, internal logistics, supply chain, performance measurement.	Suggestions to improve on following areas: responsiveness of internal information exchange, implementation of company strategy, enhancement of professional skills of employees.
Logistics system and process in express delivery service companies.	Hanzheng Zhu (May 2010)	To describe the Express Delivery Service (EDs) network models and to explain how much advanced and automated technologies	Case study	Express devivery service, logistics, spoke-hub paradigm,	It found that the Chinese express mail service (EMS) should become more independent and to

		and methods are used for optimizing network, accelerating the delivery speed and improving services.			learn from foreign experiences.
Advanced models and tools for inbound and outbound in supply chain.	Philippo Bindi (Jan 2010)	To design a set of advanced models and tools for the design and control of an integrated supply chain.	Case study	Configuration of general multi stagedistribution network, material flow, customer demand, storage, order picking.	The model presented in this study allows the planners and managers to optimize the inbound and outbound logistics.
Customer information driven after sales service management: lessons from spare parts logistics.	Muham-mad Naiman Jalil (Jan 2011)	To find what are the benefits of using customer related information to drive after sales service management.	Analytical and exploratory.	After sale service, inventory planning and information enrichment, spare parts execution management, returns management in spare parts logistics.	1. Sequential decision making is computationally efficient than simultaneous decision making, 2. It produce computationally efficient solution technique for return decision execution

Logistics collaborations in supply chains- a survey of Swedish manufacturing companies.	Eric Sandberg (2005)	To describe the logistics collaborations in supply chains	Descriptive	Logistics collaborations, barriers, and effects	1. Content of collaboration doesn't reach the strategic level, 2. Intensity of the collaboration is positively related to the effects experienced of the collaboration.
An analysis of the challenges and opportunities facing the Hong Kong logistics industry.	Lau, Anthony Siu Wing (Jun 2010)	To assess the challenges faced and opportunities available to the forwarding sector of Hong Kong's logistics industry.	Quantitative, qualitative.	Transaction cost economics, RBV, Location specific advantage theory.	The industry will have to strengthen& invest in high value added consolidation& deconsolidation services
European and Japanese logistics paradigms- An explorative study of the dynamics of logistics management.	Masato Shinohar-a (2006)	To explore the various logistics ideas under different cultural settings	Descriptive	Logistics, dynamics of logistics	1. The movement of supply chain realignment always bears the risk of contingency, 2. The two region admits their fault in the paradigm and wish to adopt the strong asset of the opposite one

A framework of logistics, environmental management and marketing: an examination of interrelations	Cartin Lammag-ard	To design a framework around the concept of value by campaigning marketing theory, logistics theory and environment management theory.	Descriptive	Logistics, environmental management, marketing.	Frame work that can be used to develop an environmental marketing program in logistics.
The logistics innovation approach and the theory of inventive problem solving	Odair Farias (2005)	To propose strategic solutions that leads to logistics innovation through the Russian methodology.	Exploratory	Inventive problem solving, logistics innovations, supply chain, business management.	The effective integration is achieved by adopting ideas like automation, segmentation, multi functionality, that enables competitive strength
Logistics-production, logistics-marketing and external integration: their impact on performance.	Cristina Gimenez, Eva Ventura	To investigate the logistics-production and logistics-marketing interfaces and their relation with the external integration process.	Empirical	Logistics integration, internal and external integration, logistics performance.	Internal and external integration are correlated and the external integration results better logistical performance.

The new rules of the logistics management and evaluation of relationship logistics model.	Yrd, Doc. Dr Serdar Pirtini	To analyse the logistics relationship model and practical application of this model into the subsequent researches.	Exploratory	Digital economy, digital environment, logistics, relationship logistics model.	The logistics relationship model ensures cost saving& efficiency increased by enabling rational flow of information among logistics functions.
Integrated logistics and value chain management- A new model approach to value chains (Article paper)	Eirik Borgen, HeidiDreyer ,Hakon Hynne, Kristine Olstad Schea	To establish the role of logistics integration on value chain management.	Case study	Value chain, strategic level, model builder's merchants, extended enterprises.	It put emphasis to transaction cost; it can be higher than savings.
Customer's logistics service requirements and logistics strategies in the Swedish sawmill industry. (Dissertation)	Asa Gustafss-on (2006)	To find out and analyze customers logistics requirements and logistics strategies practiced by the sawmill industry to meet customers logistics service requirements.	Quantitative and qualitative. Exploratory.	logistics strategy, house building industry, retail industry, sawmill industry& service needs	Improving the process performance by adopting additional generic logistics strategies &optimizing the use of existing gen- eric logistics strategies

An alternative perspective on the role of applications of ICT systems for logistics.	Odd Joran Sagegg (2004)	To explore how logistics can be improved with the ICT.	Case study	Logistics, Manufacturing, supply chain management, supply chain software.	Six guidelines: 1. Logistics is just a mean, not a purpose in itself. 2. Think total network. 3. ICT boosts fulfilling customer demand. 4. Separated and real anticipated demand. 5. Simplification,6.reductio n of the demand transferring network
Application of operations research in manufacturing logistics.	Macro Semini (2011)	To explore the typical operations research (OR) techniques to support decision making in manufacturing logistics.	Case studies	Manufacturing logistics, operations research.	1. Classification of OR techniques &manufacturing logistics decisions supported by OR, 3. To establish link between problem and OR usage. 4. Guidelines to apply OR to manufacturing logistics

Adaptive logistics- using complexity theory to facilitate increased effectiveness in logistics.	Fredrik Nilsson (2005)	To explain how adaptation brings effectiveness in logistics.	Case study	Complexity thinking, complexity theory, logistics, logistics systems, paradigms	Agent based modeling provides a feasible and applicable method and tool.
A frame work supporting the collaboration between the logistics and the product developme- nt process.	Anna Andersson (2007)	To construct a framework that supporting collaboration between the logistics and the product development process.	Case study	Logistics, collaboration, product development process.	With the support of the framework, there is a possibility for the logistics department to be involved in the early phases of product development.
Designing a competency framework for logistics executives: the case of the read- ymade garments manufacturers in Egypt.	Sara Elzarka (Aug 2010)	To create a generic competency framework to assess the competencies required for the logistics executives and use it as a tool for training.	Quantitative and qualitative	Competency, logistics, readymade garment industry.	The framework helps the readymade garments companies to optimize the allocation of resources in terms of employees training and development.

The impact of product recovery on logistics network design. (Article paper)	Moritz Fleischman-n, Patrick Beullens, Jacqueline Bloemhof Ruwaard, Luk N Van Wassenhov (2000)	To explore logistics network design in reverse logistics context.	Sensitivity analysis.	Logistics network design, logistics structure, reverse logistics, product recovery.	1. Forward flows dominate network design 2. Company can maintain dedicated unit to manage return flows, 3. Deterministic modeling approach is found to be appropriate for recovery network design in most cases.
The impact of logistics performance on organizational performance in a supply chain. (Research paper)	Kenneth W. Green Jr., Dwayne Whitten, R Anthony Inman (2008)	To find out the impact of supply chain performance on logistics performance, and organizational performance.	Descriptive	Supply chain management, organizational performance, mathematical modeling.	The strong supplier-customer relationship improves the performance of supply chain allied functions like logistics, purchasing and selling.
Analysis of the logistics research in India- White Paper	C Thaller,N Moraitakis, H Rogers, D Sigge, U	To identify t he relevant logistics clusters in India and the scope of new co operations that promote and	Exploratory	Logistics clusters in India, Co operations, international and	Already there exists some co operation between India and Germany and there has a wider scope

	Clausen, H C Pfohl, E Hartmann,B Hellinggrah	build bilateral exchange of knowledge at both an international and intercultural level.		intercultural.	and willingness on both sides to improve the co operation.
The effect of logistics measurement capability on performance (Article paper)	Kuo- Chung Shang (2004)	To examine the relationship among logistics measurement capabilities, logistics performance, financial performance.	Descriptive	Logistics measurement capability, logistics performance.	General measurement is the most critical capability that upon benchmarking and logistics performance. It indirectly impact financial performance.
The total cost concept of logistics: one of many fundamental logistics concepts begging for answers	Matthew A. Waller, Stanley E. Fawcett (2012)	To explore the total cost concept of logistics	Empirical	Logistics, total cost.	The total cost concept is difficult to model, it contain a lot of exogenous factors.
Logistics service providers and their customers: Gaining commitments	Scott J. Grawe, Patricia J. Daugherty	To explore how can an organizational implantation be used to create inter organizational relationship	Empirical	Organizational implants,relations hip,commitment, 3PL, inter	Organizational implantation can lead to greater level of outcome interdependence between

through organizational implants. (Article)	and Rajiv P. Dant (2012)	commitment.		organizational outcome, interdependence	the organizations.
Logistics management from a complexity perspective (Article paper)	Fredrik Nilsson, Jonas Waidring-er.	To examine the implications of a complexity perspective on logistics.	Descriptive	Complexity, logistics, management, dynamics, adaptation.	To find some of the components that makes complexities in the logistics system.
Customer perceptions on logistics outsourcing in the European consumer goods industry. (Article paper)	Richard Wilding, Rein Juriado (2004)	To investigate the consumer perceptions on why to outsource, what to outsource and how to manage satisfaction within third party logistics providers (3PLs)	Exploratory	Customer perceptions, logistics, outsourcing, consumer goods.	1. Cost element plays a smaller role in outsourcing than anticipated, 2. Soft issues may lead to the failure of 3PL relations
The changing role of information technology in food and beverage logistics management:	Eleni Mangina, Llias P. Vlachos	To demonstrate agent technology can optimize food supply chain by (a) reviewing intelligent agents' applications for supply chain optimization, (b) illustrating	Exploratory	Intelligent agents, beverage network optimization, food logistics, supply chain	Optimization agents can be the building block of a correct designed simulation for an accurate representation of

beverage network optimization using intelligent agent technology (Article)		how a multi-agent can optimize performance of a beverage logistics network.		management	a supply system.
Customer service in the internet-enabled logistics supply chain: website design, antecedents and loyalty effects. (Article paper)	Kofi Q. Dadzie, Cristian Chelariu, Evelyn Winston	To assess 1. The factors that determine the level of perceived LCS quality in the IT enabled logistics system. (2). The impact of LCS quality on customer loyalty towards online retailers website.	Exploratory	Customer service, IT enabled logistics supply chain.	1. Clear product information on the website is the effective strategy for meeting online customer's expectation.
State of logistics:A visionary perspective (Article)	Beth Davis-Sramec (2007)	To report the opinions & belief of the visionaries rather than draw conclusion or predict future	Qualitative	State of logistics research	Diversity of thought from logistics academics
Aligning logistics performance measures to the information needs of the firm. (Article paper)	Stanley E. Griffis, Thomas J. Goldsby, Martha Cooper,	To illustrate how managers select appropriate logistics measure to facilitate distinct evaluation and control needs by applying a framework originally proposed by	Exploratory	Logistics measures, performance measures, framework by Griffis et.al	Provide guidelines to the practitioners to identify measures that match the information needs of logistics management throughout the

	David J. Closs (2007)	Griffis et. al			organization.
The role of logistics new product development. (Article paper)	Zach G. Zacharia, John T. Mentzer (2007)	To explore the role of logistics in new product development.	Exploratory	Logistics, new product development, logistics salience.	Logistics improves the new product development process.
The use of social network analysis in logistics research (Article paper)	Craig R. Carter, Lisa M. Ellram, Wendy Tate (2007)	To define a frame work for studying and implementing social network analysis within logistics.	Social network analysis	Social network analysis, logistics	In case of informal logistics projects, network centrality is important than either individuals formal rank or tenure within an organization.
Supply chain management and its relationship to logistics, marketing, production and operations management	John T. Mentzer, Theodore P. Stank, Terry Esper.	Refining the of supply chain management definition by highlighting the relationship between logistics, marketing, production, and operations management	Descriptive	SCM, logistics, marketing, production, operations management.	Present both managerial and research/academic implications.

Supply chain interfaces: defining attributes and attribute values for collaborative logistics management	Gunnar Stefansson, Dawn M Russell (2008)	To understand (1) what interface exist and (2) how to describe interfaces to improve supply chain performance.	Exploratory	Supply chain interfaces, collaborative logistics management.	Identify 14 supply chain interfaces in CLM model and suggests same can be applied when designing and negotiating third-party for specific logistics assignments.
The role of logistics in market orientation (Article paper)	Brian S. Fugate, John T. Mentzer, Daniel J. Flint (2008)	To explore the role of logistics in market orientation.	Exploratory	Logistics, market orientation.	Logistics may play a crucial role in creating, disseminating, reaching a shared interpretation of and responding to market intelligence.
Logistics performance: efficiency, effectiveness, and differentiation. (Article paper)	Brian S. Fugate, John T. Mentzer & Theodore P. Stank, 2010	To model logistics performance in the context of efficiency, effectiveness and differentiation.	Exploratory	Logistics performance, efficiency, effectiveness, differentiation.	Provide empirical support for operationalizing logistics performances formed by logistics efficiency, effectiveness and relevance

Evolving a theory of performance based logistics using insights from service dominant logic. (Article paper)	Wesley S. Randall, Terrance L. Pohlen, Joe B. Hanna. (2010)	To draft a framework for performance based logistics by focusing on performance and outcome.	Exploratory	Performance based logistics, performance, outcome	By aligning the trading partner's knowledge and decision process with performance based outcomes, SCM can create continuous value for the end user
Knowledge synthes- is and innovative logistics processes: enhancing operational flexibility and performance	Scott J. Grawe, Patricia J. Daugherty, Anthony S. Roath. (2011)	To assess the impact of knowledge synthesis and innovative logistics processes on operational flexibility	Empirical	Knowledge synt- hesis, logistics innovation, logistics performance, operational flexibility	Innovative logistics processes can lead to operational flexibility and operational flexibility also lead to higher level of logistics performance.
Electronic logistics service quality (e-LSQ): Their impacts on the customers purchase satisfaction and retention.	Shashank Rao, Thomas J. Goldsby, Stanley E, Griffis, Deepak Iyengar, (2011)	To explore the impact of electronic logistics service quality on customer satisfaction and retention.	Empirical	Customer retentions, e-commerce, online retailing, order fulfillment, secondary data.	Purchase satisfaction is the strong indicator of customer retention.

The retailer's perspective on the link between logistics resources and perceived customer loyalty to manufacturer brand.	Mert Tokman, R. Glenn Richery, George D. Deitz, Frank G Adams (2012)	To investigate the relationship between logistics and brand related resources, their impact on the customer loyalty to manufacturers brand.	Empirical	Collaborative logistics technologies, operation quality, brand differentiation, perceived loyalty.	The end user become confident to repurchase the same brand offerings
What skills are needed to be humanitarian logistician? (Article paper)	Gyongyi Kovascs, peter Tatham, Pauul D.Larson (2012)	To describe the skills needed to be a good humanitarian logistician	Empirical	Humanitarian logistics, logistics skills, content analysis, job advertisement.	Humanitarian logistician need a broad spectrum of functional and contextual skill
An assessment of supplier-customer relationships (Article paper)	Lloyd M. Rinehart, James A. Eckert, Robert B. Handfield,	To explore the supplier – customer relationship	Exploratory	Supplier-customer relationship, non strategic transaction, Administered relationship, Joint	Provide new opportunities for understanding the design and management of customer supplier relationship.

	Thomas J. Page Jr., Thomas Atkin (2004)			ventures.	
Improving distribution service performance through effective production and logistics integration. (Article paper)	Martin Springinkle e, Carl Wallenburg (2012)	To assess (1). the role of working effective working relationship between production and logistics (2). The achieved integration at this functional interface regarding their specific importance for distribution service performance	Exploratory	Production, achieved integration, working relationship integration, integration, performance measurement.	The study recommends two levers for top management to enhance integration, 1. To influence perceived goal interdependence, 2.to enhance production logistics integration.
Establishing the relationship between logistics complexity and supply chain objectives and decision areas in large companies operating in Brazil (Article paper))	Peter F. Wanke, Henrique Luiz Correa, Maria fernanda Hijjar (2010)	To explore the relationship between logistics complexity and supply chain objectives and decision areas in large companies operating in brazil.	Exploratory	Supply chain management, contingency approach, objectives, logistics complexity, Brazil	It found positive relatio-nship between higher levels of logistics comp-lexity& higher emphasis on decision areas associ-ated with market media-tion management and the objectives related to improving customer service responsiveness.

Perspectives on Logistics Vs SCM: a survey of SCM professionals (Article paper)	Paul D. Larson, Richard F. Foist, Arni Halldorson (2007)	To explore the SCM professionals perspectives on logistics vs. SCM	Exploratory	Logistics, SCM, SCM professional.	Executives reported SCM implementation more difficult, slower and broader than expected.
The successful management of a small logistics company. (Article paper)	A Gunaseka-ran, E W T Ngai (2003)	To explain the successful management of a small logistics company.	Case study	Logistics, small enterprises, case studies, critical success factor, strategic alliances	Explain the significance of strategic alliances& the implication of regional culture on partnership formation.
A review and evaluation of logistics performance measurement system (Article paper)	Chris Caplis, Yossi Shefi (1995)	To establish a framework to evaluate the logistics performance.	Case study	Logistics, performance metrics, performance measurement system.	There are some common points that can be shared by most of the measure-ment system, there will always be situation specific characteristics
The integrated logistics management system: a framework and case study (Article)	Hual Neng Chiu (1995)	To design and implement framework to establish and improve the distribution systems for the distribution firms.	Case study	Logistics, integrated logistics, distribution system.	Integration of IT and logistics management become crucial for service improvement.

Handling non-response in logistics research. (Article paper)	Stephan M. Wagner, ReneKem-merling 2010	To describe how to handle non-response in logistics research.	Deductive	Non-response, logistics research.	Logistics oriented surveys suffer consistently from higher non-response rate.
Strategic logistics decision making (Article paper)	Peter F. Wanke, Walter Zinn (2003)	To explore relationship between strategic level decisions and selected product, operational and demand variables.	Conceptual	International business, distribution management, order system.	It suggested that the three strategic decisions are each specified specific product, operational and demand variables.
The elements of a successful logistics partnership (Article paper)	Karen Tate (1996)	To explore the elements of a successful logistics partnership	Exploratory	Logistics, elements of logistics, logistics partnership	It found various elements that promote logistics partnership.
Logistics cost efficiency for large player in cement building products. (Case study)	Ajay Tiwari, Adit Sharma (2009)	To explain the logistics cost efficiency for large players in cement building products	Case study	Logistics cost, large players, cement building products.	Many times, business leaders know what the problem is, but, don’t know how to solve.

Logistics capabilities for sustainable competitive advantage (Article paper)	Eric Sandberg, Mats Abrahamsson (2011)	To explore how sustainable competitive advantage is generated in two swedish best practice companies that successfully exploit logistics as a source for competitive advantage.	Case study	Operational capabilities, dynamic capabilities.	Sustainable competitive advantage is based on a combination of efficient and effective logistics operations and well functioning, adjusted, in-house developed IT system.
A case study investigation on purchasing green transport and logistics services (Conference paper)	Pietro Evangelista Maria,Huge Brodin, Karin Isaksson, Edward Sweeney (2012)	To explore the practice of buying green transport and logistics services in three European countries.	Case study	Green transport, logistics, sustainable logistics.	It is suggested that there is a potential for improvement in green collaboration in buyer and supplier relationship.
Control systems for logistics performance (Article paper)	Veli Matti Virolainen (May 1991)	To identify the methods and techniques used to measure the logistics performance.	Empirical	Control systems, logistics, logistics performance	LCS can be efficient and effective as the management information system that guides it destiny.

How to succeed in the Chinese express logistics market. (Article paper)	Yuchao Wang (2012)	To explore how market services and products in the Chinese express logistics market in order to be successful, especially from foreign company perspective	Empirical	Chinese express logistics market, strategic marketing.	To localize the operations by hiring more local executives.
Bringing strategic thinking to Chinese tobacco logistics center (Bachelors thesis)	Zhao Liubaihe (May 2012)	To design a strategic framework to improve the Chinese tobacco supply chain.	Case study	Supply chain, Chinese tobacco business, process flow.	Internal department integration leads to competitive strength.
Creating value in supply chain: suppliers impact on value for customers, society and shareh- olders. (Ph.D thesis)	Mirjam I. Kibbeling (2010)	To examine how fir tying to create value for the customers.	Exploratory	Value, supply chain, supplier.	It explains the strategic relevance of relationship with suppliers.
Determinants of competitiveness in logistics:	Dr Jose Tongzon	To identify the determinants of competitiveness in logistics and identify the key	Case study	Competitiveness, logistics, successful	Experience from Singapore can be of relevance to other

implications for the region (Conference paper)	(2004)	factors required for a successful logistics hub.		logistics hub	ASEAN countries to strengthen logistics.
The current status of logistics performance drivers in Indonesia: an emphasis on potential contributions of logistics service providers (LSPs)	Yeni Sumantri, Sim Kim Lau	To describe the current status of logistics performance drivers in Indonesia.		Logistics performance driver, LSPs.	LSPs provide significant contribution to customer logistics performance.
Quality evaluation in logistic service. (Article paper)	Fiorenzo Francesch-ini, Carlo Rafele	To identify the problems relevant to the quality evaluation of the logistics services.	Exploratory	Quality, logistics, service quality, measurement, supply chain.	Model to create a relationship between extern-al logistics indicators and internal supplier performance is provided.
Establishing customer service and logistics	Varanya Tilokavii-chai,	To identify the factors that influence customer service.	Case study	Customer service, logistics, uncertainty.	The firm size has no impact on customer service.

management relationship under uncertainty. (Article paper)	Peraphon Saphatsat-hit, Achara Chandrach-ai				
Development of an integrated logistic model in an organization for an automotive application problem. (Article paper)	Manjunatha, Dr H K Shivanand, Dr T C Manjunath	To present a method of developing an integrated logistics model for an industry to optimize the current integrated logistics model	Empirical	Logistics, supply chain management, integration, optimization, modeling, analysis.	It is reasonable to consider transfer and transaction of products and information as primary processes, when logistics functions are in focus.
Logistics competence in small and medium sized enterprises: the Norwegian experience (Article)	Prabir K. Bagchi, Helge Virum	To explore the logistics competence in small and medium sized enterprises in the context of Norwegian experience.	Exploratory	Logistics competence, small and medium sized enterprises.	The relationship between logistics competency and firm's performance are complicated and difficult to fathom.
Does proactive green logistics	Yongrok Choi, Ning	To explore the impact of green logistics practices on	exploratory	Green logistics management,	Green logistics practices have a positive impact on

management improve business performance? A case of Chinese logistics enterprises.	Zhang (2011)	business performance.		business performance, Chinese logistics enterprises.	sustainable business performance.
The perception on ICT use among small logistics service providers: a comparison between northern and southern Europe (Article paper)	Pietro Evangelis-ta, Heli Kilpala (2007)	To explain the ICT use and issues relevant for implementation plan among small and medium sized logistics service providers.	Empirical	Small logistics service providers, ICT, empirical survey, Northern and southern Europe	The use of ICT could improve the customization.
Innovation and competitive advantage: model and implementation for global logistics. (Article paper)	Sut Sakchutc-hawan,Pa-ul C. Hong, Stephan K. Callaway, Anand Kunnathur (2011)	To examine the impact of external factors on global logistics.	Empirical	Innovation, competitive advantage, model, global logistics.	1. Greater logistics innovation results greater financial performance. 2. Greater operational performance leads to greater financial performance.

The impact of supply chain management practices on competitive advantage and organizational performance (Article paper)	Suhong Li, Bhanu Ragu-Nathan, T S Ragu-Nathan, S Subba Rao (2004)	To assess the relationship between SCM practices, Competitive advantage, and organizational performance.	Empirical	Supply chain management, Competitive advantage, organizational performance, Structural equation modeling.	Higher level of SCM practices can lead to improve competitive advantage and organizational performance.
Gaining competitive advantage through improved management of information and material flows: A case study at Flextronics network services. (Master Theses)	Vladimir Grigorjev, Marca Hogstrom (2003)	To investigate the present situation of tied up capital in the inventory and to provide a proposal to reduce tied up capital.	Case study	Logistics, competitive advantage, information and material flow.	There is a need for companies to integrate supply chain internally and externally.
Fourth-party logistics: a case study on performance	Petrus Petersson, Tim Zantvoort	To explore the performance measurement framework adopted by fourth party logistics service providers	Case study	Performance measurement, KPI framework, 4PL, 3PL, RL,	None of the studied businesses had an effective framework for performance

measurement (Master thesis)	(May 2012)	(4PLSP).		construction logistics.	measurement.
Supply chain management, transport and the environment –A review (Working paper)	Vasco Sanchez-Rodrigues (Nov 2006)	To find out the gap in literature review regarding t he impact of supply chain strategies on green logistics.	Literature review	Green logistics, logistics integration, innovation, environment.	It finds the Impact of logistics integration on green logistics.
The impact of logistics management on CO2 emissions from freight transport- A literature review.	Palsson H (2011)	To assess the impact of logistics management on CO2 emissions from freight transport.	Literature review	CO2 emissions, logistics management, green logistics	Addresses the problem related to cut the CO2 emission.
Operations research for green logistics_ An overview of aspects, issues, contributions and challenges.	Rommert Dekker, Jacqueline Bloemhof, Ioannis Mallidis (2011)	To identify the impact of operations research for green logistics.	Empirical	Operations research, green logistics, transport.	New models framed by using operations research influence environment.

A review of green logistics schemes used in cities around the world (Article)	Nikolas Gerolimin-is, Carlos F Daganzo	To describes the examples of green logistics schemes by the cities around the world.	Literature review	Green logistics, sustainable transportation, City logistics	Combination of various schemes is best suitable for various locations.
Green logistics (The paradoxes of) (Article paper)	Jean Paul Rodrigue, Brian Slack, Claude Comtoise.	To discuss the issues in green logistics and environmental paradoxes.	Descriptive	Green logistics, Reverse distribution, sustainability.	Legislation improves the green logistics practices.
Going backwards: reverse logistics trends and practices. (Theses)	Dr Dale S Rogers, Dr Ronald S Tibben-Lembke (1998)	To describe the reverse logistics and to explain how to manage reverse logistics	Empirical	Reverse logistics, green logistics	Effective reverse mechanism improves competency.
Fujitsu activities for green logistics (Article paper)	Kazuhiko Niva (2008)	To explore the scope of Fujitsu activities for green logistics.	Exploratory	Green logistics, environmental load reduction.	It introduce Fujitsu activities for green logistics

Section 3

2.5. Dimension Wise Classification of Reviews

Dimensions imply a measurable extent of a particular kind. Based on review of related literature, the following dimensions were identified (Table 2.4).

Table 2.4

Dimension Wise Classification of Reviews

S.no	Dimensions of the study	Number of studies
1	Competitive advantage	9
2	Customer satisfaction	4
3	Value creation	8
4	IT logistics	2
5	Green logistics	4
6	Logistics costs	2
7	Logistics innovation	8
8	Logistics integration	6
9	logistics performance	15
10	Logistics service	12
11	Logistics support system	4
12	Multi commodity network	1
13	Outsourcing	22
14	Third Party Logistics (TPL)	9
15	Fourth Party Logistics (FPL)	2
	Total	**108**

The table 2.4 explains major dimensions of the studies taken for the review. It is found from the table that 'outsourcing' is the most discussed dimension followed by 'logistics performance' and 'logistics services'. 'Multi commodity network' is the least discussed dimension.

Section 4

2.6. Identification of Research Gap

Research gap is a research question or problem which has not been answered appropriately or at all in a given field of research. Identifying gaps and generating research question can be regarded as the first and most important step in writing a research paper. The table presented below (Table 2.5) shows the features of literatures included in the review.

Table 2.5

Identification of Research Gap

S. no	Area of research	No. of study	Study dimensions	Country	Methodology
1	Retail	16	Competitive advantage, Customer satisfaction, Value creation, Third Party Logistics (TPL), Fourth Party Logistics (4PL).	India, USA, UK, France, Canada, Sweden Scandinavian Countries, Middle East countries	Case study, Questionnaire/ Interviews, Experiments.
2	Automobiles	8	Logistics support system, logistics service, logistics integration, logistics performance.	India, USA, UK, Norway, Sweden	Case study, Experiments, Delphi method, Questionnaires / Interviews.

3	Logistics Service Providing (LSP)	26	Competitive advantage, Customer satisfaction, Value creation, TPL, 4PL, Outsourcing, Green Logistics, IT Logistics.	India, USA, UK, Finland, Germany, France, Canada, Sweden, Scandinavian countries.	Questionnaires / Interviews, Case study.
4	Food Processing	8	Competitive advantage, Customer satisfaction, Value creation, TPL, 4PL, Logistics performance, Logistics integration, Outsourcing	India, USA, Sweden, Scandinavian countries	Questionnaires / Interviews, case study, observation trials, Experiments.
5	High Technology Industries	2	Multi commodity network, Logistics integration	India, Sweden	Case study, Experiments, Questionnaires / Interviews
6	Logistics Infrastructure	8	Logistics support system, Logistics service, Logistics integration, Logistics performance.	India, USA, Sweden, Germany.	Questionnaires / Interviews, Case study, Delphi method.

7	Electronics	9	Competitive advantage, Customer satisfaction, Value creation, TPL, Logistics services, Logistics performance, Logistics integration, Outsourcing.	India, USA, Sweden, UK, France.	Questionnaires / Interviews, Case study.
8	Delivery	13	TPL, Logistics performance, Logistics integration, Outsourcing, Competitive advantage.	India, Sweden, Norway, UK, USA.	Questionnaire, Experiments, Case study, Participant/ Non-participant observation
9	Sawmill	1	Logistics cost, Logistics performance, Logistics integration.	Sweden	Case study
10	Textiles	3	TPL, Logistics services, Logistics performance, Logistics integration, Outsourcing, Competitive advantage, Value creation, Green logistics	India, USA	Case study, Questionnaires / Interviews.

11	Health Care	4	Green logistics, Logistics integration, Logistics cost, logistics support system, Logistics performance.	India, USA.	Case study, Questionnaire/ Interviews.
12	Others	10	TPL, Logistics integration, Competitive advantage, Green logistics, Logistics innovation	India, Sweden, Norway, UK, Canada, Middle East countries.	Case study, Participant/ Non-participant observation, observation trials, questionnaire/ interviews.

The researcher reviewed more than 200 studies before finalizing the research problem. After the formulation of final research problem, the researcher incorporated reviews of 108 studies into the thesis (See Table 2.3). Based on the reviews, the researcher identified following research gap.

Table 2.6

Scope of the study

S.no	Area of Study		Dimensions	Approach	Methodology
	Sector	Area			
1	Food Processing, Apparels and Textiles and Rubber and Agro products	Kerala	Customer Service, Customer Satisfaction, Customer Success, Customer Accommodation, Value Creation, Competitive Advantage, Logistics Excellence.	Descriptive	Questionnaire/ Interview

2.7. Conclusion

The researcher reviewed 108 studies in order to find the research gap. Most of the prior researches on logistics are focused on existing logistics system of a company. The literature review clearly indicates that there currently exists a gap in the research. No studies have carried out in India to assess the dynamics of logistics management towards the creation of logistics excellence. The present study is an attempt to fill these gaps. Therefore, the researcher chooses Kerala for conducting the study. Three industries having great operational potential have been taken. The study was limited to seven dimensions, i.e..., Customer service, customer satisfaction, customer success, customer accommodation, value creation, competitive advantage and logistics excellence.

The next chapter explains the theoretical framework of the study and discusses the relationships among the variables that have been identified, explains the theories underlying these relations and also describes the nature and direction of the relationships

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Chapter 3
Theoretical Framework

THEORETICAL FRAMEWORK

3.1. Introduction

The theoretical framework has been developed from the extensive literature survey done and from the interviews that were conducted with managers/ unit heads, and experts in the field. The theories in this chapter are arranged in four sections. Section 1 describes general concepts relating to logistics and logistics outsourcing. Section 2 discusses global and Indian statistics about logistics infrastructure. Section 3 explains the features of the three industries chosen for the study, I.e.., Food processing industry, Apparels and textiles industry and Rubber and agro products industry. Section 4 of the chapter describes theories related to the variables adopted for the study.

3.2. Section 1

Logistics and Logistics Outsourcing

I. Logistics

Diverse literatures are available to fathom the root of logistics. Traditionally logistics is a process of procurement, maintenance, distribution and replacement of personnel and material (Webster Dictionary). According to the Council of Supply Chain Management Professionals, logistics is the “process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services and related information from the point of consumption for the purpose of conforming to customer requirements and includes inbound, outbound, internal and external movements”.

The very crux of logistics deals with creating value for both the customers and the corporates. It is often construed as the dynamics of the useful products or services that the supplier wishes to sell to its customers (Francis- Luc Perret, Corynne Jaffeux, 2007). It can be viewed from several dimensions.

i. Traditional Logistics

Webster's Dictionary defines logistics as "the procurement**,** maintenance, distribution and replacement of personnel and material. Jonsson (2008) described logistics as an approach instead of a mixture of techniques, methods or tools. In accordance with the view of the Council of Logistic Management (CLM) (1998), logistics takes care of the entire process of procuring, handling and distributing goods to the end consumer. According to Christopher (2011), the logistics is substantially a plan oriented framework that searches to establish a single plan for the flow of goods and information through a business.

Although the authors define logistics differently, there are some common points such as:

1. It is the science of planning and carrying out the movement and maintenance of forces… those aspects of military operations that deal with the design and development, acquisition , storage, movement, distribution, maintenance, evacuation and disposition of material; movement, evacuation and hospitalization of personnel; acquisition of construction, maintenance, operation and disposition of facilities; and acquisition of furnishing of services (Military approach).
2. Logistics is defined as a business planning framework for the management of material, service, information and capital flows. It includes the increasingly complex information, communication and control systems required in today's business environment (Logistix partners oy, Helsinki, F.I., 1996) (Business approach).
3. Logistics is often stated as a system which commonly consisting of the sub-systems for the supply of materials, production and distribution (Jonsson, 2008).

ii. Military Logistics

Growth story of modern logistics began with war and struggle. Logistics was considered to be the hard part of fighting a war those days (Lt. Gen. E.T. Cook, USMC, November 1990). It comprises the materials and arrangements which aimed to establish the plans and strategies. Or rather, logistics executes the strategies. The key point is that strategy decides where to act, while logistics brings the troop to that point (Jomini: Precis de l' Art de la Guerre (1838)). Available literatures on military logistics give quite interesting facts. Some of the definitions in that perspective are below;

Table 3.1

Military Logistics- Definitions

Name	Year	Definition
Jomini: Precis de l' Art de la Guerre	1838	Logistics comprises the means and arrangements which work out the plans of strategy and tactics. Strategy decides where to act; logistics brings the troops to this point.
Capt. Alfred Thayer Mahan	1912	Logistics… as vital to military success as daily food is to daily work.
Fleet ADM Ernest J. King	1946	The war has been variously termed a war of production and a war of machines. Whatever else it is, so far as the united states is concerned, it is a war of logistics.
Duncan S. Ballantine	1947	In modern time it is a poorly qualified strategist or naval commander who is not equipped by training and experience to evaluate, logistic factors or to superintend logistic operations.
Gen. Robert H. Barrow, USMC	1980	Amateurs talk about tactics, but professionals study logistics.
Tom Peters	2001	Leaders win through logistics. Vision, sure. Yes, but when you go to war, you need to have both toilet paper and bullets at the right time. In other words, you must win through superior logistics.

iii. Modern Logistics

Modern logistics applications are quite different from the traditional approach in the sense that it deals with various new aspects such as information technology, Internet applications, online positioning and tracking. in order to boost the traditional logistics (zhang,2007). Christopher (1998) pointed out that consumer has become overly time-sensitive. To satisfy customers, companies have to respond quickly to customer requests. According to Christopher (2011) quick response (QR) is the umbrella term for the information systems and the logistics system that come together to offer customers ‘the right product in the right place at the right time’.

Christopher explained the importance of logistic differentiation. He points out that the firm must deliver value to its customers in a unique way that creates differentiation. Otherwise, it is difficult to generate competitive advantage over its rivals (Christopher, 2011).

II. Evolution of logistics

Logistics has a long history of derivation. History of logistics is also the history of human civilization. It can take the essence of logistics from the barter system, where people gathered together to exchange goods for goods. The invention of reel sped up the revolution, till logistics grew as a promising area of growth and development. The evolution of logistics in this study is categorized into eight phases (Alan Rushton, Phil Croucher and Peter Baker, 2010). And also the frameworks by the Weber on the evolution of logistics were analyzed.

i. Stage I

During the first phase of derivation, there is no established rigid structure for logistics and physical distribution. Manufacturers, retailers and the shoppers are engaged in activities at the absence of a perfect distribution system. There were little or no integration between the various distribution related functions (Alan Rushton, Phil Croucher and Peter Baker, 2010).

ii. Stage II

In between 1960 and 1970, tremendous changes happened in physical distribution. The concept of ‘physical distribution’ emerged with the gradual realization that the ‘dark continent’ was indeed valid area for managerial implications. To support that, there arose the need for integrating various physical activities together to manage distribution more effectively such as transport, storage, material handling and packaging. The early discussions on service improvement and cost reduction were started (Alan Rushton, Phil Croucher and Peter Baker, 2010)

iii. Stage III

This was a decade of drastic changes in the concept of physical distribution. During the decade, companies across the globe recognized physical distribution as an important component in the functional management structure. Total changes happened in physical distribution. There was a decline in the power of manufacturers and suppliers and marked increase in that of the major retailers. Retail stores started to make an independent distribution structure on regional or local basis.

iv. Stage IV

Fairly rapid cost increases and the clearer definition of the true costs of distribution contributed to a significant increase in professionalism within distribution. With this professionalism came a move towards longer term planning and attempts to identify and pursue cost saving measures. These measures included centralized distribution, severe reductions in stock holding and the use of computer to provide improved information and control. The growth of the third party distribution service industry was also of major significance, with these companies spearheading development in information and equipment technology. The concept of, and need for, integrated logistics systems were recognized by forward-looking companies that participated in distribution activities.

v. Stage V

In the 1990s, the process was developed even further to encompass not only the key functions within an organization's own boundaries but also those functions outside that also contribute to the provisions of a product to a final customer. This is known as supply chain management. The supply chain concept gave credence to the fact that there may be several different organizations involved in getting a product to the market place. These partnerships or alliances should also include other intermediaries within the supply chain, such as logistics service providers.

vi. Stage VI.

Business organizations faced many challenges as they endeavoured to maintain or improve their position against its competitors, bring new products to market and increase the profitability of operations. This led to the development of many new ideas for improvement, specifically recognized in the redefinition of business goals and the re-engineering of entire systems.

Logistics and supply chain finally became recognized as an area that was key to overall business success. Indeed, for many organizations, changes in logistics have provided the catalyst for many major enhancements to their business. Leading organizations recognized that there was a positive 'value added' role that logistics could offer, rather than the traditional view that the various functions within logistics were merely a cost burden that had to be minimized regardless of any other implications.

III. Logistics and Supply Chain Management

Supply chain management and logistics are those kind of terms which often cause confusion regarding whether the two are the same or not. The experts explain that the supply chain management is the extension of the concept logistics integration. Logistics integration advocates the benefits of viewing the different elements of logistics process as an integrated whole. Supply chain management is similar, but it includes supplier and the end user in the process, and also it contains upstream and downstream partners in the supply chain. This is the major difference between supply chain management and traditional logistics management.

The following four are the main difference between supply chain management and traditional view of logistics.

1. Unlike logistics, supply chain is considered to be a single entity. But logistics is a set of interrelated activities, like, procurement, transportation, warehouse etc. again, supply chain includes both supplier and end user and also the upstream and downstream partners.
2. Supply chain management is considered as a part of strategic systems, whereas logistics comes under the boundary of operational system.
3. Unlike traditional approach, supply chain management is looking for minimum possible inventory rather than the large bulk of inventory.
4. Presence of integrated information system within the supply chain is the central difference over the traditional form of logistics. It enables visibility of product demand and inventory levels through the full length of the pipeline.

a. Logistics Outsourcing

Outsourcing is the process of handing over the whole or part of the responsibility to the third party for some economic consideration. It becomes necessary for the modern business establishments where cost of operations is crucial. Outsourcing helps to reduce fixed assets within the firm so as to improve overall business performance. Many organizations have now realized that it can benefit from using specialized companies to take over part, or all, of logistics. Outsourcing allows the companies to concentrate the core activities.

Depending on the nature of outsourcing, it can be termed in different names, i.e, third party logistics, fourth party logistics etc.

IV. Third party logistics (3PL)

According to the Council of Supply Chain Management Professionals, 3PL is defined as "a firm that provides multiple logistics services for use by customers. Preferably, these services are integrated, or bundled together, by the provider. Among the services 3PL provides are transportation, warehousing, cross-docking, inventory management, packaging and freight forwarding". There is more thrust factors behind every outsourcing decision, Cost reduction, performance improvement, value creation, etc. are the ones among them. The logistics and distribution activities add up to almost around 5 per cent to the cost thereby increasing the final cost of the product. In addition, the inventory cost adds around 15 per cent to the cost of the product. To increase operational efficiency, it is necessary for the corporates to cut these costs to remain competitive. Companies opt for third party logistics solution for the following reasons; improved strategic focus, lowering cost, expansion of market, to improve the service level with improved response time and to increase flexibility.

Table 3.2

Third Party Logistics- Definitions

Authors	Definitions
Lieb (1992)	The use of external companies to perform logistics functions that have traditionally been performed within an organization. The function performed by the third party can encompass the entire logistics process or selected activities within that process.
Andersson (1997)	The procurement of an integrated set of logistics services in a long term relationship between a shipper and a service provider.
Murphy and Poist (1998)	A relationship between a shipper and third party which, compared with basic services, has more customized offerings, encompasses a broader number of service functions and is characterized by a longer term, more mutually beneficial relationship.

Vab Laarhoven et.al (1999)	Activities carried out by a provider on behalf of a shipper and consisting of at least management and execution of transportation and warehousing. In addition, other activities can be included, for example inventory management, information related activities, such as tracking and tracing, value added activities, such as secondary assembly and installation of products or even supply chain management. Also, the contract is required to contain some management, analytical or design activities, and the length of the cooperation between shipper and provider to be at least one year, to distinguish 3PL from traditional "arm's length" sourcing of transportation and/ or warehousing.
Berglund (2000)	Organization's use of external providers, in intended continuous relationships bound by formal or informal agreements considered mutually beneficial, which render all or a considerable number of the activities required for the focal logistical need without taking title.
Basc (2001)	Relationship between interfaces in the supply chains and third party logistics providers, where logistics services are offered, from basic to customized ones, in a shorter or longer term relationship, with the aim of effectiveness and efficiency

Source: Marasco A., A survey of third party logistics literature: preliminary findings, RIRL 2006- Sixth International Congress of Logistics Research.

V. Fourth Party Logistics (4PL)

Fourth party logistics is an integration process where the fourth party logistics provider assembles and manages all the resources, capabilities, and technology of an organization's supply chain and its array of providers (Dan Jordan, 2010). The main aim of which is to open all the possible way to create value. Unlike TPL, it is more productive and dynamic.

Fourth party logistics was a term coined by Accenture Consulting in the mid 90s. The term was coined as a result of an exhaustive survey carried out by the organization on customer satisfaction, which indicated that the customer expectation regarding costs by using 4PL service providers were not up to the mark. The survey also indicated that the balance of risk and reward on which the 3PL business model is based had titled the rewards unjustly in favor of the 3PL service providers while the risks were borne by the client organizations. This was because of the fee based model of outsourcing that resulted in inflated costs of operations with increase in the outsourcing business. As a result, the supposedly dynamic nature of the 3PL service provider had become a dynamic one. To model a more dynamic relation, Accenture coined the term 4PL with the following definition: “An integrator that assembles the capabilities, technology and resources of its own organization and other organizations to design, build and run comprehensive supply chain solutions”

For a firm to be 4PL, it must have exhaustive skills in investing and maintaining the infrastructure and resources that makes it the manager of multiple 3PL service providers crucial to the client organization. However, the definition of 4PL was misinterpreted by many 3PLs who thought 4PL as a kind of 3PL plus service and began providing some value added activities such as assembling, picking and then marketing themselves as 4PL providers.

VI. Logistics Service Provider (LSP)

Increasing competition and complex business conditions force the corporates to outsource certain activities from the third party. Logistics service providers are the pivotal players in today’s competitive world. LSPs were still treated at an arm’s length and with some suspicion. The suspicion arose from the manufacturing firms fears that the LSPs may provide information to the suppliers and customers to their competitors. However, with the increased use of information technology that increases visibility of goods the manufacturing company and the LSPs have come a long way to improve their relationship and now work closely to the improve the business of the firm. The LSPs work in tandem with the manufacturing firm to meet their supply chain activities and help manufacturing firms tap new markets because of its efficient and timely distribution of products. The new breeds of LSPs even help the manufacturing firms in designing their SCM strategy and in some cases the IT and communication infrastructure has been closely integrated allowing both the LSPs and the manufacturing firm to share information and aid in better decision making.

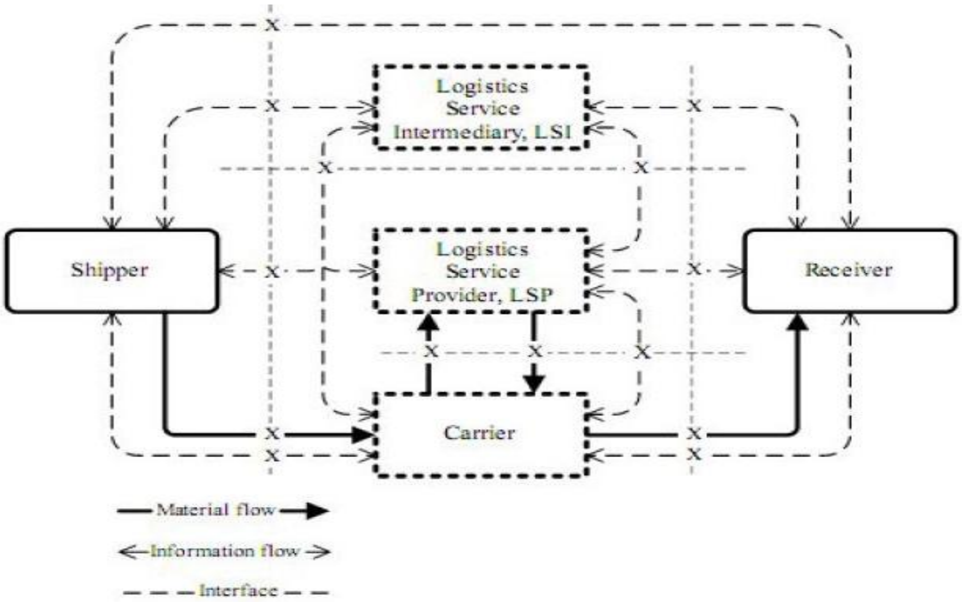

Fig 3.1: Collaborative logistics management (Stefansson 2006, 85)

VI. Logistics Resources

Conventionally, logistics is a set of interrelated activities which are carried out to execute movement of material efficiently and effectively. It has changed a lot in recent times. Now, logistics becomes strategic course of action to attain larger market space. The ability of a good TPL provider is largely influenced by its diverse resources. Resources in TPL industry imply the ability of a firm to provide different logistics services to its customers on demand.

i. Warehousing

Warehousing incorporates many different aspects of logistics operations. A warehouse has traditionally been viewed as a place to hold or store inventory.

However, in contemporary logistical systems, logistics functionality is more properly viewed as mixing inventory assortments to meet customer requirements. Storage of product is ideally held to a minimum (Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007).

Storage has always been an important aspect of economic development. In the pre-industrial era, storage was performed by individual households forced to function as self-sufficient economic units. Consumers performed warehousing and accepted attendant risks (Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007).

As transportation capability developed, it became possible to engage in specialization. Product storage shifted from households to retailers, wholesalers and, manufacturers. Warehouses stored inventory in the logistics pipeline, serving to coordinate product supply and consumer demand. Because the value of strategic storage was not well understood, warehouses were often considered necessary evils that added costs to the distribution process. The concept that middlemen simply increase cost follows from that belief. Earlier the need to deliver product assortments was limited. Labour productivity, materials handling efficiency and inventory turnover were not major concerns. Because labour was relatively inexpensive and human resources were used freely. Little consideration was given to efficiency in space utilization, work methods or materials handling. Despite such short comings, these initial warehouses provided a necessary bridge between production and marketing (Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007).

Following World War II, managerial attention shifted toward strategic storage. Management began to question the need for vast warehouse networks. In the distributive industries such as wholesaling and retailing, it was traditionally considered best practice to dedicate a warehouse containing full assortment of inventory to every sales territory. As forecasting and production scheduling techniques improved, management questioned such risky inventory deployment. Production planning became more dependable as disruptions and time delays during manufacturing decreased. Seasonal production and consumption still required warehousing, but the overall need for storage to support stable manufacturing and consumption patterns was reduced (Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007). An important goal in warehousing is to maximize flexibility.

ii. Inventory management

Inventory decisions are both high risk and high impact throughout the supply chain. Inventory committed to support future sales drives a number of anticipatory supply chain activities. Without the proper inventory assortments, lost sales and customer dissatisfaction may occur. Likewise, inventory planning is critical to manufacturing. Materials or components shortages can shut down a manufacturing line or force production schedule modification, added cost and potential finished goods shortages. Just as shortages can disrupt manufacturing marketing and manufacturing plans, inventory overstocks also create operating problems. Overstocks increase cost and reduce profitability as a result of added warehousing, working capital, insurance, taxes, and obsolescence. Management of inventory resources requires an understanding of functionality, principles, cost, impact and dynamics. Inventory management is risky, and risk varies depending upon firm positions in the distribution channel (Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007).

For manufacturers, inventory risk is long-term. The manufacturer's inventory commitment begins with raw material and component part purchase. A wholesaler purchases large quantities from manufacturers and sell small quantities to retailers. The economic justification of a wholesaler is the capability to provide customers an assortment of merchandize from different manufacturers in specific quantities. For a retailer, inventory management is about the velocity of buying and selling. Retailers purchase a wide variety of products and assume substantial risk in the marketing process (Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007). A TPL provider must be capable of themselves to coordinating all of the needs of its customers in order to secure minimum risks and problems.

iii. Procurement

Every organization, whether it is a manufacturer, wholesaler, or retailer, buys materials, services, and supplies to support operations. Historically, purchasing has been perceived as a clerical or low level managerial activity charged with responsibility to execute and process orders initiated elsewhere in the organization. The role of purchasing was to obtain the desired resources at the lowest possible purchase price from a supplier. This traditional view of purchasing has changed substantially in the past several decades. The modern focus is on total spend and the development of relationships between buyers and sellers. As a result, procurement has been elevated to a strategic activity (Bowersox, D. J., Closs, D. J., & Cooper, M. B. (2007).

iv. Transportation

The role of transportation in logistics has changed dramatically over the last three decades. Prior to transportation deregulation, the purchase of transportation could be likened to buying a commodity such as coal or grain. There was very little difference between transport suppliers in terms of product, service, or price. Transportation deregulation in 1980 introduced pricing flexibility and significantly increased the range of service transportation companies could provide to their customers.

Today a wide range of transportation alternatives are available to support supply chain logistics. For example, logistics managers may integrate private with for-hire transportation to reduce total logistics costs. Many for-hire carriers offer a wide variety of value-added services such as product sortation, sequencing, and customized freight delivery and presentation. Technology has enhanced real-time visibility of location of freight throughout the supply chain and advanced information concerning delivery. Precise product delivery reduces inventory, storage, and materials handling.

v. Transport functionality, principles, and participants

This section provides a foundation by reviewing transportation functionality and the underlying principles of transport operation

a. Transport functionality

Transportation enterprises provide two major services: product movement and product storage.

1. **Product movement:** The basic value provided, whether in the form of material, components, work-in-progress, or finished products, by transportation is to move inventory to specific destination.
2. **Product Storage**: A less visible but most significant aspect of transportation is the performance of product storage. To some extent transportation vehicle itself is the storage space but there exists a trade-off between transportation vehicles versus temporary placement of product i.e., the warehouse.
3. **Transport Principles**: There are two fundamental principles that impact transportation efficiency: economy of scale and economy of distance; Economy of scale in transportation is the decreasing cost per unit of weight as the size of shipment increases. Economy of distance refers to decreased transportation cost per unit of weight as distance increases.

These principles are important when evaluating transportation alternatives.

b. Transport participants

The transportation environment impacts the range of decisions that can be implemented in a logistics system. Unlike most commercial transactions, transportation decisions are influenced by six parties: 1. Shipper, sometimes referred to as the consignor; 2. Designation party, traditionally called as consignee; 3. Carriers and agents; 4. Government; 5, Internet and 6, the public. To understand the complexity of the transportation environment, it is useful to review the role and perspective of each party.

vi. Order management

Order picking represents a key objective of most warehouses: to extract from inventory the particular goods required by customers and bring them together to form a single shipment- accurately, on time and in good condition. It directly impacts on customer service, as well as cost, hence, this activity is a critical one. Order picking accounts for about 50 percent of the direct labour cost of a warehouse.

Customers may require goods in pallet, case or unit quantities. In the case of pallet quantities, goods can be extracted from the reserve storage area and brought directly to the marshalling area by the types of equipment described earlier (eg by a reach truck or a combination of stacker crane and conveyor). These would then typically be checked, collated with other goods, packed (if necessary) and moved to the marshalling area to form vehicle loads ready for dispatch.

In general, picking still tends to be largely a manual operation. However, there are many technological aids in terms of information systems and equipment that may be used to provide high levels of productivity and accuracy. Thus, whilst advanced ' automated warehouses' can often work effectively without direct operatives in the pallet reserve storage areas, the case and unit picking operations tend to be manually operated with technological assistance.

Order picking concepts

There are three main picking concepts that may be applied. These are:

1. Pick-to-order: This is basically where a picker takes one order and travel through the whole warehouse until the whole order is picked
2. Batch picking: Particularly for small orders, to batch these together and pick the total requirement of all the orders for each Stock Keeping Unit (SKU) on a single picking round. This method can achieve great benefit in terms of picking run into the different customer orders. This sortation may be undertaken either manually or using automated sortation equipment.
3. Pick-by-line or pick-to-zero: Under this concept, the exact numbers of cases or items are presented for picking. For example, there may be brought forward from the reserve storage area or they may be specifically ordered suppliers for cross-docking. In both instances, the unit load of one product line is picked to waiting customer orders (pick-by-line) and the picking continues until that line is exhausted (pick-to-zero)

vii. Security and hazardous material regulations

Despite the increased use of automation and mechanical handling equipments in distribution centers and warehouses, there are still many potential hazards involved. The increased speed of operations required these days has also created a new set of hazards.

Some of the hazards that are still very common include manual handling injuries, vehicle reversing incidents, the misuse of fork-lift trucks, unstable racking, and personal slipping, tripping and falling, to name a few.

The cause of accidents in the workplace usually relates to the working environment, the task or the personnel involved. Many of the hazards that have the potential to cause accidents should be identified and hopefully eliminated through the formal use of risk assortments. Senior site management need to define health and safety policies and practices clearly. These should be reinforced through the real allocation of responsibilities, the use of safe working practices, the provision of well maintained equipment and (PPE), and regular safety training. Senior managers should visibly support sound health and safety practices and set an example by their own actions. The standard of health and safety management achieved will be directly related to their level of support and action.

1. Health and safety issues

Some of the most common health and safety-related issues are listed below. This is intended as a general guide to some of the more common issues. It is by no means an exhaustive list, and professional detailed advice should be sought on these matters if there is any cause for concern.

a. The working environment

- Lighting levels should be sufficient
- The integrity and strength of the warehouse floor are important for a number of reasons: pallet racking will apply point loadings; a level floor will avoid the possibility of people tripping or forklifts and loads being destabilized; level

floors are critical where tall stands of racking need to be at right angles to the floor.

- Vehicles and pedestrians should be separated both inside the distribution centre or warehouse and outside in the yard. Ideally this will be achieved through the use of physical barriers, but pedestrian walk ways should be clearly marked on the floor as a minimum. Vehicle and pedestrian lanes should be kept clear of obstructions at all time.
- An untidy working area must be avoided. Pallets should be neatly stacked, waste packaging and rubbish should be placed in an appropriate area, spillages of any kind should be cleared up promptly, and fire exits should be free of all impediments.
- There should be sufficient natural ventilation in any area where humans are working. Local exhaust ventilation should be installed over battery charging areas.
- Suitable and sufficient toilet, washing and rest facilities must be provided for use by all staff.
- It may be necessary to isolate certain types of stored products in separate areas. These might include hazardous chemicals, flammable materials, or high value items. This will allow management to better apply any special regulations regarding the safe handling of these materials.

b. Equipment

- All equipments used should be well maintained and fit for purpose. This will include all mechanical handling equipment, lifting straps or chains, conveyors, shrink-wrap machines, heavy vehicles used in the yard to shunt trailers, and so on. A scheduled maintenance scheme should be in place for all equipments.
- All pallet racking should be suitable for the products stored. The racking must be inspected by a competent person on a regular basis. Any necessary repairs should be carried out with a minimum of delay, as pallet racking collapses can be catastrophic. Unstable pallets or loads on pallets should not be put away before either the pallet itself is changed or the load is made safe.

- Block stacking of pallets one on top of another should only be to a height relative to the strength of the pallet(s) at the bottom of the stack. As a rule of thumb, four high does not usually present any problems so long as the point regarding the strength of the bottom pallet(s) in borne in mind.
- Safety related equipment such as fire extinguishers, sprinkler systems, alarm systems, emergency lighting, first-aid kits, eye washes, emergency showers, signage and PPE should all be in place if required and serviced regularly.

c. Personnel

- All personnel should receive regular health and safety training. Specific personnel such as fork-lift drivers should have certificates of competence for the equipment they operate. Large goods vehicle drivers should also have the appropriate licence.
- There should be certain people who are trained as safety officers or first aiders, or trained to do specific jobs such as changing fork-lift batteries.
- Breaches of health and safety rules and regulations should be dealt with through visible disciplinary action, which in some cases may result in dismissal.
- Scheduled health checks should be made. Hearing and eyesight tests are obvious, but maintaining the general level of staff health is also important to avoid lost working days. General lifestyle advice and stress counseling could be made available. The vital indicators such as blood pressure, weight and temperature should be checked regularly by trained staff.
- Some companies have policies regarding the misuse of alcohol, tobacco and recreational drugs. They often include random checking of individuals.
- The selection of personnel is important, as having workers with the right behavior traits can help create a safe working environment.

d. Legislation and regulation

Many aspects of health and safety in the distribution centre/warehouse environment have been the subject of national and international legislation. Due regard should be paid to this legislation both when planning and when managing distribution centres/warehouses. The scope and scale of this legislation is vast. Therefore, professional advice should always be sought on these matters.

VII. Demand management and forecasting

Decisions regarding the amount of inventory that a company should hold and its location within a company's logistics network are crucial in order to meet customer's service requirements and expectations. But there is, potentially, a large cost associated with holding inventory. It is vital to get the balance of cost and service right.

There are a number of reasons why a company might choose or need to hold stocks of different products. In planning any distribution system, it is essential to be aware of these reasons, and to be sure that the consequences are adequate but not excessively high stock levels, the most important reason for holding stock is to provide a buffer between supply and demand. This is because it is almost impossible to synchronize or balance the precise requirements of demand with vagaries of supply. These and other important reasons are summarized as follows;

- To cut down production costs.
- To accommodate variations in demand.
- To take account of variable supply (lead) time
- Buying costs: there is an administrative cost associated with raising an order, and to minimize this cost it is necessary to hold additional inventory. It is essential to balance these elements of administration and stock holding, and for this the economic order quantity (EOQ) is used.
- To take advantage of quantity discounts
- To account of quantity discounts
- To allow for price fluctuations/ speculations: these may be for demand reasons whereby products are popular at peak times only. To cater for this whilst maintaining an even level of production, stocks need to be built up through the rest of the year. Supply variations may also occur because goods

are produced only at a certain time of the year. This often applies to primary food production where, for example, large stock results at harvest time.

- To help the production distribution operations run smoothly
- To provide customers with immediate service.
- To minimize production delays caused by lack of spare parts.
- Work-in-progress: this facilitates the production process by providing semi-finished stocks between different processes.

VIII. Logistics Capabilities

Logistics capability implies the ability of a firm to do its operations effectively and efficiently. Logistics strength and capability have been frequently viewed as a basic construct of the logistics competence. Logistics capabilities concern the firm's ability to combine, develop and deploy its resources to create value (Amit and Schoemaker, 1993). In any perspective, logistics capabilities can be viewed as a supporting pillar for logistics performance and competitive potential. A large number of studies and expert opinion advocate that the capabilities are the source of superior performance (Carmeli and Tishler, 2004; Autry et al., 2005; Shang and Marlow, 2005; Kim, 2006)

The very core of logistics capability implies how the firms utilize logistics resources productively in order to create maximum value. Irrespective of industry, inefficient utilization of resources is the key problem. In a third party logistics industry, there can be several additional ways to improve overall performance. Vehicle routing, energy efficient warehousing, green logistics practices etc. are those kind of practices which eliminate avoidable additional costs. In this study, logistics capabilities are viewed in three dimensions; process capabilities, flexibility capabilities and information integration capabilities.

i. **Process Capabilities: Definitions**

Table 3.3

Process Capabilities: Definitions

Author	Definition
Olavarrieta and Ellinger (1997)	Complex bundles of individual skills, assets and accumulated knowledge exercised through organizational processes that enable firms to co-ordinate activities and make use of their resources.

ii. **Flexibility Capabilities: Definitions**

Flexibility is facilitated by information technology. Technology has influenced almost every aspect of warehouse operations by creating new and better ways to perform storage and handling. Flexibility is also an essential part of being able to respond to ever changing customer demand in terms of product assortments, value added services and the way shipments are sequenced and presented. Information Technology facilitates flexibility by allowing warehouse operators to quickly react to changing customer requirements (Donald J Bowersox, David J Closs and M by Cooper).

Table 3.4

Flexibility Capabilities: Definitions

Authors	Definition
Teece et al., 1997, p.516	"The firm's ability to integrate, build and reconfigure internal and external competence to address rapidly changing environments"
Eisenhardt and Martin, 2000,p.1107	"The firms processes that use resources- specifically the processes to integrate reconfigure, gain and release resources- to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as market emerge, collide, split, evolve and die"

Zollo and Winter, 2002, p.340	"A learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved productivity"
Lopez, 2005, p.661	"Dynamic capabilities are complex, higher order organizational processes which provide adequate conditions for the modification and renewal of the firm's stock of business assets."
Helfat et al., 2007, p.4	"The capacity of an organization to purposefully create, extends, or modifies its resource base".
Teece, 2007, p.1319-1320	"To continuously create, extend, upgrade, protect, and keep relevant the enterprises unique asset base… Dynamic capabilities include difficult to replicate enterprise capabilities required to adapt to changing customer and technological opportunities. They also embrace the enterprises capacity to shape the ecosystem it occupies, develop new products and processes, and design and implement viable business models"
Griffith and Harvey (2001, p.597)	"it is the creation of difficult to imitate combinations of resources, including effective coordination of inter-organizational relationships, on a global basis that can provide a firm competitive advantage"

iii. Information Integration Capabilities- Definitions

Uusipaavalniemi, Jari Juga (2008), and Uusipaavalniemi, Juga (2009b) defined information integration as "the foundation for supply chain integration. It is formed of six elements: processes and activities, information technology in use, information attributes, Information sharing practices, collaborative foundation and time-related issues". Lee and Whang (2000) define information integration as "sharing of pertinent data and information among the supply chain partners".

IX. Lean management

Lean management deals with the elimination of all the possible non-value added activities and wastage of operations (Jones, Hines and Rich, 1997). Becoming lean is actually a complex process. Several crucial factors are needed to be considered when the companies are changing their course of action in a lean manner. The following statements describe the critical elements of lean logistics management and are part of the Taiichi Ohno's tool box for implementing lean (Jones, Hines and Rich, 1997):

1. Level out the work load and the flow of product's orders, eliminating the causes of demand distortion and amplification (Heijunka)
2. Organize the activities so the product flows with no interruptions.
3. Produce or deliver what is pulled from the upstream step in order to replace what the customer has taken- sell one, order one.
4. Work throughout the system to the same pace as customer's demand
5. Use the best work cycle for each task as a standard to ensure consistent performance.
6. Use the minimum necessary safety stock between operations.
7. Build a culture of stopping an operation whenever an error has been detected (Jidoka)
8. Use visual control devices to detect problems
9. Report irregularities and create priorities when conducting root cause elimination in order to prevent recurrences and finally remove waste from the flow.

i. The Lean principles

Companies want to concentrate on other areas than just eliminating waste (Liker, 2004). The real changes occur only when the workers in the company reshape its mind to live in a lean philosophy. The widely accepted fourteen principles that constitute the Toyota way (Taiichi Ohno's toolbox) are below;

Principle 1: Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals.

Principle 2: Create continuous process flow to bring problems to surface.

Principle 3: Use “Pull” systems to avoid over production.

Principle 4: Level out the workload (Heijunka)

Principle 5: Build a culture of stopping to fix problems, to get quality right the first time.

a. **Poka-Yoke devices**: this term is used to relate to those creative devices that make it nearly impossible for an operator to make an error due to its design.

Principle 6: Standardized tasks are the foundation for continuous improvement and employee empowerment.

Principle 7: Use visual control so no problems are hidden.

Principle 8: Use only reliable, thoroughly tested technology that serves your people and processes.

Principle 9: Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others.

Principle 10: Develop exceptional people and teams who follow your company’s philosophy.

Principle 11: Respect your extended network of partners and suppliers by challenging them and helping them improve.

Principle 12: Go and see for yourself to thoroughly understand the situation (Genchi Genbutsu)

Principle 13: Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly.

Principle 14: Become a learning organization through relentless reflection (Hansei) and continuous improvement (Kaizen)

3.3. Section II

Logistics: Facts and Statistics

I. Logistics Service Providing

Global markets continue to be impacted by volatility in many economies throughout the world, driving highly variable and sometimes sluggish demand for outsourced logistics services. Table 3.5 provides global 3PL revenues by region for 2011 and 2012 from Armstrong & associates, plus a summary of percentage changes reported for 2011-1 and 2010-11.

Table 3.5

3PL Trends (world)

Region	2011 Global 3PL Revenues (US$ Billions)	2012 Global 3PL Revenues (US$ Billions)	Percentage change 2011-12	Percentage change 2010-11
North America	159.9	170.6	6.7%	7.2%
Europe	160.4	156.2	-2.6%	-2.8%
Asia-Pacific	191.1	236.2	23.6%	21.2%
Latin America	39.5	44.4	12.4%	43.6%
Other Regions	65.2	69.5	6.4%	54.0%
Total	**616.1**	**676.9**	**9.9%**	**13.7%**

Source: Armstrong & Associates, 2013.

As indicated, global 3PL revenues of $676.9 billion (US dollars) reported for 2012 represent an increase of 9.9 % over 2011. This represents the weighted average of significant increases in Asia-pacific (23.6%) and Latin America (12.4%), modest increase in North America (6.7%) and other regions (6.4%), and a small decrease in Europe (-2.6%). In comparison with the percentage growth in global 3PL revenues of 13.7% reported for 2010-11, however, the 9.9% changes from 2011 to 2012 represents a decrease of about 1/3 from the growth percentage reported in the previous year.

Latin America and other regions also saw slowing growth, from the robust 43.6% and 54%, reported respectively, in 2010-11 to just 1.4% and 6.4% in 2011-12. Overall, this reflects shifts in global economic activity and related freight movements that have caused some "cooling off" of the growth in 3PL revenue that was reported one year ago in some regions of the world. Global economic conditions may be responsible for the somewhat slower growth in 3PL revenues associated with emerging and developing markets.

i. User spending patterns on logistics and 3PL services.

According to the report, 3PL users report an average of 44% of their total logistics expenditures are related outsourcing. This compares with an average of 39% reported last year, and 42% reported in the year before. Total logistics expenditures include transportation, distribution, warehousing and value added services. Considering Armstrong & Associates' estimated and projected increases in global3PL revenues cited in table 3.5, these percentages support the finding that global markets for 3PL services continue to expand

ii. Shippers Experiences with 3PLs

Table 3.6

Shippers Experiences with 3PLs

Results		2013 Study	2014 Study
Logistics cost reduction		15%	11%
Inventory cost reduction		8%	6%
Logistics fixed asset reduction		26%	23%
Order Fill Rate	Changed from	58%	66%
	Changed to	65%	68%
Order Accuracy	Changed from	67%	68%
	Changed to	72%	69%

Source: 2014, 18th Annual Third Party Logistics Study**.**

Table 3.6 summarizes the tangible benefits shippers report from the use of 3PL services, including average improvements in order fill rate and order accuracy. The average logistics cost reduction reported by shippers was 11%; the average inventory cost reduction was 6%; and the average fixed logistics cost reduction was 23%. These figures are down modestly from those reported in last year's study; this is not unexpected, since both shippers and 3PLs have been working earnestly to attain these benefits. As with the past years, just over half of shipper respondents (55%, compared to 56% last year) report the use of 3PLs has led to year- over year incremental benefits, while 91% of 3PLs believed that the customer use of 3PL services has led to year-over-year benefits.

Table 3.7

Logistics Services and Percentages

Logistics services	Percentage	Logistics services	Percentage
Domestic transportation	81%	SC consultancy services	25%
International transportation	78%	IT services	22%
Warehousing	73%	Order management and fulfilling	18%
Freight forwarding	62%	Inventory management	17%
Customs brokerages	57%	Fleet management	17%
Reverse logistics	36%	Lead logistics provider (LLP)/4PL services	15%
Cross-Docking	36%	Customer service	13%
Freight bill auditing and payment	33%	Service parts logistics	11%
Product labeling, packaging, assembly and kitting	32%	Sustainability/ Green supply chain services	5%
Transportation planning and management	28%		

Source: 2014, 18th Annual Third Party Logistics Study.

Table 3.7 depicts the percentage of shippers outsourcing several logistics services. From the table, it is notable that the percentages of conventional logistics services are higher than that of modern practices. Values of Domestic transportation (81%), international transportation (78%), Warehousing (73%) and Freight forwarding (62%) substantiate this.

iii. Third Party Logistics in India

Third party logistics (3PL) in India is expected to grow rapidly in recent future. The share of 3PL in India's total logistics activities is just 9 per cent; India is still in a nascent stage. ASOCHAM claims that the business on Indian 3PL is set to become sharply improved in recent future. In order to serve the customer with good service, 3PL is the best solution for the companies. The table 3.8 underscores the fact that the developed countries across the globe widely adopt 3PL partners in their operations.

Table 3.8

Share of Third Party Logistics Market

	Japan	**US**	**Europe**	**India**
Share of 3PL market	80%	57%	40%	09%

Source: Industrial data base, KPMG analysis

Table 3.8 shows that the share of 3PL in total logistics activities is 80 per cent in Japan. It is an interesting lesson for all the countries, how Japan could handle the outsourcing of logistics. US and Europe approach 3PL with an open mind. Finding from the data is that the share of 3PL in total logistics activity is comparatively higher in developed countries than the under developed countries.

As per the various surveys, the propensity of customers to outsource have been most pronounced in transportation (67 per cent) followed by warehousing (33 per cent), production (16 per cent), spare parts management (12 per cent), invoicing (6 per cent), order processing (6 per cent), and inventory management (4 per cent).(BS Sahay, 2006). It proves that the 3PL providers are concentrated on traditional services than the modern value added process. The process of 3PL has been limited to only few industries, like automotives, IT, Telecom etc.

II. Reasons for Logistics Outsourcing in India

Transport Corporation of India (TCI) and Management Development Institute (MDI) conducted a survey to identify the reasons behind the logistics outsourcing in India by using ten variables. Logistics cost reduction becomes the prime reason behind the adoption of outsourcing it accounts 80.6 per cent, where as Diverting Capital investment placed least, it scores 24.5 per cent. Focus on core competence (76.0), improved customer services (71.3), improve return on asset (68.2), to increase inventory turn(60.6),productivity improvement (56.5), more flexibility in operations (46.1), access to emerging technology (45.3) and access/ expansion to unfamiliar markets (35.9) are placed between the two extremes. Less than 55 per cent of Indian companies subscribe to 3PL compared to more than 75 per cent globally. More than 50 per cent of the companies have already outsourced activities like transportation, warehousing and customs clearing/forwarding.

III. Logistics Costs in India

As per the methodology adopted by Hekett et al (1973), Total Logistics cost is composed of two elements, i.e, Transportation cost and inventory cost.

> ***"Total Logistics Cost (TLC) = Sum of all transportation costs (all modes of transportation) + Inventory carrying cost + Administrative cost (Including obsolescence cost)".***

Table 3.9

Elements of Logistics Cost

Elements	India	China	United States
Transportation	35%	49%	50%
Inventories	25%	24%	15%
Warehousing	9%	9%	25%
Others (Including Losses)	31%	18%	10%

Source: Cygnus Consulting

Table 3.9 describes the elements of logistics cost in the three countries having highly significant economic impact over the world economy. It is clear from the data that transportation occupies a lion's share. Data shows that the influence of transportation cost in total logistic costs of India is low when compared with that in other countries, which is just 35 per cent. China and the US have 50 per cent as transportation costs. The element "Others", which primarily includes various types of losses, gives an interesting fact. It becomes second highest cost contributing to the total logistics costs in India and it hints that India is still in a stage of infancy in logistics management.

The other perspective, logistics, as percentage of total product cost, is 20 per cent. It is about 4.5 times more than in developed countries. It shows that Indian logistics services have not met international standards. There are several reasons behind it; fuel price hike becomes the primary issue. It sharply increases the cost of freight transport.

IV. Logistics Performance Index (LPI)

Logistics Performance Index (LPI) reflects the perceptions of a country's logistics based on efficiency of customs clearance process, quality of trade and transport related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, frequency with which shipments reach the consignee within the scheduled time. For this, more than 5000 country assessment by more than 1000 freight forwarders. It covers 155 countries. It uses five point scale for measurement with 1 for very low and 5 for very high.

Table 3.10

LPI of BRICS Countries

Countries	2010	2012	Rank 2012
Brazil	3.20	3.13	54
Russia	2.61	2.58	117
India	3.12	3.08	46
China	3.49	3.52	26
South Africa	3.46	3.67	23

Source: World Bank Report, 2012

Logistics Performance Index results (Table 3.10) are directly based on the practitioners view. It helps the logistics sector translate the needs into policy reform proposals. The above table represents the LPI scores of BRICS nations. As the table explains, the LPI score in India is 3.12 in 2010 and 3.08 in 2012, which is not a good score as compared with countries having high growth potential. South Africa scores high among BRICS nations.

3.4. Section III: Profile of industries

I. Food processing industry.

The Indian food processing industry is poised for huge growth, increasing its contribution to world food trade every year. In India, the food sector has emerged as a high-growth and high-profit sector due to its immense potential for value addition, particularly within the food processing industry.

The food industry, which is currently valued at US$ 39.71 billion, is expected to grow at a compound annual growth rate (CAGR) of 11 per cent to US$ 65.4 billion by 2018. Food and grocery account for around 31 per cent of India's consumption basket, accounting for about 32 per cent of the country's total food market, The Government of Indian has been instrumental in the growth and development of the food processing industry. The government through the Ministry of Food Processing Industries (MoFPI) is making all efforts to encourage investments in the business. It has approved proposals for joint ventures (JV), foreign collaborations; industrial licenses and 100 per cent export oriented units in the food processing industry.

i. Market Size.

The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. Food has also been one of the largest segments in India's retail sector, which was valued at US$ 490 billion in 2013. The Indian food retail market is expected to reach Rs 61 lakh crore (US$ 894.98 billion by 2020.

The Indian food processing industry accounts for 32 per cent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. It contributes around 14 per cent of manufacturing gross domestic product (GDP), 13 per cent of India's exports and six per cent of total industrial investment. Indian food service industry is expected to reach US$ 78 billion by 2018. The Indian gourment food market is currently valued at US$ 1.3 billion and is growing at a compound annual growth rate (CAGR) of 20 per cent. India's organic food market is expected to increase by three times by 2020.

The online food ordering business in India is in its nascent stage, but witnessing exponential growth. The organised food business in India is worth US$ 48 billion, of which food delivery is valued at US$ 15 billion. With online food delivery players like food panda, Zomato, tiny owl and swiggy building scale through partnerships, the organised food business has a huge potential and a promising future.

ii. Investments

According to the data provided by the Department of Industrial Policies and Promotion (DIPP), the food processing sector in India has received around US$ 6.82 billion worth of Foreign Direct Investment (FDI) during the period April 2000-March 2016. The Confederation of Indian Industry (CII) estimates that the food processing sectors have the potential to attract as much as US$ 33 billion of investment over the next 10 years and also generate employment of nine million person-days.

Mr Tomasz Lukaszuk, the Ambassador of the Republic of Poland had also highlighted the keen interest shown by Polish companies looking for opportunities in India to expand collaboration and invest in food processing.

Some of the major investments in this sector in the recent past are:

- Di Bella, the Australia-based coffee chain, plans to invest Rs 67 crore (US$ 10 million) for setting up around 20 new outlets in Mumbai, besides entering Delhi and Bangalore by 2017.
- KKR & Co LP, the US-based private equity firm, plans to invest about Rs 520 crore (US$ 77.38 million) in dairy company Kwality Ltd, which will be used to strengthen its milk procurement infrastructure and increase processing capacity.

- Henry Ford Health Systems (HFHS), a US-based health and wellness group, plans to enter India by signing a franchise partnership with Chandigarh-based hospitality and food services firm KWalls Hospitality, and set up 'Culinary Wellness' branded stores across the country.
- Mondelez International, the US-based confectionery, food, and beverage major, inaugurated its new manufacturing plant in Andhra Pradesh set up for Rs 1,265 crore (US$ 190 million), with an annual production capacity of 250,000 tonnes.
- PureCircle, a Malaysia-based natural sweetener producer, plans to invest around Rs 1,300 crore (US$ 200 million) in India to set up a manufacturing plant and make the country its regional production and export hub in the next five years.
- Swiggy, a food delivery start-up owned by Bundl Technologies Private Limited, has raised Rs 230.34 crore (US$ 33.80 million) in a Series C funding round, with its existing investors SAIF Partners, Accel Partners, Norwest Venture Partners and Apoletto Asia Ltd contributing 79 per cent of the new funds raised.
- Gujarat Cooperative Milk Marketing Federation (GCMMF), popularly known as 'Amul', plans to invest Rs 5,000 crore (US$ 733.6 million) to establish ten new processing plants as well as expand the current capacity to touch 32 million litres per day (MLPD) capacity by 2020.
- American doughnut chain Dunkin' Donuts has tied up with local online grocery delivery platform Grofers for home-delivery of its packaged and freshly made products.
- Private Equity (PE) firm India Value Fund Advisors (IVFA) plans to invest around US$ 100-150 million in the food business in India over the next two years.
- Zomato, a restaurant search and discovery platform, has raised US$ 60 million from Singapore government-owned investment company Temasek, along with existing investor Vy Capital, in order to explore new business verticals.

- ITC Limited plans to invest Rs 800 crore (US$ 117.4 million) to set up a world-class food processing facility in Medak, a district located in Telangana. The company has also formulated plans to enter the dairy market.

iii. Government Initiatives

In order to promote food processing industries, increase level of processing and exploit the potential of domestic and international market for processed food products, Vision Document-2015 was prepared by the Ministry of Food Processing Industries. The document envisages trebling the size of investment in the processed food sector by increasing the level of processing of perishables from 6 per cent to 20 per cent, value addition from 20 per cent to 35 per cent and share in global food trade from 1.5 per cent to 3 per cent by 2015. According to the Ministry, an investment of Rs 100,000 crore (US$ 14.67 billion) would be required in 2015 to achieve these targets. The Government of India has also relaxed foreign direct investment (FDI) norms for the sector, allowing up to 100 per cent FDI in food product e-commerce through automatic route.

Some of the major initiatives taken by the Government of India to improve the food processing sector in India are as follows:

- The Government of India allocated Rs 1,500 crore (US$ 225.7 million) and announced various measures under the Merchandise Exports from India Scheme (MEIS), including setting up of agencies for aquaculture and fisheries in coastal states and export incentives for marine products.
- Union Budget 2016-17 has proposed 100 per cent FDI through FIPB (Foreign Investment Promotion Board) route in marketing of food products produced and manufactured in India.
- All of the ration cards in India have been digitised and 42 per cent of the digitised ration cards are now linked to Unique Identification (UID) or Aadhaar cards.
- Government of India plans to allow two Indian dairy companies, Parag Milk Foods and Schreiber Dynamix Dairies, to export milk products to Russia for

six months, after these companies got approval for their products by Russian inspection authorities.

- Ms Harsimrat Kaur Badal, Union Minister for Food Processing Industries, Government of India inaugurated the first of its kind Rs 136 crore (US$ 20 million) mega international food park at Dabwala Kalan, Punjab. She has also expressed confidence that the decision to allow 100 per cent Foreign Direct Investment (FDI) in multi-brand retail with 100 per cent local sourcing condition, will act as a catalyst for the food processing sector, thereby controlling inflation, uplifting the condition of farmers, and creating more jobs in the country.
- The Food Safety and Standards Authority of India (FSSAI) has issued new rules for importing products, to address concerns over the entry of sub-standard items and simplify the process by setting shelf-life norms and relaxing labelling guidelines.
- The Ministry of Food Processing Industries announced a scheme for Human Resource Development (HRD) in the food processing sector. The HRD scheme is being implemented through State Governments under the National Mission on Food Processing. The scheme has the following four components:
    - Creation of infrastructure facilities for degree/diploma courses in food processing sector
    - Entrepreneurship Development Programme (EDP)
    - Food Processing Training Centres (FPTC)
    - Training at recognised institutions at State/National level
- The Food Safety and Standards Authority of India (FSSAI) under the Ministry of Health and Family Welfare has issued the Food Safety and Standards (Food Product Standards and Food Additives) Regulations, 2011 and the Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011 which prescribe the quality and safety standards, respectively for food products.

- The Ministry of Food Processing Industries has taken some new initiatives to develop the food processing sector which will also help to enhance the incomes of farmers and export of agro and processed foods among others.
- Spices Board, set up by the Ministry of Commerce to develop and promote Indian spices worldwide, aims spice exports of US$ 3 billion by 2017.
- The Government of India has approved the setting up of five numbers of Mega Food Parks in the states of Bihar, Maharashtra, Himachal Pradesh and Chhattisgarh. The Government plans to set up 42 such mega food parks across the country in next three to four years.
- In the Budget 2015-16, a corpus of Rs. 2,000 crore (US$ 293.44 million) was created under National Bank for Agriculture and Rural Development (NABARD) to provide cheaper credit to food processing industry. Excise duty on plant and machinery for packaging and processing has been brought down to six per cent from 10 per cent.

II. Textiles and Apparels Industry

The textiles and apparel industry consists of broadly two segments; Yarn and fibre, and processed fabrics and apparel. India occupies a share of 14 per cent of world's total production of textile fibres and yarns (largest producer of jute, second largest producer of silk and cotton, and third largest in cellulosic fibre). India has the largest loom capacity (including handlooms) with 63 per cent of the world's market share.

The textile and apparel industry in India is estimated to grow to US$141 billion by 2021 from US$ 67 billion in 2014. Increased penetration of organised retail, favourable demographic profile and growing income levels are expected to fuel demand for textiles. At present, India is the world's second largest exporter of textiles and clothing (http://www.ibef.org/industry/indian-textiles-and-apparel-industry-analysis-presentation).

Textiles and apparel exports from India to the rest of the world are expected to grow to US$ 82 billion by 2021 from US$ 40 billion in 2014. Readymade garments remain the largest contributor to total textile and apparel exports from India. In

FY15 the segment had a share of 40 per cent of all textile and apparel exports. Cotton and man-made textiles were the other major contributors with shares of 31 per cent and 16 per cent respectively (http://www.ibef.org/industry/indian-textiles-and-apparel-industry-analysis-presentation).

Ever increasing government attention and favourable policies is leading to growth in the textiles and clothing industry. Foreign direct investment (FDI) in textile sector increased to US$ 1587.8 million in FY15 from US$ 1424.9 million in FY14. The ministry of textiles in encouraging investments through increasing focus on schemes such as technology up-gradation fund scheme (TUFS). To promote apparel exports, 12 locations have been approved by the government to set up apparel parks for exports. As per the 12th five year plan, the government plans to provide a budgetary support of US$ 4.25 billion to textiles. Free trade with ASEAN countries and proposed agreement with European Union will also help boost exports (http://www.ibef.org/industry/indian-textiles-and-apparel-industry-analysis-presentation).

III. Rubber and Agro based industry

Rubber is a versatile product with multiple usages. It is grown in various countries worldwide and plays a crucial role in the Indian economy too. India is one of the leading rubber producers in the world.

The use of rubber is widespread, ranging from household to industrial products, entering the production stream at the intermediate stage or as final products. Tyre and tubes are the largest consumers of rubber. The remaining 44% is taken up by the general rubber goods sector, which includes all products, except tyres and tubes. Synthetic rubber is mainly used for the production of auto tyres and tubes, cycle tyres and tubes and footwear. Other applications for the synthetic variety are camel back, belts and hoses. The market segmentation includes Auto tyres and tubes 56%, Bicycle tyres and tubes 9%, Footwear 18%, Latex goods 8%, Belts and hoses 4%, Camelback 5%.

India, being the fourth largest producer of natural rubber in the world, is considered to be one of the key players in the global rubber business. The entire requirement of rubber-based industries for natural rubber, synthetic rubber, rayon and nylon tyre cord, steel cord, carbon black and rubber chemicals, etc is being met from indigenous sources. Rapid progress has also been made in the production of natural rubber.

There are about 5000 units comprising 30 large-scale, 300 medium scale and around 4600 small-scale and tiny sector units. These units manufacture more than 35,000 rubber products.

The main producer of synthetic rubber in India has been Synthetics and Chemicals, Apar Industries, Apcotex Lattices and Unimers India. Synthetics and Chemicals had closed down.

The future for natural rubber looks bright. Ever increasing volumes are being produced. At 5.92 million tonnes per annum, natural rubber has 39 per cent of the world rubber consumption of 15.14 million tonne per annum. The rubber industry is expected to grow at over 8 per cent per annum this decade, as the per capita consumption of rubber is 0.8 kg against 14 kg in the developed world. India is likely to become the world's third-largest producer of natural rubber after Thailand and Indonesia, Rubber Board sources said. And with crude prices unlikely to come down, synthetic rubber is likely to remain a costly alternative. With accelerating demand from automobile industry and other rubber consuming industries in developing countries, the shortage of natural rubber is likely to aggravate in coming years. There exists a huge scope for expansion causing import of machinery, technology and raw materials and export of rubber goods.

3.5. Section IV- Variables used for the study

Having identified the problem, the challenge for any researcher is to operationalise it through proper variables. Selection of appropriate variables is an important part of any research process. The following variables have been used for the study.

I. Customer Accommodation

Since addressing customers' needs is the core objective of a firm, many of today's most dynamic and successful firms emphasize logistics service as a competitive differentiator (Livingstone, 1992; Stern *et al.,* 1993). Logistics contributes to an organization's success by accommodating customers' delivery and inventory availability expectations and requirements and the focus is on creating or adding value for the customer. The customer being served is the focal point and driving force in establishing logistical performance requirements (Berky Kong, Mae Fong Choe, 2011).

In customer accommodation, there are increasing levels of sophistication and commitment to customer-driven service. The varying levels can be arrayed along a continuum (see Figure below). As firms become more sophisticated and more adept at leveraging logistical abilities, they move along the continuum from initial efforts targeted to basic customer service and on to re-focused effort toward achieving customer satisfaction and eventually, may shift to emphasizing customer success as the ultimate goal (Berky Kong, Mae Fong Choe, 2011).

Fig 3.2: Continuum of the different levels of customer-driven service (Ellinger et al, 1997),

Defining Customers

In total supply chain, the ultimate customer is the end user of products or services. End users can be further broken down to two categories. Firstly, we have consumers who are individuals or households that purchase goods or services to satisfy personal needs. Secondly, organizational end users purchase to allow them to perform a job or task in the organization. The supply chain management perspective entails the accommodation of both the consumer as well as organizational end users. Additionally, the supply chain perspective recognizes specific firms between the firm and the end user, termed as 'intermediate customers' as they are purchasing for the purpose of reselling (Berky Kong, Mae Fong Choe, 2011)

> *"From a logistics standpoint, however, a customer can be perceived as any delivery location. Destinations range from consumers' homes to retail and wholesale businesses to the receiving docks of manufacturing plants and warehouses. In some cases, the customer is a different organization or individual or organization taking over ownership of the product or service being delivered. In many other firms the customer is a different facility of the same firm or a business partner at some other location in the supply chain."*- (Bowersox, Closs and Cooper 2010)

i. Customer Service (Customer Accommodation Level One)

Customer service is described by Jonsson (2008) as "a number of activities involving the purchaser, the vendor and third parties, which aim to add value to the product" and includes "the entire process of filling the customer's order (either manual or electronic), managing the payment, picking and packing the goods, shipping the package, delivering the package, providing customer service for the end user and handling the possible return of goods" (Ballou, 2004). Outstanding customer service adds value throughout the supply chain. Customer service at the basic level balances availability, operational performance and reliability for all customers (Berky Kong, Mae Fong Choe, 2011)

• Availability is the capacity to have the inventory as desired by the customer. Three main performance measures relating to availability are stock-out frequency, fill rate and orders shipped complete.

• Operational Performance deals with the time required to deliver a customer's order and are specified in terms of speed, consistency, flexibility and malfunction recovery

• Service Reliability regards the combined attributes of logistics and relates to the firm's ability to perform all order-related activities as well as provide critical information and status updates on logistics operations (Bowersox, Closs and Cooper 2010).

The focus of the basic customer service level is typically on operational aspects of logistics where the organization strives to provide the seven rights to its customers. These are to provide:-

- the right quantity
- the right product
- at the right time
- at the right place
- in the right condition
- at the right price
- with the right information

(Bowersox, Closs and Cooper, 2010).

"The ultimate in logistics service is to do everything right and to do it right the first time". The highest level of commitment is perfect order performance which requires zero defects logistics operations and is therefore generally reserved for key customers (Bowersox, Closs and Cooper, 2010).

The perfect order is an order that is:-

- delivered complete
- delivered on time

- delivered at the right location
- delivered in perfect condition
- delivered with complete and accurate documentation

(Bowersox, Closs and Cooper 2010).

The level of commitment to each dimension of service requires careful consideration of competitive performance and cost/benefits analysis. “A firm can provide logistics service equal to or even better than a competitor’s but still have dissatisfied customers. This may arise from the lack of knowledge of customer expectations, improper standards of performance, performance failure, poor communication or incorrect customer or firm perception of performance.” (Bowersox, Closs and Cooper 2010) (Berky Kong, Mae Fong Choe, 2011)

ii. Customer Satisfaction (Customer Accommodation Level Two)

The next level of customer accommodation is the attainment of customer satisfaction, over and above the basic service. The basic service of focusing on internal operational performance is improved to attain customer satisfaction, which recognizes that customers have service expectations that “Extend beyond typical logistical considerations and include factors related to communication, credibility, access, responsiveness and customer-specific knowledge as well as reliability and responsiveness of operations.” (Bowersox, Closs and Cooper 2010) (Berky Kong, Mae Fong Choe, 2011)

Parasuraman, Zeithaml and Berry (1988) have identified 10 customer logistics-based expectations as follows:-

- Reliability
- Responsiveness
- Access
- Communication
- Credibility
- Security

• Courtesy
• Competency
• Tangibles
• Knowing the Customer

Some of these elements may be more important than others and there may be factors other than those listed with significance to particular markets. It is essential to understand the differing requirements of different market segments as each market will attach different importance to different service elements. “It is because of the multivariate nature of customer service and because of the widely differing requirements of specific markets that it is essential for any business to have a clearly identified policy towards customer service” (Christopher, 2005) (Berky Kong, Mae Fong Choe, 2011)

Furthermore, as customer satisfaction is built on the platform that customers have expectations about performance, it is then logical and necessary to assess their perceptions against those expectations to ascertain service quality levels. However, it is important to first distinguish satisfaction from quality (Berky Kong, Mae Fong Choe, 2011)

Service quality and customer satisfaction

Bateson (1992) conceptualizes quality as an attitude, the customer’s comprehensive evaluation of a service offering, built up from a series of evaluated experiences and is hence less dynamic than satisfaction. Satisfaction, on the other hand, is the outcome of the evaluation a consumer makes of any specific transaction (Berky Kong, Mae Fong Choe, 2011)

By definition, service quality is:

> *“a measure of how well the service level delivered matches customer expectations. Delivering quality service means conforming to customers’ expectations on a consistent basis.”* (Lewis and Booms, 1983)

Meanwhile customer satisfaction is defined as

> *"A function of the similarities between the consumer's expectations and the perceived performance of the purchase"* (Oliver, 1981)

In empirical studies, quality and satisfaction are treated as synonymous in a service context (Zeithaml et al. 1993, Ruyter, et al, 1996) (Berky Kong, Mae Fong Choe, 2011)

Organizations continually aim at achieving quality as it is seen as "the lifeblood that brings increased patronage, competitive advantage and long term profitability" (Clow and Vorhies, 1993). Service quality enhancements have been shown to consistently result in increased market share and revenue gains. (Ellinger et al, 1997). In order to take steps to manage and enhance the service quality, it is natural that an assessment of present service levels must be done. "If you can't measure it, you can't manage it" (Peter F. Drucker, 2005) (Berky Kong, Mae Fong Choe, 2011)

SERVQUAL scale and Gap Model

Parasuraman et al. (1988) developed the SERVQUAL scale—a widely used instrument to compare both the expectations and the service perceptions of customers on a twin scale of 22 items. Expectations and perceptions are measured across 5 dimensions of service quality, where the size of the gaps between customers' service expectations and their perceptions indicate the level of dissatisfaction while the degree and direction of the gap between consumers' perceptions and expectations indicate perceived service quality. (Parasuraman, Zeithaml and Berry, 1988) (Berky Kong, Mae Fong Choe, 2011)

- **Tangibles**: Physical facilities, equipment and appearance of personnel.
- **Reliability**: Ability to perform the promised service dependably and accurately.
- **Responsiveness**: Willingness to help customers and provide prompt service.

- **Assurance**: Knowledge and courtesy of employees and their ability to inspire trust and confidence.
- **Empathy:** Caring, individualized attention the firm provides for its customers.

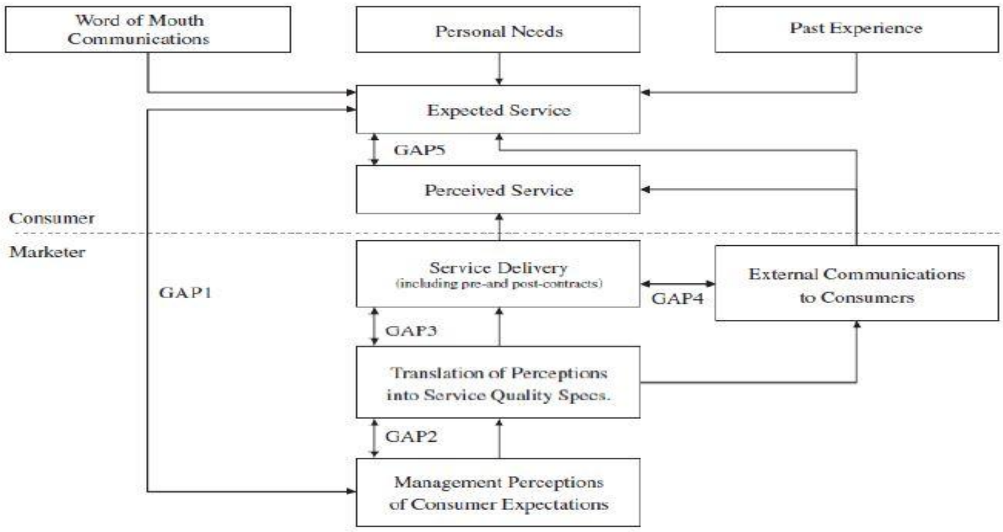

Fig 3.3: The service quality model (Parasuraman, et al, 1985)

The service quality model depicted above in Figure 3.3 represents the relationship between the perceived and expected service levels from the consumer and the perspectives of the service provider (marketer) and the customer (consumer), while the gaps are described in Table below:

Table 3.11

Description of Gaps in Service Quality Model (Parasuraman, et al, 1985)

Gap 1	Knowledge	Reflects management's lack of knowledge or understanding of customers
Gap 2	Standards	Exists when internal performance standards do not adequately reflect customer expectations
Gap 3	Performance	The difference between standard and actual performance
Gap 4	Communications	Over commitment or promising higher levels of performance than can actually be provided

Gap 5	Perception	Customers sometimes perceive performance to be higher or lower than actually achieved
Gap 6	Satisfaction/ Quality	When one or more gap exists customer perception is that performance does not meet expectations

What then is customer satisfaction? Expectancy disconfirmation states if a customer's expectations of a supplier's performance are met or exceeded, the customer will be satisfied (Berky Kong, Mae Fong Choe, 2011)

- If Perceived Performance > = Expectations, then Satisfaction
- If Perceived Performance < Expectations, then Dissatisfaction

"Customers will be satisfied if a supplier meets or exceeds the customer's expectations" (Parasuraman et al, 1988)

However, attaining customer satisfaction is not sufficient and satisfied customers are not necessarily loyal customers. Satisfied customers still defect. This has been supported by research showing that many customers who report being satisfied that their expectations have been met are likely to patronize and do business with competitors. (Bowersox, Closs and Cooper 2010) (Berky Kong, Mae Fong Choe, 2011)

Another limitation of customer satisfaction is the realization that customers' expectations may not be their real requirements. Additionally, satisfaction lies in the expectations and perceptions of individual customers and not all customers are equal. In other words, what satisfies one customer may not satisfy others and it is thus important to shift the focus from customers' expectations to their real, individual requirements (Berky Kong, Mae Fong Choe, 2011)

iii. Customer Success (Customer Accommodation Level Three)

The highest level of customer accommodation is known as customer success. Where basic customer service aims to meet internal standards and satisfaction programs seek to meet or exceed expectations, a success platform is built on customer needs and requirements, which are frequently different from customer expectations (Berky Kong, Mae Fong Choe, 2011).

“Achieving customer success requires an intimate knowledge of customers’ needs and their operational requirements and a commitment by the service provider to enhance their customer’s ability to compete more successfully in the marketplace.” (Bowersox, Closs and Cooper 2010) (Berky Kong, Mae Fong Choe, 2011).

Table 3.12

Evolution of management thought (Bowersox, Closs and Cooper, 2010)

Philosophy	Focus
Customer Service	Meet internal standards.
Customer Satisfaction	Meet expectations.
Customer Success	Meet customer requirements.

As mentioned earlier, customer expectations may not be their real requirements as these expectations are often downgraded to perceptions due to previous expectations, word of mouth or communication from the firm itself. This emphasizes why happy customers are not the result of merely meeting expectations. (Bowersox, Closs and Cooper 2010) (Berky Kong, Mae Fong Choe, 2011).

Achieving customer success involves a thorough understanding of individual customers’ requirements, internal processes, competitive environment and whatever else necessary to succeed in its own competitive arena. The following provides a rationale for working to achieve customer success. “..even highly satisfied customers can go out of business, leaving a firm with a diminished customer base. In short, a satisfied customer is not always a successful customer, and successful customers are needed for sustained operations. The distinction between achieving satisfaction and success is knowledge of the entire supply chain. Whereas customer satisfaction requires information to bridge the gap between the firm and its customers, customer success requires that a firm understands what its customers' customers desire … This knowledge is used to provide a 'better' product/service mix . ..” (Fawcett and Fawcett, 1995) (Berky Kong, Mae Fong Choe, 2011)

Value-added services represent a means to achieve customer success. The value added services or ancillary services are sometimes offered as an expected or optional supplement that adds perceived value to the primary service but may not be required as a necessary or usual part of the sale. Some examples related to logistics are customized packaging, shipment consolidation, expedited orders/documentation and may also involve high-end services like payment gathering, Purchase Order Management, demand forecasting, information processing and reporting, education and training and the like. These are the unique or specific activities that firms can jointly develop to enhance their efficiency, effectiveness and relevancy. As these tend to be customer specific, valueadded services are not generalized. As such, organizations may need to select customers for which it should develop value-added services. (Bowersox, Cooper and Closs, 2010, Anderson and Vincze, 2000) (Berky Kong, Mae Fong Choe, 2011).

II. Internal Customer Service

Internal customer service or internal exchange refers to methods used to satisfy needs within the organization. An important part of the internal exchange is the emphasis on providing a high level of service quality to internal customers for the same reasons they provide it to external customers – more effective performance, lower waste, and lower costs (Marshall, Baker and Finn, 1998; Hart, 1995; Heskett et al., 1994) (Berky Kong, Mae Fong Choe, 2011).

Atkinson (1990) also suggests that “emphasis should be on the internal dynamics of the organization, recognizing that meeting the requirements of the internal customer is as important as meeting the needs of the external customers.”
A parallel exists between Internal Customer Service and the idea of Internal Marketing, which can be seen as:

“viewing the employees as internal customers, viewing jobs as internal products and then endeavouring to offer internal products that satisfy the needs and wants of these internal customers while addressing the objectives of the organization” (Baron and Harris, 2003).

Internal marketing is based on a dual tenet that every employee in a service organization should recognize that they have their own customers to serve and that all employees should be convinced of the quality of service provided. This approach has been found to result in better communication, reduced internal conflict and a spirit of innovation (Baron and Harris, 2003) (Berky Kong, Mae Fong Choe, 2011).

Internal customer service is different from internal marketing, in that the former focuses on how employees serve other employees, while the latter has a greater focus on how the company serves the employees (Berry 1981; George, 1990; Grönroos, 1996). However, both internal customer service and internal marketing has its focus on the internal customer, where the orientation is based on the identification of internal market having a “value exchange between different departments”.

Providing superior internal inter-relational functions provides a base for effective performance, lower waste and costs and may also positively affect the external service quality. This is in line with Hart (1995) and Heskett et al. (1994), that

“According to the service-profit chain concept, improvements in internal service quality also should be expected to result in improved external service quality”.

III. Value Creation

In a competitive environment, it is not enough for an organization to simply position a fixed set of activities along a value chain. Organizations constantly strive to provide “value – an intangible concept that is frequently defined in terms of exceptional customer service that accompanies exceptional product quality and value-based prices” (Anderson and Vincze, 2000). Increasingly, smart organizations do not just add value, they reinvent it. According to Normann and Ramirez (2000), focus should not just be on the company or the industry, but:

"The value-creating system within which different economic actors (e.g. suppliers, customers, employees, business partners, etc.) work together to co-create value" (Berky Kong, Mae Fong Choe, 2011)

The key strategic task lies in the reconfiguration of roles and relationships among this constellation of economic actors in order to mobilize the creation of value in new forms and by new players. Hence, the underlying strategic goal is:

"To create an ever-improving fit between organizational competencies and customers"

It is a systematic social innovation which involves continuous design and redesign of complex business systems.

i. Definition of Customer Value

Bowersox, Closs and Cooper (2010) define that customers have at least three perspectives of value:

The traditional perspective of value is economic value. Economic value builds on economy of scale in operations as the source of efficiency. The focus of economic value is efficiency of product/service creation. The customer's take-away of economic value is high quality at a low price. (Berky Kong, Mae Fong Choe, 2011).

A second value perspective is market value. Market value is about presenting an attractive assortment of products at the right time and place to realize effectiveness. Market value focuses on achieving economy of scope in product/service presentation. The customer's take-away of market value is convenient product/service assortment and choice. (Berky Kong, Mae Fong Choe, 2011).

The third value perspective is relevancy. Relevancy involves customization of value-adding services, over and above product and positioning, which make a significant difference to customers. Relevancy value means the right products and services, as reflected by market value, at the right place, as reflected by economic value, modified, sequenced, synchronized and otherwise positioned in a manner that creates valuable segmental diversity. In manufacturing and assembly, relevancy is achieved by integrating specific components into products to increase functionality desired by a specific customer. The customer's take-away in terms of relevancy is a unique product/service bundle. (Berky Kong, Mae Fong Choe, 2011).

The simultaneous achievement of economic value, market value, and relevancy value requires total integration of the overall business process and is known as the integrative management value proposition which is illustrated in Table below.

Table 3.13

Integrative management value proposition (Bowersox, Closs and Cooper, 2010)

Economic Value	Market Value	Relevancy Value
Lowest total cost	Attractive assortment	Customization
Economy of scale efficiency	Economy of scope effectiveness	Segmental diversity
Product/ service creation	Product/ service presentation	Product/ service positioning
Procurement/ manufacturing strategy	Market/ distribution strategy	Supply chain strategy

ii. Creation of customer value through logistics

A school of thought links logistics function to customer value. Langley and Holcomb (1992) suggest that the objective of supply chain management should be the synchronization of all supply chain activities to create customer value. Thus, supply chain management philosophy suggests the boundaries of supply chain management include not only logistics but also all other functions within an organization and within a supply chain to create customer value and satisfaction. In this context, understanding customers' values and requirements is essential (Ellram and Cooper 1990; Tyndall et al. 1998). Thus, supply chain management philosophy drives supply chain units to have a customer orientation which provides the basis for internal logistics service with an internal customer focus (Berky Kong, Mae Fong Choe, 2011).

Stank, Keller, Daugherty (2001) suggest that a primary goal of supply chain management is to create or enhance value provided to the end-customer. Christopher (2005) also supports the customer orientation perspective by adding the cost element. He argues that the objective of supply chain management is to link the marketplace, distribution network, manufacturing processes and procurement activity in a way that customers can receive quality services at a lower total cost (Berky Kong, Mae Fong Choe, 2011).

Part of the value that a company creates for its customer is its ability to deliver the right product in the right amount at the right place at the right time for the right customer in the right condition at the right price (Shapiro and Heskett, 1985). This translates to the fact that logistics service is part of the value of the product (Mentzer et al., 1997). According to Langley and Holcomb (1992), logistics creates customer value through three generic ways: efficiency, effectiveness, and differentiation or relevancy. Moreover, when traditional attributes of logistics services are modified to create value added services or are configured, they result in unique logistics capabilities that can be a source of competitive advantage (Morash et al., 1996; Lynch et al., 2000) (Berky Kong, Mae Fong Choe, 2011).

iii. Co-creating value from a Service-Dominant Perspective

Service-Dominant (S-D) logic was first developed by Vargo and Lusch (2004) and revised in 2008 (Vargo and Lusch, 2008). According to S-D logic, value is defined and co-created by customers rather than being embedded in the output. During the era when manufacturing was booming, organizations widely adopted the Goods-Dominant (G-D) logic perspective which advocates product/service providers produce products/services and customers buy them. S-D logic perspective suggests that:

"Customers and providers co-create value"

The salient differences between Goods-Dominant (G-D) logic and S-D logic perspectives can be summarized in their views in Table 3.14 about the meanings and implications of relationships (Berky Kong, Mae Fong Choe, 2011)..

Table 3.14

Goods-Dominant (G-D) logic and S-D logic

	G-D logic	**S-D logic**
Meanings of relationships	• Dyadic bonds represented by trust and commitment • Long-term patronage repetitive transactions	• Reciprocal, service-for-service nature of exchange • Co-creation of value • Complex, networked structure of the market • Temporal, emergent nature of value creation • Contextual nature of value determination
Normative implication	• Manage customers through communication and satisfaction, to maximize	• Collaborative nature of value determination • Collaborate with customers to develop mutually beneficial value propositions • Co-create value through service-for-service exchange

Source: Adapted from Vargo (2009)

Vargo (2009) argues that G-D logic may be viewed as embedded in the context of the S-D logic, making S-D logic a broader view (Vargo, 2009) under which production and delivery of products and services may be understood (Berky Kong, Mae Fong Choe, 2011)..

Based on S-D logic, it is suggested that value creation in the provision of logistics service is an interactive process, and the organization and its customers exist in a relational context (Vargo and Lusch, 2008). This implies that logistics service providers have to maintain tight relationships with customers to generate value.

Overall, based on the above discussion, four key ways may be identified in which S-D logic provides a powerful framework for the process of logistics service provision and consequent logistics value creation (Yazdanparast, Manuj and Swartz 2010) (Berky Kong, Mae Fong Choe, 2011)..

- The concept of "service" makes it a suitable context for S-D logic to be an appropriate framework to analyze logistics being a service which is critical to aspects of business operations.
- The quality of logistics service affects the value perceived by the customer not only of the service received but also of the product delivered through the logistics service. Therefore, the concept of goods deriving value through the service they provide becomes salient in a logistics context.
- The powerful concept of "co-creation" of value becomes critical in a logistics context because of the dynamic and ever-changing environment in which logistics services are provided.
- As the world economy becomes more service-driven and more outsourcing takes place, logistics becomes a key service to provide and deliver value in a broader and global context.

Logistics, being a service characterized by frequently modified service offerings, provides a dynamic context which potentially stands to gain from the S-D logic perspective. In addition to being an appealing context in which to look at the process of value creation and service provision from an S-D logic perspective, logistics is also an essential context because logistics service has been viewed as a competitive tool (Stock and Lambert, 1992). To employ logistics as a competitive lever, it is important to examine the customer's understanding of the phrase "service value" in order to deliver services that lead to value creation for the customers (Berky Kong, Mae Fong Choe, 2011). Thus, close relationships with customers are necessary.

iv. Logistics Service Value Co-creation Process

The process of co-creation of value in a logistics context has three phases: learning, innovation and execution, and outcomes (Yazdanparast, Manuj and Swartz, 2010). See figures below for illustrations.

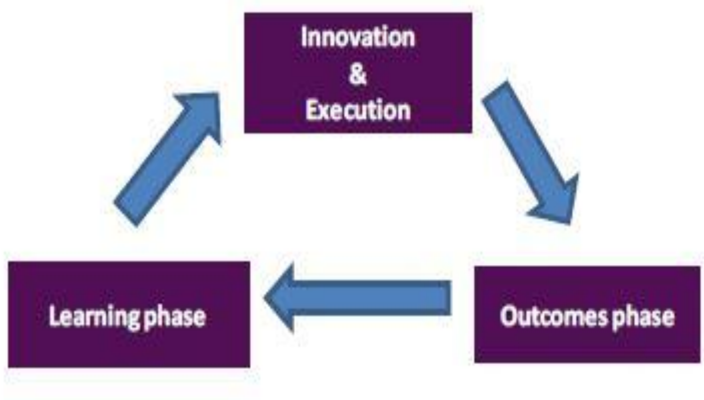

Fig 3.4: Logistics value co-creation process in three phases (Yazdanparast, Manuj and Swartz, 2010).

The three phases and their key elements are integrated into a comprehensive process of co-creation of logistics service value which encompasses 12 propositions (12 Ps).

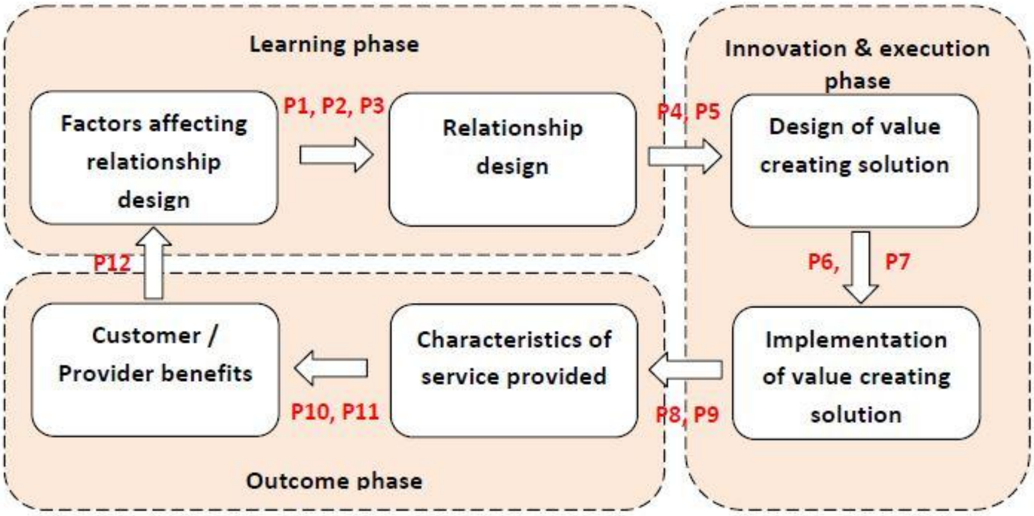

Fig 3.5: Logistics service value co-creation process with 3 phases and 12 propositions (Yazdanparast, Manuj and Swartz, 2010)

Learning Phase

During the learning phase, the logistics service provider focuses on understanding the customer (internal and external) and also the customer focuses on understanding the logistics service provider through the interactions and relationship experiences intended to encourage learning between the 2 key actors – the customer and the provider (Berky Kong, Mae Fong Choe, 2011).

Learning is a capability that enables other logistics capabilities that are vital for the co-creation of logistic service value such as collaboration (Sinkovics and Roath, 2004), agility (Bowersox et al., 1995; Christopher, 2000), flexibility (Fawcett et al., 1996; Morash and Clinton, 1997) and innovation (Flint et al., 2008). According to Grant (2010), learning is the process of absorbing, involving and integrating external and internal knowledge resources (Berky Kong, Mae Fong Choe, 2011).

"*Value co-creation is a collaborative and interactive process*" (Vargo, 2009)

To engage customers in co-creation, logistics managers must plan and implement relationship experiences for customers that encourage active engagement of customers in designing logistics services. The nature of relationships in the logistics context is either transactional or collaborative, which is a function of service offering composition, contract duration and the customer's motivation for using the services offered by the service provider (Selviaridis and Spring, 2007). Of these, service offering composition and customers' motivation can be directly influenced by the design of the relationship experience (Figure 3.6).

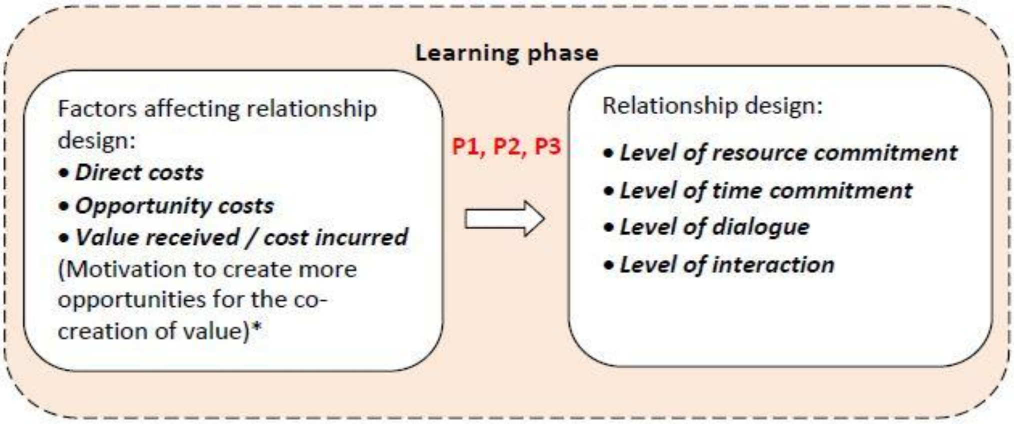

Fig 3.6: Influencers of Relationship Design in the Learning phase (Yazdanparast, Manuj and Swartz, 2010) Note: *Consequence of the outcomes

P1. The design of a relationship experience, in terms of time and resource commitments, depends on direct costs and opportunity costs of a transaction as perceived by both the provider and the customer.

P2. Relationship designs that enable a higher relative return in terms of value received and cost incurred will lead to higher levels of dialogue and interactions with customers.

P3. The higher level of dialogue and interaction will lead to a higher level of joint learning focused on the co-creation of logistics value (Berky Kong, Mae Fong Choe, 2011)..

Innovation and execution phase

In this phase (Figure 3.7), the logistics service provider utilizes the knowledge acquired in the previous learning phase to design and implement customized and innovative solutions that lead to value-creating service offerings for the customer (Berky Kong, Mae Fong Choe, 2011).

Dickson (1992) suggests that organizations that do the best are those that learn most swiftly in a dynamic and evolving competitive market. Thus, an increased investment in a relationship experience focused around learning leads to a service that closely matches the customer expectations because the service is "co-created" by the customer rather than just "offered" to the customer. That is, the service delivered involves innovation and is customized to the requirements rather than merely an item from a predetermined "service menu" of the provider (Berky Kong, Mae Fong Choe, 2011).

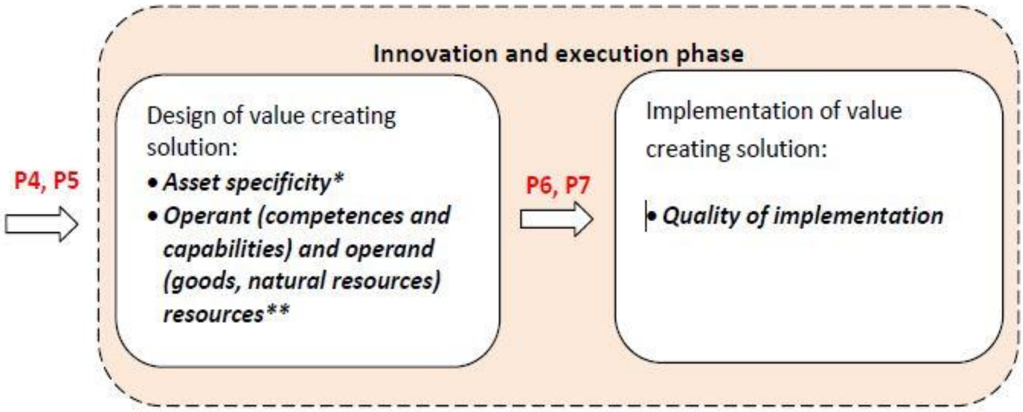

Fig 3.7: Design and implementation of value creating solution in the Innovation and execution phase (Yazdanparast, Manuj and Swartz, 2010) (Berky Kong, Mae Fong Choe, 2011).

*Asset specificity in the inter-party relationship of a transaction represents the extent to which the investments made to support a particular transaction have a higher value to that transaction than they would have if they were redeployed for any other purpose (McGuinness 1994) (Berky Kong, Mae Fong Choe, 2011).

**Operand and Operant Resources - Operant resources are those resources that act upon other resources to create benefit, such as an organization's competences and capabilities. Operand resources are those resources which must be acted on to be beneficial, such as natural resources, goods, and other generally static matter

(Constantin and Lusch 1995; Vargo and Lusch 2004a) (Berky Kong, Mae Fong Choe, 2011).

P4. Learning phase will lead to innovation phase.

P5. Higher levels of knowledge gained through joint learning and mutual expectation clarification will lead to higher levels of asset specificities of the value-creating activities.

P6. The higher the level of asset specificities, the higher would be the quality of solution implementation or service delivered.

P7. The higher the availability of relevant operational resources, the higher will be the implementation quality of value-creating activities in terms of how closely the delivered service matches customer requirements (Berky Kong, Mae Fong Choe, 2011).

Outcomes phase

The learning achieved and innovations developed through the aforesaid two phases influence the performance of the service provider and also impact the customer in terms of service quality, efficiency, effectiveness, and relevancy. In this outcomes phase (Figure below), superior performance leads to competitive advantage and customer satisfaction which will motivate the service provider and customer to continue the relationship experience with the aim of achieving even more superior outcomes. It is not just the strategy but the execution of strategy and resulting innovation that leads to successful outcomes for an organization (Berky Kong, Mae Fong Choe, 2011).

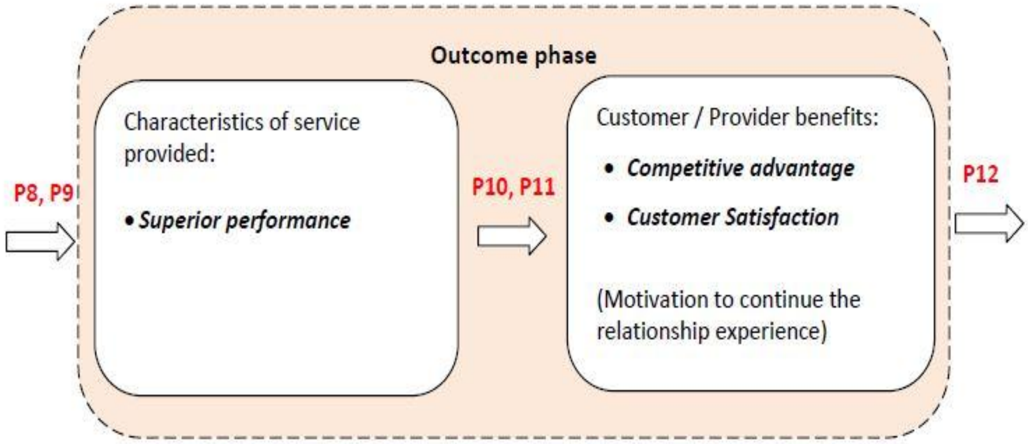

Fig 3.8: Characteristics of service provided and Customer/Provider benefits in the Outcome phase (Yazdanparast, Manuj and Swartz, 2010)

P8. The innovation phase leads to the outcomes phase.

P9. Service offerings based on co-creation of value will lead to efficiency and effectiveness for both actors and relevancy for the customer.

P10. Higher relevancy will lead to a stronger competitive advantage for both actors and higher customer satisfaction.

P11. Higher efficiency, effectiveness, and relevancy will lead to the pursuit of additional learning opportunities to maintain the value co-creation process.

P12. Mutual benefits such as higher efficiency and effectiveness for both actors and relevancy for the customer will lead to a higher motivation for continuing relationships (Berky Kong, Mae Fong Choe, 2011).

An on-going value co-creation process

As a result, the outcomes phase will lead back to the learning phase hence transforming the complete process of relationship-driven value co-creation from a linear process to a loop. Based on the concept of S-D logic, the outcomes should not be seen as one-off outputs with value, but rather resource inputs for an on-going value creation process (Lusch et al., 2008, Berky Kong, Mae Fong Choe, 2011)..

v. Customer integration

Bowersox, Closs, and Stank (1999) provide a comprehensive conceptualization of customer-focused capabilities in the logistics context, which is "customer integration”. Customer integration or customer-focused capabilities enable organizations to build lasting distinctiveness and competitive advantage with customers of choice. This requires organizations to assess their own strengths and weaknesses in service capability relative to the needs and desires of top customers. Since few firms can fully satisfy every customer or market segment, leading organizations are increasingly using such assessments to select where and where not to compete. Top organizations recognize the differences in the needs and desires of major or key customers and design offerings according to those needs (Berky Kong, Mae Fong Choe, 2011).

Successful integration depends upon comprehensive knowledge of the organization and its supply chain partners' capabilities as well as customer requirements and expectations. This enables management to focus efforts primarily on customers for whom they can provide unique and profitable product/service offerings and flexibly deploy resources toward customer-valued activities that competitors cannot effectively match (Berky Kong, Mae Fong Choe, 2011).

Customer integration involves "identifying the long-term requirements, expectations, and preferences of current and/or potential customers and markets, and focusing on creating customer value". Four capabilities have been proposed within the customer integration concept:

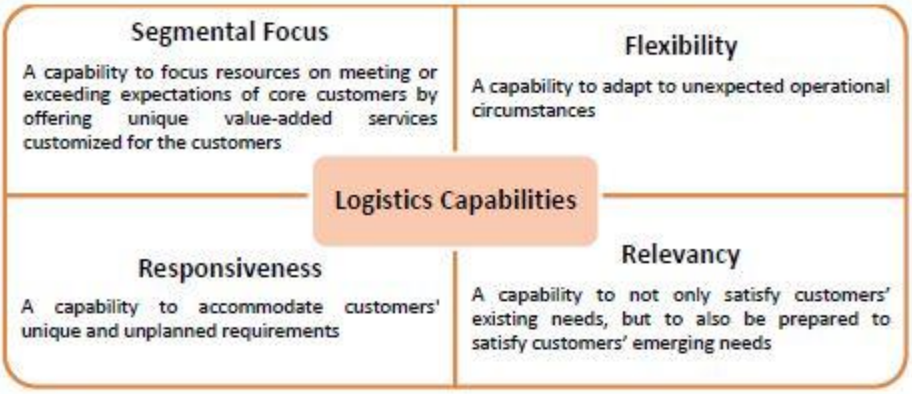

Fig 3.9: Logistics capabilities within the concept of Customer Integration (Bowersox, Closs, and Stank (1999)

Customer segmental focus is the capability to tailor product/service offerings to the needs of each key customer by allocating relatively more departmental resources to those key customers than the rest of the customers. Sustainable competitive advantage can be generated through better efficiency, effectiveness and differentiation for the segment that contributes a relatively higher percentage of an organization's profit (Berky Kong, Mae Fong Choe, 2011).

While sound operations are a prerequisite for customer integration, organizations go beyond the basics by developing a meaningful understanding of customers' needs supported by flexible processes that enable them to create customized solutions (relevancy). This type of approach can progress to an intimacy with customers' operations (flexibility) and a proactive search for customer closeness. Organizations share information and use it to be more responsive to customers (responsiveness). Ultimately, this can lead to partnering and alliance formation to solidify the relationship and sustain differential advantage (Berky Kong, Mae Fong Choe, 2011).

Customer-focused capabilities are significantly related to organizational performance. Consistent success depends on an organization's ability to create value for end-customers. In order to achieve customer integration, however, it requires dramatically new ways of thinking and acting from the management and the employees of an organization. Standardized and routine operations have to be reformed to enable customer integration to succeed (Berky Kong, Mae Fong Choe, 2011).

IV. Competitive Advantage

The very central theme of competitive advantage is the ability of a firm to act differentiate itself, from the eyes of the customers, from its competitions and secondly by operating at a lower cost and hence at greater profit. Logistics competence becomes a more critical factor in creating and maintaining competitive advantage (Donald J. Bowersox, David J. Closs). As the business landscape has become more competitive, the ability of a firm to acquire and keep competitive strength has become increasingly important to long term success (Berky Kong, Mae Fong Choe, 2011).

Logistics service value focuses on the relationship of logistics service to customer service, capabilities and competitive advantage of an organization (Yazdanparast, Manuj and Swartz 2010). Logistics service is an important element of customer service and helps an organization maintain its current competitive position in the marketplace (Langley and Holcomb, 1992, Berky Kong, Mae Fong Choe, 2011).

i. Efficiency, Effectiveness and Relevancy/Differentiation, Value added processes generates competitive advantage

Logistics customer value is created through efficiency, effectiveness, and differentiation (Mentzer and Konrad 1991; Langley and Holcomb 1992). For instance, value can be created through customer service elements such as product availability, timeliness and consistency of delivery and ease of placing orders. If logistics can create value through the inimitability of its logistics activities, an organization may be able to differentiate itself from its competitors (Grant 2010). The value customers receive from logistics activities also serves as an indicator of logistics performance. Excellence in logistics performance requires superiority when compared to competitors (i.e., differentiation) (Langley and Holcomb 1992, (Berky Kong, Mae Fong Choe, 2011).

Beyond efficiency and effectiveness, logistics activities provide the best comparative net value to customers (Stahl and Bounds 1991) in order to compete in today's competitive marketplace. Due to the importance of logistics to customer value creation (Flint et al. 2005; Lambert, García-Dastugue, and Croxton 2005), the performance of logistics activities must be perceived as differentially superior to competitors in the same market segment(s) (Williamson, Spitzer, and Bloomberg 1990, Berky Kong, Mae Fong Choe, 2011).

In addition to the traditional logistics service that focuses on achieving internal operation standards that translate into efficiency and customer focus based upon meeting customer performance standards that translate into effectiveness, a truly relationship-driven logistics function that focuses on establishing customer success that translates into relevancy, is needed (Bowersox et al., 2000). An emphasis on having a specific understanding of the needs and requirements of the diverse and varied customers of the logistics function has the potential to turn standard basic services into value added solutions. Evidence collectively reveals that the logistics function as a whole should strive to minimize the ratio of resources utilized against derived results (efficiency), accomplish predetermined objectives (effectiveness) and gain superiority when compared to competitors (differentiation) (Bobbitt 2004, Berky Kong, Mae Fong Choe, 2011).

When traditional attributes of logistics service are modified to create value-added services or are configured in unique bundles, they take the shape of logistics capabilities that can be a source of competitive advantage (Morash et al., 1996; Lynch et al., 2000, Berky Kong, Mae Fong Choe, 2011).

Creating value-added solutions involves the willingness and capability of an organization to become an increasingly relevant provider to its customers. This is an ongoing process. Apart from achieving a one-time understanding of customer needs and requirements, mechanisms to regularly monitor and be aware of the changing priorities of the customer should be established (Langley and Holcomb, 1992). Constant alert on customers' changing needs and continuously developing value-added solutions for them may lead to relevancy and differentiation, Berky Kong, Mae Fong Choe, 2011).

V. Logistics Excellence

Recently, due to the increased ease of global sourcing, manufacturing quality improvements overseas, and a reduction in glass-related tariffs, its market dynamics have changed substantially. In just a few short years, the company is moving from using nearly 100% in-house production to being almost entirely reliant on offshore sources (using both its own plants and those of contract vendors). As a result, its huge domestic production asset base is largely being shuttered. Its manufacturing cost advantages are gone, and the company's competitive advantage based on traditional production expertise and engineering is also quickly eroding.

3.6. Conclusion

The chapter discussed the theoretical framework of the study. Various aspects of logistics and logistics outsourcing were presented. The next chapter discusses the research methodology employed in the study.

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Chapter 4

Research Methodology

RESEARCH METHODOLOGY

4.1. Introduction

This Chapter presents the research methodology and measurement scale validation. It contains research design and participants, instrument development and pre-testing, pilot study, sampling and data collection methods, scale validation, methods of analysis and operationalization of measurement.

1. Research Process

This study was carried out in three stages. The first phase was to identify the broad area of research. The problem initially set was “Role of Logistics Service Providers in Building Competitive Advantage and Logistics Excellence of Firms in Selected Industries in Kerala”. To narrow down the research area, an extensive review of literature was done. After the review of related literature, research problem was identified. In order to build specific conceptual foundation, the theoretical framework was developed showing the relationships among the various constructs identified as important to the problem and then hypotheses were formulated.

The second phase of the study dealt with research design. A research design is the set of methods and procedures used in collecting and analyzing measures of the variables specified in the research problem. The research design defines type of investigation, the study setting, the time horizon and the unit of analysis. This phase also covered decisions regarding type of sample to be used, data collection methods, measurement scale design and decisions on how data were to be analysed.

The third phase of the study included data collection, detailed analysis of the data, making inferences and deductions based on the results obtained so as to ascertain whether the results support the hypotheses

Research Design

The descriptive research design was found most suitable for the study. The study opted for survey method rather than case study method or action research. Data were collected from respondents through structured questionnaire.

2. **Questionnaire Design.**

Questionnaire design involves selecting the most suitable measurement scale, formulating appropriate questions, fixing of response format and finally deciding the sequence of questions to be arranged in the questionnaire. In this study, the questionnaire had seven main constructs. The statements used in the questionnaire were adapted from the study 'Logistics as a strategic role for the creation of customer value' by Berky Kong and Mae Fong Choe (2011).

The statements used in this study were designed with five point Likert scale varying from "strongly disagree" to "strongly agree". This scale was adopted based on the following reasons (Kassim 2001) (Reji Kumar G, 2011):

- It yields higher reliability coefficients with fewer items than the scales developed using other methods (Hayes 1998) (Reji Kumar G, 2011)
- This scale is widely used in market research and has been extensively tested in both marketing and social sciences (Garland 1991) (Reji Kumar G, 2011)
- It offers a high likelihood of responses that accurately reflect respondent opinion under study (Burns and Bush (2002), Wong (1999); Zikmund (2000)) (Reji Kumar G, 2011)
- It helps to increase the spread of variance of responses, which in turn provides stronger measures of association (Aaker et al 2000; Wong 1999) (Reji Kumar G, 2011)

The structure of the questionnaire was divided into three sections namely A, B and C. Section A consists of questions related to reasons for logistics outsourcing and the criteria for the selection of logistics service provider. Section B deals with scaled items for measurement of seven constructs. Finally, part C consists of general information and profile of the respondents.

In order to analyse the demographic features of the respondents, questions related to district and industry were included. One of the major objectives of the study is to find out the reasons for logistics outsourcing and the factors considered while selecting a logistics service provider. For this, analytical hierarchy processing method was used. A separate set of questions was included in the questionnaire for facilitating this analysis.

3. Pre-test

Pre-test was conducted among 50 respondents to evaluate the questionnaire. People having strong knowledge on research methodology were included. On the basis of their responses, questionnaire was redesigned with short, simple, jargon free and meaningful statements. The pre-test provided an opportunity to detect and rectify a wide range of potential problems with the instrument. These problems included:

- Questions that respondents do not understand
- Ambiguous questions
- Questions that combined two or more issues in a single question (double-barrelled questions)
- Questions that made respondents uncomfortable

4. Pilot Study

A pilot study was done with 50 respondents, who were managers or unit heads of companies. The 50 respondents were randomly selected from food processing industry, textiles and apparels industry and rubber and agro products industry. After the pilot study, 8 questions were deleted due to low reliability.

5. Sampling Design

The sampling design is the systematic process to determine and obtain a sample from the population. The study was done in Kerala. Companies which outsource logistics services to logistics service providers were taken for the study. Three industries were considered, i.e.., food processing, textiles and apparels, and rubber and agro products. The entire process of sampling design was done in five stages.

Stage 1: Identification of population

The geographical boundary of the study was Kerala. Three industries were taken, i.e, food processing, textiles and apparels, and rubber and agro products. Based on the data collected through Right to Information Act, 2005, it is found that, in Kerala, over 400 companies are currently functioning in these three industries. After the preliminary investigation, the researcher identified 256 companies which are outsourcing logistics services to the logistics service providers (LSP). Among these, 107 companies are from food processing industry, 88 from textiles and apparels industry and the remaining 61 from rubber and agro products industry.

Stage II: Determination of sample size

Table 4.1

Population

No	Industry	Number
1	Food Processing Industry	107
2	Apparels and Textiles Industry	88
3	Rubber and Agro products Industry	61

By applying the formula below (Krejcie and Morgan- in an article titled “Determining s ample size for research activities”), sample size of the study was fixed at 154 companies.

$$n = \frac{X^{2}*N*P*(1-P)}{(ME^{2}*(N-1))+(X^{2}*P*(1-P))}$$

Where, n= Required sample size

X^2= Chi-square for the desired confidence level at 5 degree of freedom

N= Population Size

P= Population Proportion (0.50)

ME= Desired Margin of Error (Expressed as proportion)

Stage III: Selection of sample size

The researcher took 180 companies as sample. Then, number of companies from the three verticals was fixed proportionately based on proportion of the population i.e...**107:88:61**.

Table 4.2

Sample Size

No	Industry	Sample size
1	Food processing industry	75 Companies
2	Apparels and textiles industry	62 Companies
3	Rubber and agro products industry	43 Companies
	Total	**180 Companies**

Stage IV: Selection of sample

Sample selection was done by following simple random sampling method. For this, first, the researcher created separate industry wise list of companies on an MS Excel worksheet. Thereafter, the researcher took samples from each list randomly by generating random numbers using MS Excel.

Stage V: Data collection

The data collection was done personally by meeting the respondents individually. The structured questionnaire was distributed to respondents after meeting them and explaining them the purpose of the study. The respondents were met in the office of the sample companies. The survey was conducted during the period of November 2016 to June 2017. Completed responses from 180 respondents were scrutinized.

6. Missing Values

Before analysing the data collected, issues related to missing data were examined. The procedure of missing data analysis followed the three steps suggested by Hair, et al. (2006): 1. Eliminate obvious cases or variables, 2. Examine the pattern of missing data, and, 3. Determine approach to deal with missing data. The first step in the analysis involved uncovering obvious cases and/ or variables with significant missing data. Following the rule of thumb to delete cases above 10 percent of missing data and variables above 15 percent of missing data suggested by Hair et.al (2006) (Ming Juan Ding, 2011), it was found that no case or variable was above the stipulated limit. Therefore, no case or variable was deleted.

7. Outliers

The multivariate assessment of outliers was conducted using the DfBeta Influence Statistics method using SPSS 21.0. The following rules were applied to estimate the effect of outliers in the study:

$$DfBeta > \left|\frac{2}{\sqrt{n}}\right| \text{ ; where } n = \text{Sample Size}$$

The result detected 12 cases as outliers, which were eliminated. Hence, the final sample size of the study had 168 companies.

4.2. Assessment and Validation of Measurement Scale

The questionnaire contains three sections; section A was designed for information about the reasons for logistics outsourcing and criteria for selecting a logistics service provider. Section B was designed to measure seven main constructs; it had 122 items, all were measured on a five point scale. Section C dealt with demographic details of the respondents.

Section A

Questions in this section were developed compatible with Analytical hierarchy processing (AHP) technique.

Table 4.3

Measurement Scale for AHP

No	Scale	Number of items
1	Reasons for outsourcing	6
2	Criteria for selecting a logistics service provider	11
	Total	**17**

1. **Reasons for Logistics Outsourcing**

Based on expert opinion and review of available literature, the researcher identified six main reasons for logistics outsourcing. The table 4.4 shown below presents the reasons for logistics outsourcing and its supporting literature.

Table 4.4

Reasons for Logistics Outsourcing

S.no	Factors	Authors and industry
1	Time saving	P-E International (1994): Consumer goods industry, Boyson et al. (1999): all industries, Fernie (1999): Retailers, Van Laarhoven et al. (2000): Wide range of industries, Penske Logistics (1999): Several industries.
2	Order cycle length reduction	
3	Fixed asset reduction	
4	Customer service improvement	
5	Customer clearance is too complicated	
6	Logistics cost reduction	

2. Criteria for selecting a logistics service provider

The relevant criteria for the selection of a provider, which have been widely discussed in the literature, are compiled and presented in the table 4.5 given below.

Table 4.5

Criteria for Selecting a Logistics Service Provider

S.no	Selection criteria	Relevance	References
1	Service Quality (SQ)	Quality of the provider includes many aspects such as on-time delivery, accuracy of order fulfilment, frequency and cost of loss and damage, promptness in attending customers' complaints, commitment to continuous improvement, etc.	Razzaque and Sheng (1998), Thompson (1996), Langley et al. (2003), Stock et al. (1998)
2	Service Price (SP)	The transportation cost, inventory cost, handling and package cost, damages during transportation, and insurance costs	Razzaque and Sheng (1998), Thompson (1996)

S.no	Selection criteria	Relevance	References
3	Continuous Improvement (CI)	A good operational performance of the provider is reflected by measures such as delivery performance, performance-monitoring capability, statistical data reporting to the user, fault diagnosis capability, detailed accounting information, system security, responsiveness, confidentiality of sensitive data, etc.	Langley et al. (1999), Tam and Tummala (2001)
4	Experience, Expertise, Innovation (EEI)	Prior experience of the provider in the product line of user is the added advantage to the user.	Razzaque and Sheng (1998), Ackerman (1996), Richardson (1993)
5	Business scope and Market (BM)	It refers to the opinion of the people about how good they are in satisfying the needs of the customer. The reputation of a provider plays a major role in its selection. This is more relevant in the initial screening of the providers.	Lynch (1998), Thompson (1996), Boyson et al. (1999)
6	Supporting Business Expansion (BE)	In the long run the possibility of a dispute between the user and the provider cannot be denied.	Richardson (1993)
7	Professional and Staff (PS)	Flexibility in operations and delivery may enable the user to give customized service to its customers, particularly in special or non-routine requests.	Stank and Daugherty (1997)
8	Culture and Strategy (CS)	Able management of the provider may not only provide good service to the user but may also foster a longterm relationship between the user and the	Andersson and Norman (2002),

S.no	Selection criteria	Relevance	References
		provider.	Lynch (2000), Boyson et al. (1999)
9	Suitable IT system (IT)	The advanced IT capabilities of a provider help in reducing uncertainties and inventory level. In some cases, the providers may allow the users to take advantage of their advanced IT capabilities. In such cases, the user companies need not invest in advanced IT capabilities just for the sake of tracking of goods and raw materials.	Andersson and Norman (2002), Lynch (2000), Langley et al. (1999), Boyson et al. (1999), Langley et al. (2002), Rabinovich et al. (1999)
10	Business Type (BT)	Wide geographic spread and range of services offered by the provider are desirable as these create enhanced access to market and many more avenues to the user. Large GS and RS offered by the provider may also enable the user to save money on distribution and marketing of product.	Boyson et al. (1999), Maltz (1995), Bradley (1994)
11	Multiple Service (MS)	The market share of the provider reflects its financial performance, customer satisfaction, and reputation.	Thompson (1996)

Section B

Section B of the questionnaire developed for the study consisted of seven constructs. i.e.., customer service, customer satisfaction, customer success, customer accommodation, value creation, competitive advantage and logistics excellence (See Table 4.6). The constructs were arranged in a logical manner based on the objectives of the study. Within each construct, the questions were logically organized to ease the cognitive burden of respondents (Dillman, 2000) and the various statements were grouped by content to allow the respondents to organize their thoughts better.

Table 4.6

Constructs and Number of Statements

No	Scales	Number of items
1	Customer accommodation	11
2	Customer service	24
3	Customer satisfaction	24
4	Customer success	15
5	Value Creation	18
6	Competitive advantage	21
7	Logistics excellence	09
	Total	**122**

a. Analysis of Measurement Scale

Analysis of various constructs used for the study was done in three stages;

- Explanatory Factor analysis using SPSS 21.0
- Confirmatory Factor analysis using SPSS AMOS 21.0
- Validity, Reliability and Normality

i. Factor Analysis

There are two basic types of factor analysis available for the scale development process. The first is termed exploratory and is commonly used to reduce the set of observed variables to a smaller, more parsimonious set of variables. The second type is called confirmatory and is used to assess the quality of the factor structure by statistically testing the significance of the overall model, as well as the relationships among items and scales. When using inductive approach, exploratory factor analysis may be most helpful for identifying those items that load as predicted. For deductive studies, confirmatory factor analysis may be most useful. Both types of analysis can be used, however in both inductive and deductive studies, prior to conducting factor analysis, the researcher may find it useful to examine inter-item correlations among the variables and any variable that correlates at less than 0.4 with all other variables may be deleted from the analysis (Kim and Muller, 1978). Low correlations indicate items that are not drawn from the appropriate domain and that are producing error and unreliability (Churchill, 1979).

a. **Exploratory Factor Analysis:** A common factoring method such as principal axis was used because the principal components method of analysis accounts for common, specific and random error variances (Ford, MacCallum, and Tait, 1986; Rummel, 1970). The number of factors to be retained depends on both underlying theory and empirical results. There are no specific rules for retaining items, however, Eigen values greater than 1(Kaiser criterion) or a scree test of the percentage of variance explained (cf., Cattell, 1966) is commonly used to determine the number of factors retained, If the factors are assumed to be largely uncorrelated, an orthogonal rotation should be used; if the factors are assumed to be correlated, an oblique rotation should be used. It may be useful to conduct both types of analyses to determine which items to retain. However, if the intent is to develop scales that are reasonably independent of one another, more reliance should be placed on orthogonal analyses when eliminating items.

The objective is to identify those items that most clearly represent the content domain of the underlying construct. Only those items that clearly load on a single factor should be retained. Again, there are no hard and fast rules for this, but the 0.40 criterion level appears most commonly used in judging factor loadings as meaningful (Ford et al., 1986). A “useful heuristic might be an appropriate loading of greater than 0.40 and/or a loading twice as strong on the appropriate factor than on any other factor. It may be also be useful to examine the communality statistics to determine the proportion of variance in the variable explained by each of the items, retaining the items with higher communalities. The percentage of the total item variance that is explained is also important; the larger the percentage the better. Once again there are no strict guidelines, but 60% may serve as a minimum acceptable target. At this stage items loading inappropriately can be deleted and the analysis repeated, until a clear factor structure matrix that explains a high percentage of total variance is obtained.

The present study has seven main dimensions to explore. This was to be done in seven stages. In each stage, the factors derived from exploratory factor analysis were confirmed by applying confirmatory factor analysis (CFA) and then check its reliability and construct validity by using appropriate methods.

b. **Confirmatory Factor Analysis:** In statistics, confirmatory factor analysis (CFA) is a special form of factor analysis, most commonly used in social research. It is used to test whether measures of a construct are consistent with a researcher's understanding of the nature of that construct (or factor). As such, the objective of confirmatory factor analysis is to test whether the data fit a hypothesized measurement model. This hypothesized model is based on theory and/or previous analytic research. CFA was first developed by Jöreskog and has built upon and replaced older methods of analyzing construct validity such as the MTMM Matrix as described in Campbell & Fiske (1959).

ii. Validity

Measurement model validity highly depends on how well each item in the measurement model fits the data. It explains the extent to which data collection methods accurately measure what they were intended to measure (Saunders and Thornhill, 2003). Validation of the measurement model in this study consists of content validity, face validity, exploratory convergent validity and discriminant validity.

a. Content Validity and Face Validity

Content validity is the extent to which the elements within a measurement procedure are relevant and representative of the construct that they will be used to measure (Haynes et al., 1995). Establishing content validity is a necessary initial task in the construction of a new measurement procedure (or revision of an existing one).

Face validity is the most basic type of validity and it is associated with a highest level of subjectivity because it is not based on any scientific approach. In other words, in this case a test may be specified as valid by a researcher because it may seem as valid, without an in-depth scientific justification.

Application of content validity and face validity can be effectively facilitated with the involvement of panel of 'experts' closely familiar with the measure and the phenomenon. For this study, the experts strictly reviewed the objectives and questionnaire of the study. From the result of their analysis, Content validity and face validity were established.

b. Convergent Validity: Convergent validity refers to the degree to which two measures of constructs that theoretically should be related are in fact related (Campbell & Fiske, 1959). Convergent validity can be established if two similar constructs correspond with one another, while discriminant validity applies to two dissimilar constructs that are easily differentiated (Hair et al., 2009).

c. Discriminant Validity: Discriminant Validity is the degree to which measures of different traits are unrelated. Discriminant validity is assessed by comparing the shared variance (squared correlation) between each pair of constructs against the average of the AVEs for these two constructs (Bove et al., 2009, p. 702; Hassan et al, 2007; Walsh, BeattyandShiu, 2009)

iii. Reliability

Reliability can be defined as the degree to which measurements are free from error and, therefore, yield consistent results. It can also designate as the measure of consistency and re-productivity. A reliable construct must produce consistent results on repeated trails (Carmines & Zeller, 1979).

iv. Normality

Normality is assessed to determine if a data set is well-modelled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. Many of the statistical methods require the assumption that the variables observed are normally distributed. With multivariate statistics, the assumption is that the combination of variables follows a multivariate normal distribution. Since there is no direct test for multivariate normality, the researchers generally test each variable individually and assume that they are multivariate normal if they are individually normal, though this may not necessarily the case. In SEM model, estimation and testing are usually based on the validity of multivariate normality assumption, and lack of normality will adversely affect goodness-of-fit indices and standard errors (Baumgartner and Homburg 1996; Hulland et al 1996; Kassim 2001, Rejikumar,2011).

Assessment of Measurement Scale

The analyses of measurement scale deals with exploring the constructs and confirm the existence of various dimensions.

1. Customer Service

The construct 'customer service' consists of twenty four statements.

I. Exploratory Factor Analysis (Customer Service)

A principal component analysis of the 24 questions related to perceived 'customer service' was performed using SPSS 21.0 to reduce the larger set of variables into a smaller, conceptually more coherent set of variables, by identifying redundancy among variables. In the process of factor analysis, five variables were identified as outlying variables because they seemed to be unrelated to other items, and were deleted from further factoring. The resultant 19 items were re-analyzed following the same procedure.

For factor analysis to be done, it is appropriate to first test that variables are sufficiently interconnected and the Kaiser-Meyer-Olkin statistic is the usual measure. The KMO statistic indicates the proportion of variance in the variables that might be caused by underlying factors. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.849 (Table 4.5), a level described as 'marvelous' by Kaiser (1974). The Barlett's test of Sphericity is a statistical test for the presence of correlations among the variables and tests the hypothesis that the correlation matrix is an identity matrix i.e., all diagonal elements are 1 and off diagonal elements 0, implying that all the variables are uncorrelated and therefore unsuitable for structure detection.

The Bartlett's Test of Sphericity was significant ($p<0.001$) and the test value was high at 3595.322 (Table 4.7) leading to the conclusion that there were correlations in the data set appropriate for factor analysis (Neetha Eppan, 2014).

Table 4.7

KMO and Bartlett's Test (Customer Service)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.849
Bartlett's Test of Sphericity	Approx. Chi-Square	3595.322
	df	153
	Sig.	.000

The results of statistical assumption tests indicated that the data set was appropriate for factor analysis. Therefore principal component analysis was conducted. The results of latent root criterion revealed that the indicators captured four components with an Eigen value greater than 1, which together explained over 84.502 percent of the variance (See Table 4.8). Component loadings below 0.5 were suppressed in the principal component analysis. The scree test (Figure 4.1) indicated that by laying a straight edge across the bottom portion of the roots, there were four factors before the curve becomes approximately a straight line (Neetha Eppan, 2014).

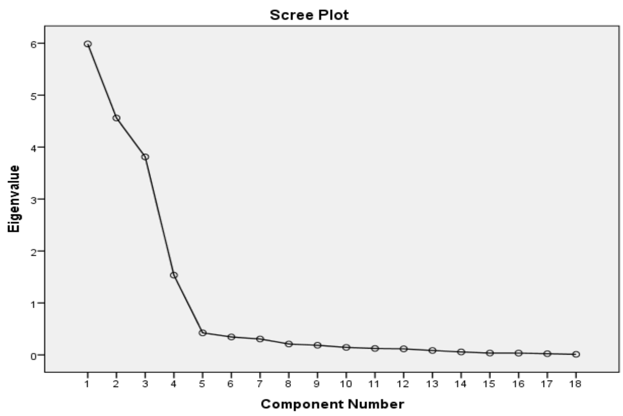

Fig 4.1: Scree plot- Customer service

The items re-organised based on factor analysis were theoretically justified as correlations among reflective measures are expected and so there can be possibility of respondents having a different factor perception for certain indicators. A table with rotated component loadings and percentage of variance explained is given below:

Table 4.8

Rotated Component Loadings (RCL) with Percentage of Variance (PV) Explained (Customer Service)

Re-Classified Factors	Statements	Code	RCL	PV
Responsiveness	LSP provides prompt services	RS1	.931	24.518
	Our LSP tells us the time frame within which the service will be performed.	RS2	.927	
	LSP responds to my requests without delay	RS3	.927	
	LSP is always willing to help us with unloading, documentation etc...	RS4	.903	
	LSP is always willing to help us	RS5	.835	
Reliability	Our LSP provides its services right first time	RY1	.897	24.052
	Our LSP provides its services at the time it promises to do so.	RY2	.889	
	Our LSP keeps their promise at fixed time	RY3	.888	
	LSP insists on error free documents	RY4	.886	
	LSP always shows sincere effort in solving our problems	RY5	.877	
Assurance	LSP makes us feel safe in transactions	AS1	.891	17.980
	LSP is consistently courteous to us	AS2	.846	
	LSP instils confidence	AS3	.839	
	LSP understands our questions	AS4	.834	

Re-Classified Factors	Statements	Code	RCL	PV
Empathy	LSP has operating hours/ delivery times that are convenient to us	EM1	.874	17.951
	LSP understands our specific needs.	EM2	.874	
	LSP gives us personal attention	EM3	.833	
	LSP frequently seeks our needs and problems	EM4	.797	
Total Variance Extracted				**84.502**
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 4 iterations. (Note: LSP- Logistics Service Providers)				

Table 4.8 shown above provides names of the four factors along with items, factor loadings and percentage of variance explained by each factor (Refer Table 4.9 for theoretical support). Compared with the intended measurement scales, the factor analysis results met the theory very well. Five items are about responsiveness, explaining over 24.518 percentage of variance, five items are about reliability, explaining over 24.052 percentage of variance, four items are about assurance, explaining over 17.980 percentage of variance and four items are about empathy, explaining over 17.951 percentage of variance. In total, the four factors together explain over 84.502 percentage of variance.

Table 4.9

Factor Names and Reviews (Customer Service)

S.no	Constructs	Authors
1	Reliability	Daniel Abdiu, Mikael Strandberg and Martin Stridsberg (2005), Wu, Chiag, Wu, and Tu (2004), Li, Kumar and Lim (2002), Helo and Szekely (2005), Lundahl and Skarvad (1999), Lamber and Stock (2001), Jonsson and Mattsson (2005).
2	Responsiveness	Anna Berg, Konrad von Otter Choroszynski (2008), Christopher (2005), Aronsson et al (2004), Baskontogruppen (2007), Jonsson and Mattsson (2005), Erdal Cakir (2009), Szymankiewicz (1994), Boyson et al(1999), Fernie (1999)
3	Assurance	Naylor et al (1999), Christopher and Towill (2000), Stalk and Hout (1990), Narasimham and Das (1999), White et al (2005), Van Hoek R (1998), Mason-Jones et al (2000), Childerhouse et al (2002), Naim and Barlow (2003), Wu and Dunn (1995).
4	Empathy	Wolfagang Kersten, Meike Schroder, Carolin Singer and Max Feser (2012), Kajuter (2007), Gabler Wirtschaftslexikon (2004), Bamberg et al (2008), Laux (2005), Knight (1921), Terry (1972), Romeike (2003), Eberle (2005), Narasimhan and sahasranamam (2007).

The next step was to conduct a confirmatory factor analysis for the customer service dimensions identified from the exploratory factor analysis to assess whether the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure.

II. Confirmatory Factor Analysis for the Customer Service Dimensions Identified

The prime reason to adopt CFA was to measure the ability of a predefined factor model to fit an observed set of data. It provides estimates for each parameter of the measurement model. The Confirmatory Factor Analysis (CFA) on the construct 'customer service' consisted of four factors and eighteen items (Refer table 4.8).

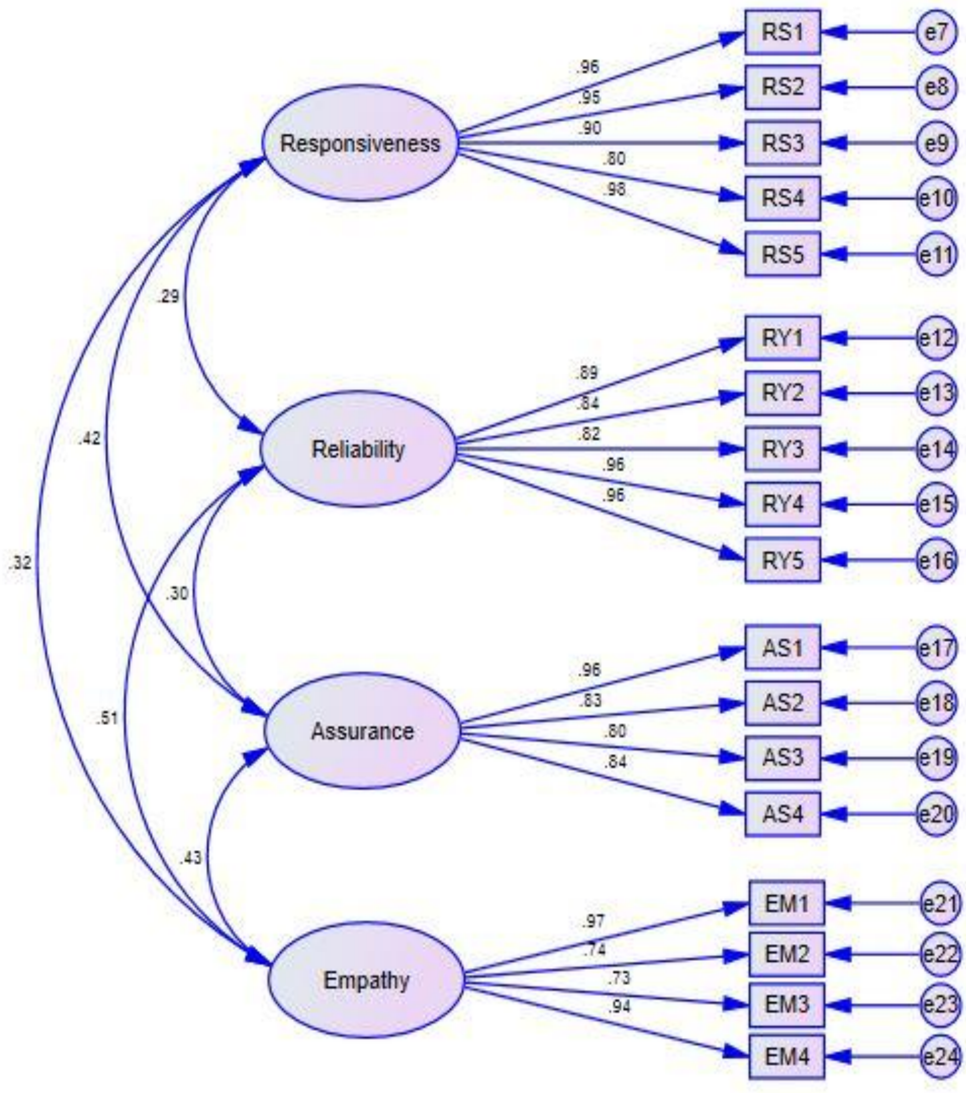

Fig. 4.2: Measurement model – Customer service

The data were found free from missing values and outliers. The model with four constructs and eighteen variables was suggesting good fit in the first estimate as mentioned in the table 4.10. Compared with the generally accepted model fit standards, the test outcomes seemed to fit the measurement model. The RMSEA is 0.031 suggesting a close fit between the empirical data and the measurement model; it explains 94.2% of the data variance-covariance (GFI=0.942); it achieved a good balance between theoretical simplicity and explanation power (NFI=0.980, CFI=0.997, TLI=0.995). In all the factors, the coefficients were larger than 0.6, which indicates strong loadings among the items in each factor.

Table 4.10

Model Fit Indices (Customer Service)

Variable	**CFI**	**GFI**	**TLI**	**NFI**	**RMSEA**
Measurement model	0.997	0.942	0.995	0.980	0.031
Standard	>0.9	>0.9	>0.9	>0.9	>0.05

The details of the construct "customer service" after conducting confirmatory factor analysis (CFA) are given in table 4.11. The overall reliability of the scale was 0.924.

Table 4.11

Details of Factors after Confirmatory Factor Analysis (Customer Service)

Factors	**Items**	**No. of items**	**Cronbach's alpha**	**Overall cronbach's alpha**
Reliability	RY1, RY2, RY3, RY4, RY5	5	0.953	0.924
Responsiveness	RS1, RS2, RS3, RS4, RS5	5	0.963	
Assurance	AS1, AS2, AS3, AS4	4	0.911	
Empathy	EM1, EM2, EM3, EM4	4	0.927	

III. Validation of the Measurement Scale -Customer Service

Measurement model validity highly depends on how well each item in the measurement model fits the data. It explains the extent to which data collection methods accurately measure what they were intended to measure (Saunders and Thornhill, 2003). Validation of the measurement model in this study consists of exploratory convergent validity, composite reliability and discriminant validity.

a. Convergent validity (Customer service): Convergent validity was established when the relationship between measurement items and the factor were significantly different from zero. Based on this criterion, critical ratios were used to evaluate the statistical significance. Parameters which have a critical ratio (CR) greater than 1.96 were considered significant based on the level of $p<0.05$ (Anderson and Gebing, 1988; Rejikumar, 2011). In this study, all of the measurement items represented their factors significantly; hence, all of the measurement items satisfied the convergent validity criteria (Table 4.12). Also, the standardized regression weights should be significantly linked to the latent constructs and have at least loading estimate of 0.5 and ideally exceed 0.7 (Hair et al 2006). In this study the factor loadings ranged from 0.735 to 0.975 and no loading was less than the recommended value of 0.50, hence, evidencing convergent validity.

Table 4.12

Standardized Factor Loadings (SFL) of Construct Items (Customer Service)

	Construct Statements	**SFL**	**p value**
Responsiveness	Our LSP tells us the time frame within which the service will be performed.	.961	<0.05
	LSP provide prompt services	.950	<0.05
	LSP is always willing to help us	.900	<0.05
	LSP is always willing to help us with unloading, documentation etc.	.803	<0.05
	LSP responds to my requests without delay	.975	<0.05
Reliability	Our LSP keep their promise at fixed time	.890	<0.05
	LSP always shows sincere effort in solving our problems	.840	<0.05
	Our LSP provides its services correctly the first time	.815	<0.05

	Construct Statements	SFL	p value
	Our LSP provides its services at the time it promises to do so.	.955	<0.05
	LSP insists on error free documents.	.959	<0.05
Assurance	LSP instils confidence	.959	<0.05
	LSP makes us feel safe in transactions	.827	<0.05
	LSP consistently courteous to us	.805	<0.05
	LSP understands our questions	.844	<0.05
Empathy	LSP gives us personal attention	.972	<0.05
	LSP has operating hours/ delivery times that are convenient for us.	.742	<0.05
	LSP frequently seeks our needs and problems	.735	<0.05
	LSP understands our specific needs.	.941	<0.05

b. Composite reliability (Customer service): A valid construct must be a reliable one. Reliability can be defined as the degree to which measurements are free from error and, therefore yield consistent results. It can also designate as the measure of consistency and reproductivity. A reliable construct must produce consistent results on repeated trails (Carmines & Zeller, 1979). Composite reliability measures the overall reliability of a set of items in a measurement scale. Its values range between 0.60 and 0.70 is acceptable if other indicators of the construct's validity are good (Hair et al, 2006). The values of composite reliability were measured by using the formula below;

$$\text{Composite Reliability } (\rho) = \frac{(\sum \lambda_1)^2}{[\ (\sum \lambda_1)^2 + \sum(\delta_1)\ ]}$$

Where' ʎ 'is the standardized factor loadings and '**δ'** is the indicator measurement error. This can be interpreted as the sum of squares of the standardized factor loadings divided by sum of square of standardized factor loadings plus sum of indicator measurement errors. The values of composite reliability are shown in table 4.13 given below.

Table 4.13

Composite Reliability and AVE of Constructs (Customer Service)

Sl. No	Construct	Composite Reliability	AVE
1	Reliability	0.99	0.99
2	Responsiveness	0.99	0.98
3	Assurance	0.99	0.98
4	Empathy	0.98	0.97

As seen from the table 4.13, composite reliability of all the factors belong to the construct "customer service" have a value higher than 0.80, evidencing adequate internal consistency.

c. Discriminant validity: One construct must be truly distinct from other constructs, and then only it can be called a discriminantly valid measurement scale. It implies that an unobserved variable should explain better the variance of its own indicators than the variance of other unobserved variables. Or in other words, the loadings of variables comes under one latent variable should be higher than that of all other latent variables.

Testing of discriminant validity is done by comparing the Average Variance Extracted (AVE) with the squared correlation for each of the constructs. The AVE of an unobserved variable should be greater than the squared correlations between the unobserved variable and all other unobserved variables (Cooper & Zmud, 1990, Hair et al., 1998). Discriminant validity is achieved when each measurement item correlates weakly with all other constructs, except with the constructs which are theoretically associated (Cooper & Zmud, 1990, Hair et al., 1998). The two things which lead to discriminant validity are given below;

1. The correlation of the latent variable score with measurement item need to show an appropriate pattern of loading, one in which the measurement item load highly on its theoretically assigned factor and not highly on other factors.
2. Establishing discriminant validity requires an appropriate AVE. The test is to see if the square root of every AVE for each construct is much higher than any correlation among any pair of latent construct. As a rule of thumb, the square root of each construct should be much larger than the correlation of the specific construct with any of the other constructs in the model (Chin, 1998) and should be at least 0.50 (Fornell and Larker, 1981).

The values of Average Variance Extracted (AVE) were calculated manually by using the formula quoted below suggested by Hair et al., (1995).

$$AVE = \frac{(\sum_{i=1}^{n} \lambda_i^2)}{(\sum_{i=1}^{n} \lambda_i^2) + (\sum_{i=1}^{n} \delta_i)}$$

Where λ is the standardized factor loadings and **δ** is the indicator measurement error.

For the construct ‘customer service’, the proof of discriminant validity is shown in table 4.13. As a rule of thumb, a 0.85 correlation or higher indicates poor discriminant validity in structural equation modelling (David 1998). None of the correlations among variables were above 0.85. In addition, to confirm discriminant validity the squared inter construct correlation (SIC) were calculated and compared with average variance extracted. All variance extracted (AVE) estimates in the Table 4.13 were larger than the squared inter construct correlation estimates (SIC) provided in Table 4.14. Thus, discriminant validity of the measurement model established

Table 4.14

Correlations among Constructs- Customer Service

Correlations	Estimate	SIC
Responsiveness <--> Reliability	0.29	0.08
Responsiveness <--> Assurance	0.42	0.17
Responsiveness <--> Empathy	0.32	0.10
Reliability <--> Assurance	0.30	0.09
Reliability <--> Empathy	0.51	0.26
Assurance <--> Empathy	0.43	0.18

IV. Normality (Customer Service)

Kolmogrov- Smirnov and Shapiro-Wilk tests were used to assess normality of the data used. The table 4.15 shows the test results

Table 4.15

Tests of Normality (Customer Service)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RY1	.291	168	.000	.746	168	.000
RY2	.269	168	.000	.737	168	.000
RY3	.261	168	.000	.756	168	.000
RY4	.301	168	.000	.736	168	.000
RY5	.308	168	.000	.730	168	.000
RS1	.357	168	.000	.659	168	.000
RS2	.347	168	.000	.688	168	.000
RS3	.342	168	.000	.699	168	.000
RS4	.333	168	.000	.723	168	.000
RS5	.358	168	.000	.674	168	.000
AS1	.372	168	.000	.655	168	.000

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
AS2	.281	168	.000	.721	168	.000
AS3	.298	168	.000	.741	168	.000
AS4	.336	168	.000	.699	168	.000
EM1	.357	168	.000	.659	168	.000
EM2	.360	168	.000	.659	168	.000
EM3	.354	168	.000	.660	168	.000
EM4	.335	168	.000	.661	168	.000
a. Lilliefors Significance Correction						

The significance values of both Kolmogrov-Smirnov and Shapiro-Wilk test revealed that none of the variables was normally distributed. Hence, testing whether Skewness and Kurtosis is in limits, and tested the deviation of normality to confirm whether deviation is problematic. Skewness and Kurtosis values should be in the range of ±2.58 and ±1.96 (Hair, Black, Babin, Anderson, and Thatham, 2006).

Table 4.16

Skewness and Kurtosis (Customer Service)

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
RY1	168	.60623	-.405	.187	-.653	.373
RY2	168	.67450	-1.019	.187	1.700	.373
RY3	168	.69334	-.950	.187	1.279	.373
RY4	168	.58969	-.373	.187	-.690	.373
RY5	168	.58052	-.340	.187	-.728	.373
RS1	168	.51048	.081	.187	-1.672	.373
RS2	168	.53047	-.051	.187	-1.219	.373
RS3	168	.53980	-.100	.187	-1.064	.373
RS4	168	.56398	-.178	.187	-.770	.373

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
RS5	168	.51906	.055	.187	-1.407	.373
AS1	168	.50645	.201	.187	-1.626	.373
AS2	168	.63632	-.954	.187	1.769	.373
AS3	168	.59750	-.381	.187	-.668	.373
AS4	168	.54164	-.145	.187	-1.067	.373
EM1	168	.51048	.081	.187	-1.672	.373
EM2	168	.50981	.105	.187	-1.665	.373
EM3	168	.51107	.057	.187	-1.677	.373
EM4	168	.51316	-.087	.187	-1.679	.373

All the variables in the construct ‘customer service’ fall under Kurtosis value of 1.96 and skewness value of 2.58, suggesting Kurtosis and Skewness was not problematic in this study (See Table 4.16) (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, the data were appropriate for parametric tests.

2. Customer Satisfaction

The construct 'customer satisfaction' has twenty four statements.

I. Exploratory Factor Analysis (Customer Satisfaction)

The 24 items for the customer satisfaction scale were entered into SPSS 21.0 for factor analysis. Principal component analysis method, varimax method, and the minimal eigenvalue >=1.0 criterion were applied in performing EFA. Altogether, six items were deleted in two stages. Three meaningful factors were derived, accounting for over 78.36 percentage of the total variance. All the items had above 0.60 loadings on their corresponding factors.

Table 4.17

KMO and Bartlett's Test (Customer Satisfaction)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.920
Bartlett's Test of Sphericity	Approx. Chi-Square	3947.500
	df	153
	Sig.	.000

Since KMO value was 0.920, it was considered as adequate. The Bartlett's test of sphericity indicated the significance and the suitability of the responses of the study. The Bartlett's test value was less than 0.05 and hence significant and recommended for factor analysis (Table 4.17). The Scree test (Figure 4.3) indicated that by laying a straight edge across the bottom portion of the roots, there were three factors before the curve becomes approximately a straight line (Neetha Eppan, 2014).

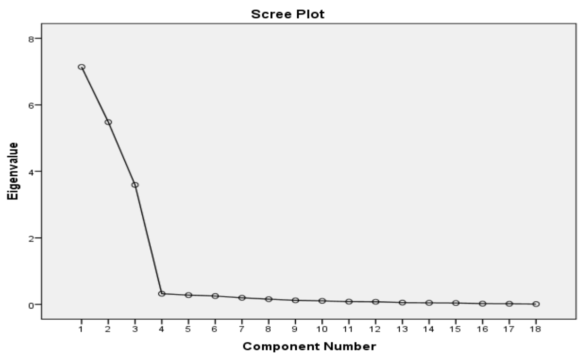

Fig 4.3: Scree plot-Customer satisfaction

The eighteen items on customer satisfaction were re-organised in three factors (See Table 4.18). Based on the nature of factorization, three names were given (See Table 4.19 for review support), i.e., Operations, outbound and inbound. ‘Operations’ explains over 40.28 percentage of the variance, ‘outbound’ explains over 26.66 percentage of the variance and ‘inbound’ explains over 14.41 percentage of the variance.

Table 4.18

Rotated Component Loadings (RCL) with Percentage of Variance (PV) explained (Customer Satisfaction)

Factors	Statements	Code	RCL	PV
Operations	Our customers are happy with the stock lead time	OP1	.970	40.278
	Our customers expect better stock lead time (From order to pick-up availability/ Despatch)	OP2	.962	
	We have the ability to accommodate special situations and unusual or unexpected customer requests (Flexibility is high)	OP3	.952	
	Our LSP handles claims/returns very promptly	OP4	.944	
	Our LSPs informs customers of delays	OP5	.942	
	We have the ability to quickly implement contingency plans when a failure occurs in the supply chain (malfunction recovery is high)	OP6	.926	
	We are very prompt in measures how many shipments arrive without damaged products (Deliveries are damage free)	OP7	.896	
	Customers should receive shipments within the promised time.	OP8	.856	
Outbound	Shipments always match orders (measures how many shipments contain the exact amount of product ordered)	OB1	.944	23.664
	Shipments are always shipped to correct	OB2	.901	

Factors	Statements	Code	RCL	PV
	location (measures how many shipments are made to the customers selected location)			
	Customers are satisfied with the transportation time	OB3	.880	
	Invoices are error free (measures what percentage of invoices contains no errors)	OB4	.863	
	Customers are satisfied with the responses	OB5	.651	
	Responses to customers are correct and easy to understand	OB6	.630	
Inbound	Stocks are available when needed	IN1	.802	**14.413**
	The correct safety stock levels are held	IN2	.788	
	We know what the service level is today. (Service level=promised level of availability)	IN3	.774	
	We perceived or experienced that the service level is correct	IN4	.685	
Total Variance Extracted				**74.999**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

Table 4.19

Factor Names and Reviews (Customer Satisfaction)

Sl.No	Constructs	Authors
1	Inbound	Eduardo J. Rodrigues, Paula A. Alexandrino, Maria S. Carvalho (2013), Van Goor (2001), Hammer and Champy (1993), Hammer (1990), Davenport and Short (1990).
2	Operations	Black and Hunter (2003), Ford and Crowther (1992), Putnik and Cunha (2005), Womack et al (1990), Lander and Liker (2007), Shingo (1989), Womack and Jones (1996), Taiichi Ohno (1988), Liker (2004), Jones, Hines and Rich (1997).

3	Outbound	Ballou (2004), Fine and Whitney (1996), Tuck and Hague (2007), Power, Desouza and Bonifazi (2006), Muller (2002), Krajewski, Rtzman, Malhotra (2007), Koh et al (2007), Zeng (2000).

II. Confirmatory Factor Analysis for the 'Customer Satisfaction' Dimensions Identified

The exploratory factor analysis result was meaningful, because the derivation of factors and item distributions highly justify the intended scales. The next step was to conduct a confirmatory factor analysis for the construct "customer satisfaction".

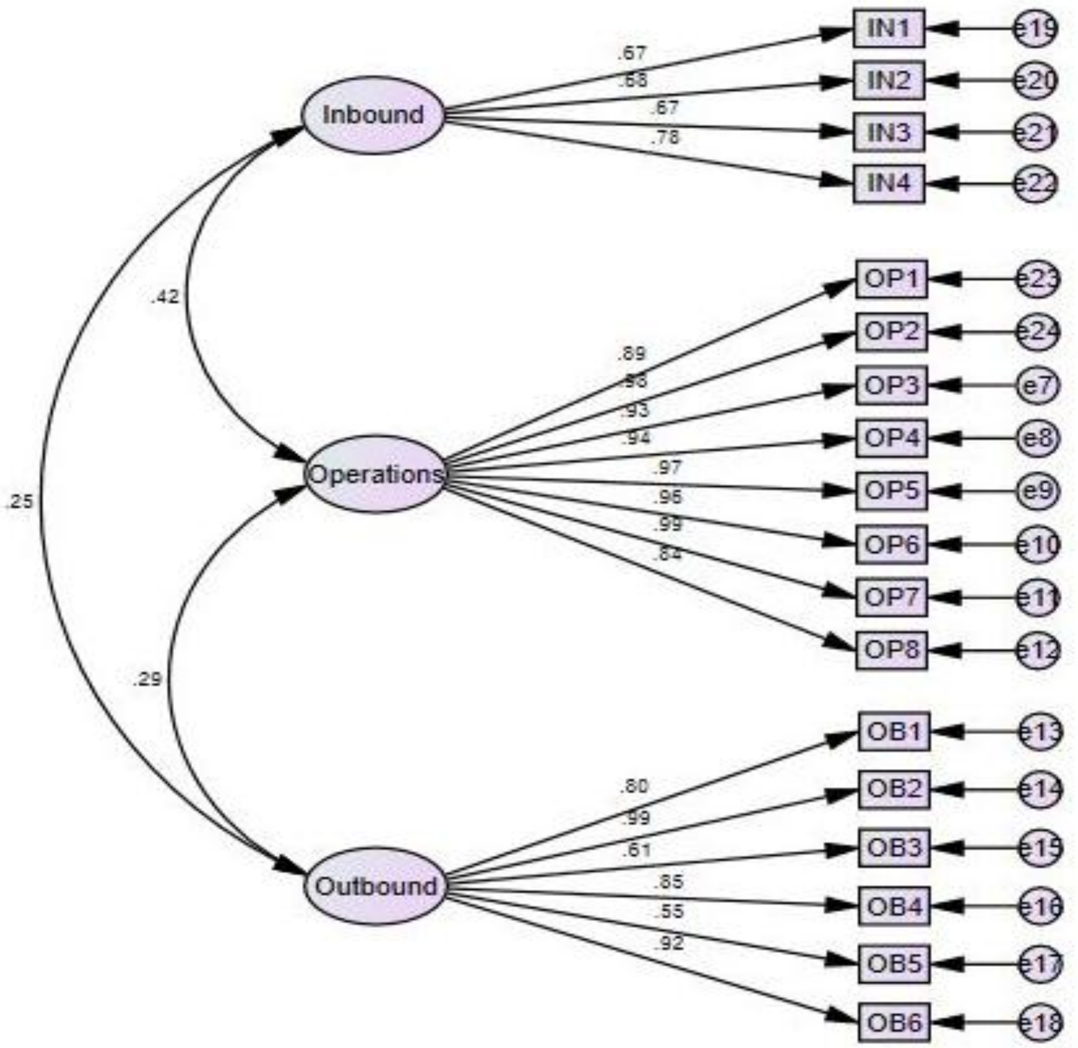

Fig 4.4: Measurement model –Customer satisfaction.

The model fit indices like the Comparative Fit Indices (CFI), the Goodness of Fit index (GFI), Normed Fit Index (NFI), Tucker Lewis Index (TLI) and Root Mean Square Error Approximation (RMSEA) were selected to measure model fit.

Table 4.20

Model Fit Indices (Customer Satisfaction)

Variable	**CFI**	**GFI**	**TLI**	**NFI**	**RMSEA**
Measurement Model	0.997	0.948	0.995	0.985	0.032
Standard	>0.9	>0.9	>0.9	>0.9	>0.05

In order to obtain an acceptable fit with data, CFI, GFI, NFI and TLI should be around 0.9 and the RMSEA value must be lower than 0.05. The measurement model was found to be good fitting model (See Table 4.20). Hence, confirms exploratory factor analysis result.

Table 4.21

Variables after Confirmatory Factor Analysis (Customer Satisfaction)

Factors	**Items**	**No. of items**	**Cronbach's alpha**	**Overall cronbach's alpha**
Inbound	IN1,IN2,IN3,IN4	4	0.901	0.859
Operations	OP1,OP2,OP3,OP4,OP5,OP6, OP7,OP8	8	0.950	
Outbound	OB1,OB2,OB3,OB4,OB5,OB6	6	0.926	

Table 4.21 shows adequate reliability for the extracted factors. The overall reliability of the construct was 0.859.

III. Validation of the Measurement Scale 'Customer Satisfaction'

a. Convergent validity: In this construct (customer satisfaction), all the measurement statements represented their factors significantly (See Table 4.22);

hence, all of the measurement items satisfied the convergent validity criteria. Also, the standardized regression weights should be significantly linked to the latent constructs and have at least loading estimate of 0.5 and ideally exceed 0.7 (Hair et al 2006). In this study the factor loading ranged from 0.546 to 0.991 and no loading was less than the recommended value of 0.50, hence, evidencing convergent validity.

Table 4.22

Standardized Factor Loadings (SFL) of construct items (Customer Satisfaction)

	Statements	SFL	p value
Inbound	Stocks are available when needed	.674	<0.05
	The correct safety stock levels are held	.684	<0.05
	We know what the service level is today.	.671	<0.05
	We perceived or experienced that the service level is correct	.780	<0.05
Operations	Our customers are happy with the stock lead time (From order to pick-up availability/ Despatch)	.888	<0.05
	Our customers expect better stock lead time (From order to pick-up availability/ Despatch)	.978	<0.05
	We have the ability to accommodate special situations and unusual or unexpected customer requests (Flexibility is high)	.934	<0.05
	Our LSP handles claims/returns very promptly	.945	<0.05
	Our LSPs informs customers of delays	.967	<0.05
	We have the ability to quickly implement contingency plans when a failure occurs in the supply chain (malfunction recovery is high)	.960	<0.05
	We are very prompt in measures how many shipments arrive without damaged products (Deliveries are damage free)	.989	<0.05
	Customers should receive shipments within the promised time.	.842	<0.05

	Statements	SFL	p value
Outbound	Customers are satisfied with the responses	.801	<0.05
	Responses to customers are correct and easy to understand	.991	<0.05
	Customers are satisfied with the transportation time	.615	<0.05
	Invoices are error free (measures what percentage of invoices contains no errors)	.855	<0.05
	Shipments always match orders (measures how many shipments contain the exact amount of product ordered)	.546	<0.05
	Shipments are always shipped to correct location (measures how many shipments are made to the customers selected location)	.923	<0.05

b. Composite reliability (Customer satisfaction): As seen from the values depicted in Table 4.23, composite reliability of the factors belongs to the construct 'customer satisfaction' have a value higher than 0.80, evidencing adequate internal consistency.

Table 4.23

Composite Reliability and AVE of constructs (Customer Satisfaction)

Factors	Composite Reliability	AVE
Inbound	0.98	0.961
Operations	0.99	0.996
Outbound	0.98	0.980

c. Discriminant validity (Customer satisfaction): The proof of discriminant validity is shown in table 4.24. All AVE estimates in the Table 4.23 were higher than the squared inter construct correlation estimates (SIC) provided in Table 4.24. Further, none of the correlations among the factors were above 0.85. Hence, it evidences discriminant validity.

Table 4.24

Correlations among Constructs (Customer Satisfaction)

Correlations	Estimates	SIC
Inbound <--> Operations	0.42	0.17
Operations <--> Outbound	0.29	0.08
Outbound <--> Inbound	0.25	0.06

IV. Normality (Customer Satisfaction)

Kolmogrov- Smirnov and Shapiro-Wilk tests were used to assess the normality of the data used. The table 4.25 given below depicts the test results.

Table 4.25

Tests of Normality (Customer Satisfaction)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
CSIN1	.386	168	.000	.704	168	.000
CSIN2	.237	168	.000	.805	168	.000
CSIN3	.291	168	.000	.790	168	.000
CSIN4	.349	168	.000	.739	168	.000
CSOP1	.354	168	.000	.701	168	.000
CSOP2	.374	168	.000	.679	168	.000
CSOP3	.382	168	.000	.683	168	.000
CSOP4	.373	168	.000	.688	168	.000
CSOP5	.371	168	.000	.680	168	.000
CSOP6	.361	168	.000	.689	168	.000
CSOP7	.377	168	.000	.677	168	.000

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CSOP8	.325	168	.000	.709	168	.000
CSOB1	.275	168	.000	.745	168	.000
CSOB2	.289	168	.000	.685	168	.000
CSOB3	.307	168	.000	.718	168	.000
CSOB4	.281	168	.000	.751	168	.000
CSOB5	.324	168	.000	.728	168	.000
CSOB6	.277	168	.000	.715	168	.000
a. Lilliefors Significance Correction						

The significance values of both Kolmogrov-Smirnov and Shapiro- Wilk test explains that none of the variables was normally distributed. Hence, it is better to go for Skewness and Kurtosis.

Table 4.26

Skewness and Kurtosis (Customer Satisfaction)

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CSIN1	168	.53208	.152	.187	.071	.373
CSIN2	168	.72621	-.166	.187	-1.081	.373
CSIN3	168	.65593	-.149	.187	-.685	.373
CSIN4	168	.57385	-.055	.187	-.398	.373
CSOP1	168	.55619	-.287	.187	.587	.373
CSOP2	168	.51978	.155	.187	-1.125	.373

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CSOP3	168	.52102	.190	.187	-.883	.373
CSOP4	168	.52643	.123	.187	-.951	.373
CSOP5	168	.52125	.132	.187	-1.142	.373
CSOP6	168	.54705	-.247	.187	.625	.373
CSOP7	168	.51824	.179	.187	-1.106	.373
CSOP8	168	.59075	-.637	.187	1.419	.373
CSOB1	168	.67246	-.926	.187	1.567	.373
CSOB2	168	.63180	-1.172	.187	2.823	.373
CSOB3	168	.58248	-.566	.187	.460	.373
CSOB4	168	.70192	-1.033	.187	1.302	.373
CSOB5	168	.61721	-.822	.187	.476	.373
CSOB6	168	.65135	-1.057	.187	2.189	.373

All the variables in the construct ‘customer satisfaction’ fall under Kurtosis value of 1.96 and skewness value of 2.58, suggesting Kurtosis and Skewness was not problematic in this study (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, the data were appropriate for parametric tests.

3. Customer Success

The construct 'customer success' has fifteen statements.

I. Exploratory Factor Analysis (Customer Success)

15 items were entered into SPSS 21.0 for factor analysis. Initially, three factors were derived. Four items of two factors were deleted because of the lower loadings. The resultant 11 items were re-factorized. The result is given below;

Table 4.27

KMO and Bartlett's Test (Customer Success)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.943
Bartlett's Test of Sphericity	Approx. Chi-Square	2135.912
	df	55
	Sig.	.000

Since the KMO value was 0.943, it was considered as adequate. The Bartlett's Test of Sphericity value (2135.912, df 55) was less than 0.05 and hence, significant and recommended for factor analysis (See Table 4.27).

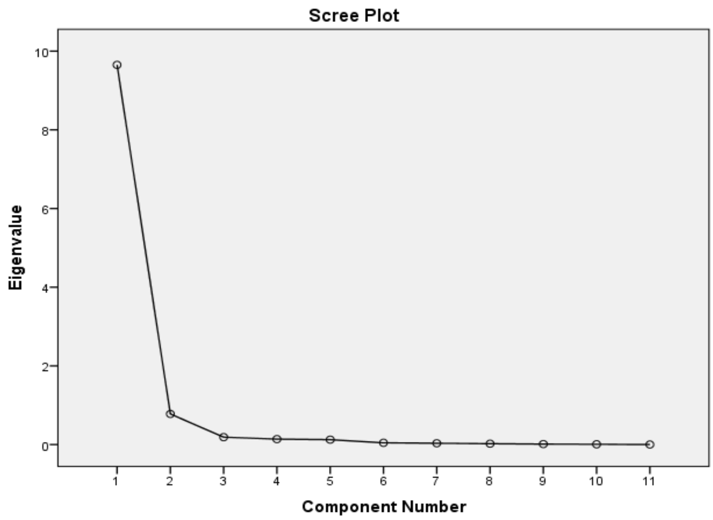

Fig 4.5: Scree plot- Customer success

The Scree test plot (figure 4.5) indicated that, there was only one factor before the curve becomes approximately straight line. The table below explains the name of factor along with the statements, component loadings and the percentage of variance explained.

Table 4.28

Rotated Component Loadings (RCL) with Percentage of Variance (PV) explained (Customer Success)

Factor Name	Statements	Code	RCL	PV
Customer Success	I am overall satisfied with the services of LSP	CS1	.940	74.697
	I would choose another service provider if given the choice	CS2	.924	
	I have increasing expectations	CS3	.920	
	The information on increased expectation are being communicated frequently	CS4	.914	
	My expectations on the service levels are the same as my actual requirements	CS5	.912	
	LSP always assess our requirements	CS6	.905	
	LSP always aware about our specific requirements	CS7	.901	
	LSP understand our customers' requirements and processes	CS8	.879	
	LSP provides value added services	CS9	.862	
	LSP provided customized value added services	CS10	.851	
	The value added services are relevant to us and provides competitive advantage	CS11	.850	
Total Variance Extracted				**74.697**
Extraction Method: Principal Component a. 1 components extracted.				

Only one factor was derived in the final factor analysis, consisting of 11 items, all showed higher loadings of above 0.8. Table 4.28 shown above provides name of the factor along with items, factor loadings and percentage of variance explained (Refer Table 4.29 for theoretical support). Compared with the intended measurement scales, the factor analysis results met the theory very well. It explains over 74.70 percentage of the variance

Table 4.29

Factor Names and Reviews (Customer Success)

Sl.no	Constructs	Authors
1	Customer success	Lining Bai, Ying Zhong (2008), Coyle et al (2003), Lambert and stock (1993), Bloomberg et al (2002), Baudin (2004), Dobler, Burt and Lee (1990), Quayle and Quayle (2000), Simchi-Levi et al (2004), Grittner (1996).

The next step was to conduct a confirmatory factor analysis for the customer success dimensions identified from the exploratory factor analysis to assess whether the factor generated from exploratory factor analysis has the same underlying structure as the intended measurement structure.

II. Confirmatory Factor Analysis for the 'Customer Success' Dimensions Identified

The Confirmatory Factor Analysis (CFA) on the construct 'customer success' consisted of one factor and eleven items (See Fig 4.6).

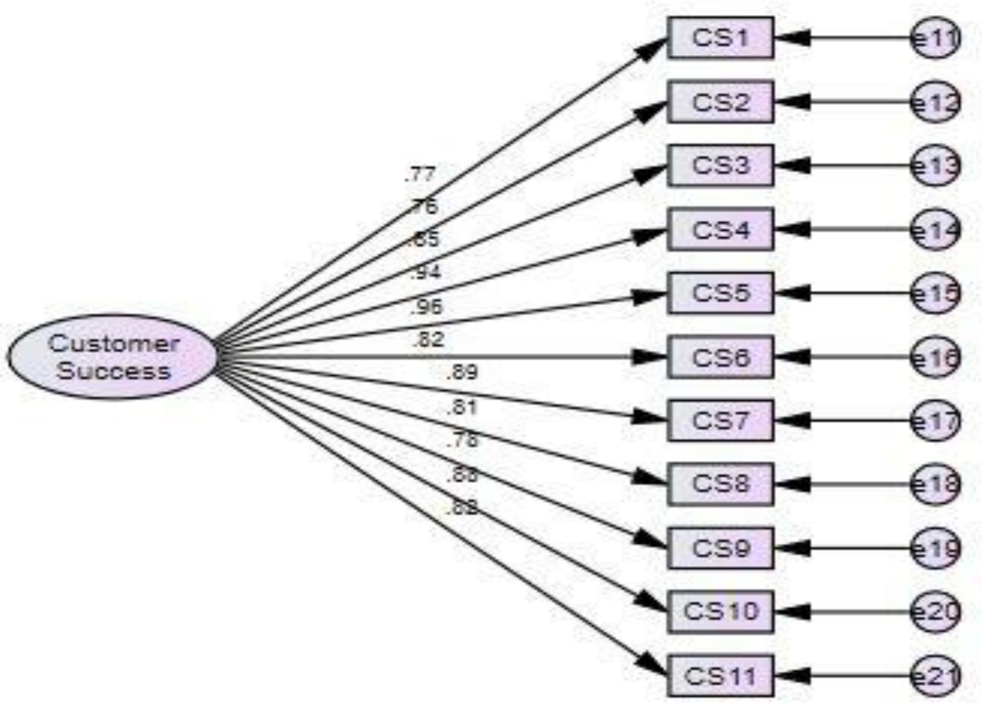

Fig 4.6: Measurement model - Customer success

Table 4.30

Model fit indices (Customer Success)

Variable	**CFI**	**GFI**	**TLI**	**NFI**	**RMSEA**
Measurement Model	0.998	0.964	0.995	0.987	0.032
Standard	>0.9	>0.9	>0.9	>0.9	>0.05

In order to obtain an acceptable fit with data, CFI, GFI, NFI and TLI should be around 0.9 and the RMSEA value must be lower than 0.05. The measurement model was found to be good fitting model (See Table 4.20). The RMSEA is 0.032 suggesting a close fit between the empirical data and the measurement model; it explains 96.4% of the data variance-covariance (GFI=0.964); it achieved a good balance between theoretical simplicity and explanation power (NFI=0.987, CFI=0.998, TLI=0.995). Hence, confirms exploratory factor analysis result.

Table 4.31

Variables after Confirmatory Factor Analysis (Customer Success)

Factors	Items	No. of items	Cronbach's alpha
Customer success	CS1, CS2, CS3, CS4, CS5, CS6, CS7, CS8, CS9, CS10, CS11.	11	0.975

III. Validation of the Measurement Scale (Customer Success)

Scale validation of the construct 'customer success' includes convergent validity, composite reliability and discriminant validity. Since there was only one factor for "customer success", it is not appropriate for testing discriminant validity. Then the study adopts convergent validity and composite reliability.

a. Convergent validity (Customer success): The criteria recommended as the basis for concluding that a measurement model has acceptable convergent validity are: P values associated with the loadings should be lower than 0.05 and loadings for indicators of all respective latent variables must be 0.5 or above for the convergent validity of a measure to be acceptable (Hair et al., 2009). The factor loadings associated with the construct 'customer success' ranged between 0.761 and 0.960 (See Table 4.32), it is reasonable to assume that the measurement model for the construct 'customer success' has acceptable convergent validity.

Table 4.32

Standardized Factor Loadings (SFL) of Construct Items (Customer Success)

	Customer Success	SFA	p value
1	I am overall satisfied with the services of LSP	.770	<0.05
2	I would choose another service provider if given the choice	.761	<0.05
3	I have increasing expectations	.850	<0.05
4	The information on increased expectation are being communicated frequently	.944	<0.05

	Customer Success	SFA	p value
5	My expectations on the service levels are the same as my actual requirements	.960	<0.05
6	LSP always assess our requirements	.816	<0.05
7	LSP always aware about our specific requirements	.892	<0.05
8	LSP understand our customers' requirements and processes	.813	<0.05
9	LSP provides value added services	.781	<0.05
10	LSP provided customized value added services	.879	<0.05
11	The value added services are relevant to us and provides competitive advantage	.818	<0.05

b. Composite reliability (Customer success): As seen from the values depicted in table 4.33, composite reliability of the construct is 0.99 which is greater than the recommended value (Composite Reliability >0.80), hence, evidencing adequate internal consistency.

Table 4.33

Composite Reliability and AVE of Constructs (Customer Success)

Construct	Composite Reliability	AVE
Customer success	0.99	0.98

IV. Normality (Customer Success)

Table 4.34

Tests of Normality (Customer Success)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
CS1	.266	168	.000	.775	168	.000
CS2	.266	168	.000	.782	168	.000
CS3	.278	168	.000	.762	168	.000
CS4	.301	168	.000	.736	168	.000
CS5	.298	168	.000	.741	168	.000
CS6	.278	168	.000	.765	168	.000
CS7	.295	168	.000	.746	168	.000
CS8	.289	168	.000	.755	168	.000
CS9	.268	168	.000	.772	168	.000
CS10	.288	168	.000	.750	168	.000
CS11	.295	168	.000	.751	168	.000
a. Lilliefors Significance Correction						

The results of One-Sample K.S test and Shapiro-Wilk test shows p values are less than 0.05, hence it is revealed that the construct 'customer success' is non normal in character. Hence, it is better to go for Skewness and Kurtosis.

Table 4.35

Skewness and Kurtosis (Customer Success)

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CS1	168	4.2917	.65983	-.396	.187	-.743	.373
CS2	168	4.2976	.67955	-.566	.187	-.244	.373
CS3	168	4.3333	.63498	-.416	.187	-.670	.373
CS4	168	4.3929	.58969	-.373	.187	-.690	.373
CS5	168	4.3810	.59750	-.381	.187	-.668	.373
CS6	168	4.3333	.64434	-.443	.187	-.686	.373
CS7	168	4.3690	.60496	-.386	.187	-.656	.373
CS8	168	4.3452	.61894	-.388	.187	-.652	.373
CS9	168	4.3036	.65441	-.407	.187	-.723	.373
CS10	168	4.3690	.61478	-.426	.187	-.647	.373
CS11	168	4.3512	.61068	-.370	.187	-.650	.373

All the variables in the construct ‘customer success’ fall under Kurtosis value of 1.96 and skewness value of 2.58, suggesting Kurtosis and Skewness was not problematic in this study (See Table 4.35) (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, the data were appropriate for parametric tests.

4. Customer Accommodation

The construct customer accommodation has seven statements.

I. Exploratory Factor Analysis (Customer Accommodation)

11 scaled items were entered into SPSS 21.0 for factor analysis. Initially, two factors were derived. Four items from the second factor were deleted because of the lower loadings. The resultant 7 items were re-factorized. The result is given below;

Table 4.36

KMO and Bartlett's Test (Customer Accommodation)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.826
Bartlett's Test of Sphericity	Approx. Chi-Square	908.202
	df	21
	Sig.	.000

Since the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.826, it is acceptable. The Bartlett test of Sphericity values (908.202, df 21) indicates that the values are significant and implies that non-zero correlations existed at the significance level of less than 0.001, and hence proceed to factor analysis (See Table 4.36). The Scree test plot (figure 4.7) indicated that by laying a straight edge across the bottom portion of the roots, there was only one factor before the curve becomes approximately straight line.

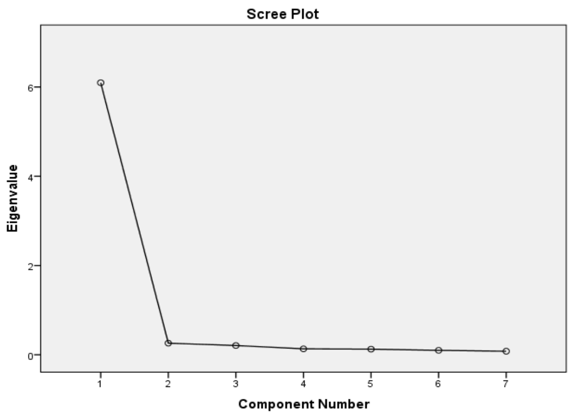

Fig 4.7: Scree plot- Customer accommodation

The Table 4.37 shown below provides the details of factor along with items, component loadings and percentage of variance extracted. The name of the factor remained unchanged “customer accommodation”, because only one factor was derived.

Table 4.37

Rotated Component Loading (RCL) with Percentage of Variance (PV) explained (Customer Accommodation)

Factor name	Statements	Code	RCL	PV
Customer accommodation	LSP satisfies overall logistics deliveries with the right amount	CAC1	.877	68.744
	LSP satisfies overall logistics deliveries with the right product	CAC2	.868	
	LSP satisfies overall logistics deliveries with the right time	CAC3	.847	
	LSP satisfies overall logistics deliveries with the right place	CAC4	.817	
	LSP satisfies overall logistics deliveries with the right condition	CAC5	.810	
	LSP satisfies overall logistics deliveries with the right price	CAC6	.809	
	LSP satisfies overall logistics deliveries with the right information.	CAC7	.772	
Total Variance Extracted				**68.744**
Extraction Method: Principal Component a. 1 components extracted.				

Table 4.37 shown above provides name of the factor along with items, factor loadings and percentage of variance explained (68.755) by the factor (Refer Table 4.38 for theoretical support). Compared with the intended measurement scales, the factor analysis results met the theory very well.

Table 4.38

Factor Names and Reviews (Customer Accommodation)

S.no	Constructs	Authors
1	Customer success	Coyle et al (2003), Lambert and stock (1993), Bloomberg et al (2002), Baudin (2004), Quayle and Quayle (2000), Simchi-Levi et al (2004), Grittner (1996).

The next step was to conduct a confirmatory factor analysis for the construct 'customer accommodation'.

II. Confirmatory Factor Analysis for the 'Customer Accommodation' Dimensions Identified

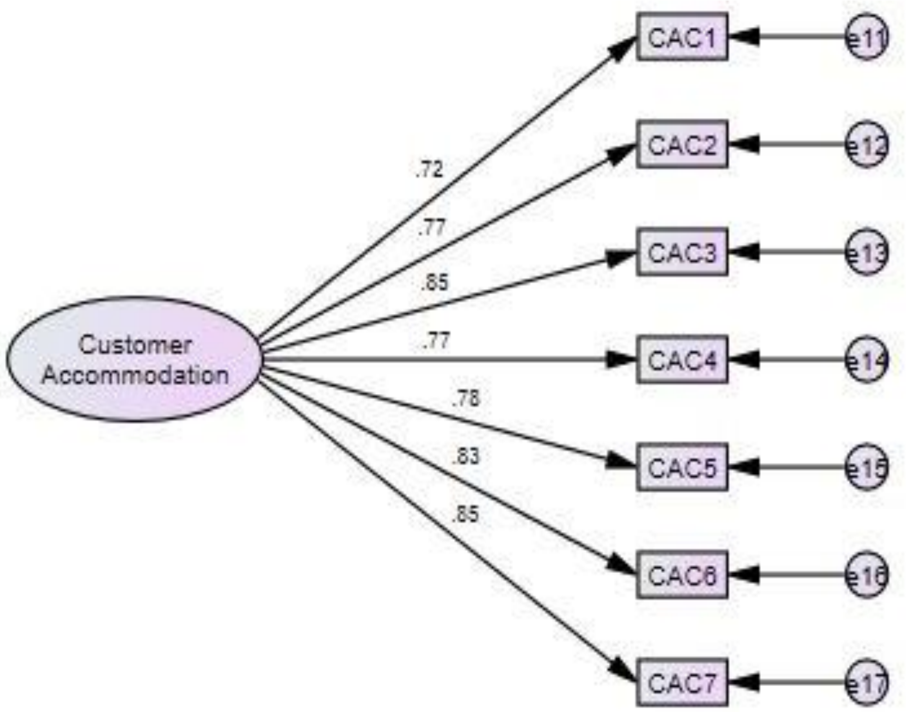

Fig 4.8: Measurement model- Customer accommodation.

The data were found free from missing values and outliers. The model with one construct and nine variables was suggesting good fit in the first estimate as mentioned in the table 4.39. Compared with the generally accepted model fit standards, the test outcomes seemed to fit the measurement model.

Table 4.39

Measurement Fit Indices (Customer Accommodation)

Variable	CFI	GFI	TLI	NFI	RMSEA
Measurement Model	0.998	0.976	0.996	0.991	0.041
Standard	>0.9	>0.9	>0.9	>0.9	>0.05

The details of the construct "customer accommodation" after conducting confirmatory factor analysis (CFA) were given in table 4.40. The overall reliability of the scale was 0.961.

Table 4.40

Variables after Confirmatory Factor Analysis (Customer Accommodation)

Factor	Items	No. of items	Cronbach's alpha
Customer accommodation	CAC1, CAC2, CAC3, CAC4, CAC5, CAC6, CAC7, CAC8, CAC9	9	0.961

III. Validation of the Measurement Scale (Customer Accommodation)

Since there was only one factor for "customer accommodation", it is not appropriate for testing discriminant validity. Then the study tests convergent validity and composite reliability to assess the validity.

a. Convergent validity (Customer accommodation): From the table 4.41, it can be identified that the loadings associated with the latent variable was higher. The p-values related to the loadings were lower than 0.05 and loadings for indicators of all respective latent variables were above 0.5. Since the model satisfies the above criteria, it is said to have acceptable convergent validity.

Table 4.41

Standardized Factor Loadings (SFL) of Construct Items (Customer Accommodation)

	Customer Accommodation	SFL	p value
1	LSP satisfies overall logistics deliveries with the right amount	.722	<0.05
2	LSP satisfies overall logistics deliveries with the right product	.769	<0.05
3	LSP satisfies overall logistics deliveries with the right time	.851	<0.05
4	LSP satisfies overall logistics deliveries with the right place	.773	<0.05
5	LSP satisfies overall logistics deliveries with the right condition	.781	<0.05
6	LSP satisfies overall logistics deliveries with the right price	.833	<0.05
7	LSP satisfies overall logistics deliveries with the right information.	.848	<0.05

b. Composite reliability (Customer accommodation): As seen from the values shown in table 4.42, composite reliability of the construct has a value higher than 0.80, therefore, suggesting adequate internal consistency.

Table 4.42

Composite Reliability and AVE of Constructs (Customer Accommodation)

Construct	Composite reliability	AVE
Customer accommodation	0.99	0.99

IV. Normality (Customer Accommodation)

The significance values of both Kolmogrov-Smirnov and Shapiro- Wilk test explains that none of the variables was normally distributed. Hence, the measure of Kurtosis and Skewness was used (See Table 4.43).

Table 4.43

Tests of Normality (Customer Accommodation)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CAC1	.433	168	.000	.611	168	.000
CAC2	.439	168	.000	.619	168	.000
CAC3	.470	168	.000	.551	168	.000
CAC4	.456	168	.000	.576	168	.000
CAC5	.428	168	.000	.620	168	.000
CAC6	.447	168	.000	.605	168	.000
CAC7	.463	168	.000	.571	168	.000
a. Lilliefors Significance Correction						

All the variables in the construct 'customer accommodation' fall under Kurtosis value of 1.96 and skewness value of 2.58, suggesting Kurtosis and Skewness was not problematic in this study (See Table 4.44) (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, the data were appropriate for parametric tests.

Table 4.44

Skewness and Kurtosis (Customer Accommodation)

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CAC1	168	4.1964	.48026	.166	.187	1.249	.373
CAC2	168	4.2143	.46613	.659	.187	.127	.373
CAC3	168	4.2202	.42981	1.131	.187	-.041	.373
CAC4	168	4.2500	.44788	.961	.187	-.505	.373
CAC5	168	4.1607	.48115	.090	.187	1.485	.373
CAC6	168	4.1964	.45464	.734	.187	.405	.373
CAC7	168	4.1845	.43279	.944	.187	.677	.373

5. Value Creation

The construct 'value creation' has eighteen statements

I. Exploratory Factor Analysis (Value Creation)

The 18 items for the value creation scale were entered into SPSS 21.0 for factor analysis. Principal component analysis method, Varimax rotation, and the minimal eigenvalue>= 1.0 criterion were applied in performing EFA. Altogether five items were deleted; three meaningful factors were generated, accounting for over 83.818 percentage of variance. All items had above 0.80 loading on their respective factors.

Table 4.45

KMO and Bartlett's Test (Value Creation)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.842
Bartlett's Test of Sphericity	Approx. Chi-Square	2960.881
	df	78
	Sig.	.000

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.842 and the Bartlett test of spherisity was significant ($p<0.005$) with a Chi square value of 2960.881 with 78 degrees of freedom which was considered to be very good for further analysis and provided support for the factorization (Table 4.45).

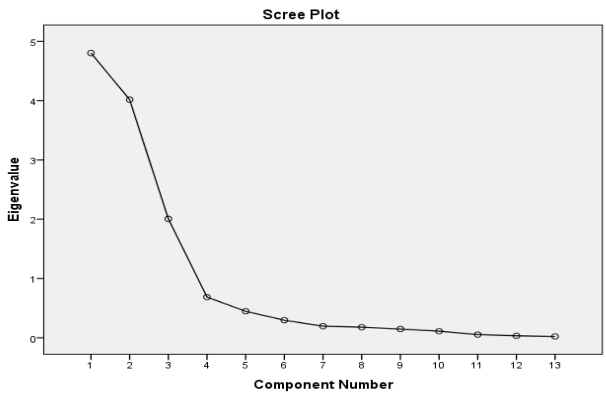

Fig 4.9: Scree plot- Value creation

The Scree test (Figure 4.9) indicated that by laying a straight edge across the bottom portion of the roots, there were three factors before the curve becomes approximately a straight line (Neetha Eppan, 2014).

Table 4.46

Rotated Component Loadings (RCL) with Percentage of Variance (PV) Explained (Value Creation)

Factors	Statements	Code	RCL	PV
Co-creation of value	LSP actively modifies transportation options offered.	CV1	.968	39.520
	LSP actively enhances the order handling processes	CV2	.964	
	LSP discusses with us on appropriate stock levels.	CV3	.958	
	LSP actively meet us to understand our needs and requirements	CV4	.919	
	LSP has active meeting with us to discuss on distribution management	CV5	.870	
	LSP has on going meetings with us to fine tune the order handling process	CV6	.779	
Logistics capabilities	LSP develops customer specific programs to cater difference in customer demands	LC1	.902	24.502
	LSP maintanis and mpodifies its operations based on the channging customers expectations	LC2	.844	
	LSP is good at handling unique or unplanned customer requirements	LC3	.825	
	LSP has the flexibility for adaption to unexpected operational circumstances.	LC4	.902	
Customer integration	There is sharing of ideas, information and other resources between us and the LSP	CI1	.919	19.795
	There is a joint planning to anticipate and resolve operative problems between us and LSP	CI2	.868	
	There is already established team work between us the LSP	CI3	.861	
Total Variance Extracted				**83.818**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

The Table 4.46 represents the names of the factors along with items, factor loadings of each items, and the percentage of variance explained by the items in each factor (Refer Table 4.47 for review support). It was observed that the items corresponding to each factors shows some commonalities and hence it is also justified the theory. The so derived factors were named as "co-creation of value, logistics capabilities and customer integration".

Table 4.47

Factor Names and Reviews (Value Creation)

Sl.No	Constructs	Authors
1	Co-creation of value	Angel Martinez Sanchez, Manuela Perez Perez (2005), Barad. M, Sapir. D (2003), Jones. R, Ostroy. J (1984), Kickert. W.J (1985), Vickery. S, Calantone. R, Droge. C (1999), Vorkula. R.J, O'Leary-Kelly. S (2000).
2	Customer integration	Arthur. D. Little (2007), Prof. Dr. Matthias Klumpp, Dipl. Kfm. Sascha Bioly, Prof. Dr. Stephan Zelewski (2009), Lai (2004), Persson and Virum (2001), Marasco (2008), Selviaridis and Spring (2007), Berglund, Laarhoven, Sharman and Wandel (1999), Marasco (2008).
3	Logistics capabilities	Morash, Droge and Vickery (1996a), Fawcett, Stanley and smith (1997b), Fawcett, Calantone, and smith (1996), MSUGLRT (1995); Bowersox, Closs and Stank (2000), Bower and Hout (1992); Daugherty and Pittman (1995).

Next, the so derived factors were considered for confirmatory factor analysis to assess whether the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure.

II. Confirmatory Factor Analysis for the 'Value Creation' Dimensions Identified

CFA was used to analyze the suitability of the model based upon the collected sample. In order to evaluate the model, emphasis was given to CFI, GFI, NFI, TLI and RMSEA.

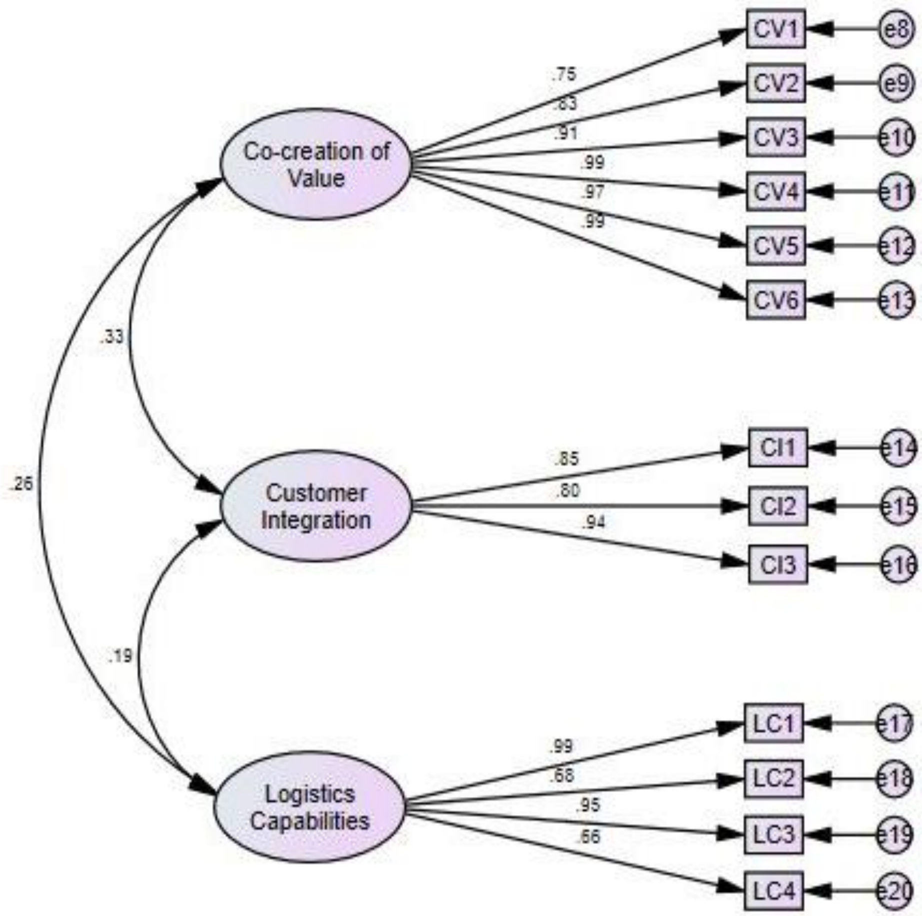

Fig 4.10: Measurement model -Value creation

Table 4.48

Model fit indices (Value Creation)

Variable	CFI	GFI	TLI	NFI	RMSEA
Measurement model	0.996	0.979	0.984	0.991	0.057
Standard	>0.9	>0.9	>0.9	>0.9	>0.05

Compared with the generally accepted model fit standards, the test outcomes seemed to fit the measurement model (See Table 4.48). Therefore, it confirms the exploratory factory analysis result. Table 4.49 shows the details of factors after factor analysis. Overall reliability of the construct was 0.918.

Table 4.49

Variables after Confirmatory Factor Analysis (Value Creation)

Factors	Items	No. of items	Cronbach's alpha	Overall Cronbach's alpha
Co-creation of value	CV1, CV2, CV3, CV4, CV5, CV6	6	0.918	0.825
Customer integration	CI1, CI2, CI3	3	0.835	
Logistics capabilities	LC1, LC2, LC3, LC4	4	0.921	

III. Validation of the Measurement Scale (Value Creation)

a. Convergent validity: All the item loadings towards the latent variables were above 0. 5 and were significant at $p < 0.05$ and thus established convergent validity (Table 4.50).

Table 4.50

Standardized Factor Loadings (SFL) of Construct Items (Value Creation)

	Value creation	SFL	p value
Co-creation of value	LSP has active meeting with us to discuss on distribution management	.750	<0.05
	LSP has on going meetings with us to fine tune the order handling process	.826	<0.05
	LSP discusses with us on appropriate stock levels.	.914	<0.05
	LSP actively modifies transportation options offered.	.990	<0.05

	Value creation	SFL	p value
	LSP actively enhances the order handling processes	.969	<0.05
	LSP actively meet us to understand our needs and requirements	.990	<0.05
Customer integration	There is sharing of ideas, information and other resources between us and the LSP	.850	<0.05
	There is a joint planning to anticipate and resolve operative problems between us and LSP	.799	<0.05
	There is already established team work between us the LSP	.938	<0.05
Logistics capabilities	LSP develops customer specific programs to cater difference in customer demands	.986	<0.05
	LSP maintanis and mpodifies its operations based on the channging customers expectations	.683	<0.05
	LSP is good at handling unique or unplanned customer requirements	.950	<0.05
	LSP has the flexibility for adaption to unexpected operational circumstances.	.657	<0.05

b. Composite reliability (Value creation): The Table 4.51 presents the composite reliability and the Average Variance Extracted (AVE) of the construct 'value creation'. As inferred from the values shown in the table, composite reliability of all the factors in the construct "value Creation" have a value higher than 0.80, evidencing adequate internal consistency.

Table 4.51

Composite Reliability and AVE of Constructs (Value Creation)

Construct	Composite Reliability	AVE
Co-creation of value	0.98	0.99
Customer integration	0.98	0.98
Logistics capabilities	0.98	0.98

c. Discriminant Validity (Value creation): Discriminant validity was confirmed by examining correlations among the constructs. As a rule of thumb, a 0.85 correlation or higher indicates poor discriminant validity in structural equation modelling (David 1998). None of the correlations among variables were above 0.85 (See Table 4.52). The results suggested adequate discriminant validity of the measurement. Further, all Average variance extracted (AVE) estimates in the Table 4.51 were larger than the squared inter construct correlation estimates (SIC) provided in Table 4.52. Therefore, suggesting discriminant validity.

Table 4.52

Correlations among Constructs (Value Creation)

Correlations	Estimate	SIC
Co-creation of value <-> Customer Integration	0.33	0.11
Co-creation of value <-> Logistics Capabilities	0.26	0.07
Customer Integration <-> Logistics Capabilities	0.19	0.04

IV. Normality (Value Creation)

Table 4.53

Tests of Normality (Value Creation)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
CV1	.283	168	.000	.730	168	.000
CV2	.294	168	.000	.714	168	.000
CV3	.306	168	.000	.712	168	.000
CV4	.350	168	.000	.687	168	.000
CV5	.339	168	.000	.699	168	.000
CV6	.339	168	.000	.699	168	.000
CI1	.344	168	.000	.707	168	.000

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CI2	.297	168	.000	.740	168	.000
CI3	.318	168	.000	.717	168	.000
LC1	.304	168	.000	.730	168	.000
LC2	.343	168	.000	.714	168	.000
LC3	.304	168	.000	.734	168	.000
LC4	.321	168	.000	.729	168	.000
a. Lilliefors Significance Correction						

The result of One-Sample K.S test shows p values are less than 0.05, hence it is concluded that the data measuring 'value creation' are non- normal in character (See Table 4.53). Therefore, it is better to use Kurtosis and Skewness for assuming normality.

Table 4.54

Skewness and Kurtosis (Value Creation)

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CV1	168	.64079	-.901	.187	1.609	.373
CV2	168	.62445	-.909	.187	1.910	.373
CV3	168	.59866	-.740	.187	1.393	.373
CV4	168	.52957	-.028	.187	-1.215	.373
CV5	168	.54075	-.122	.187	-1.066	.373
CV6	168	.54075	-.122	.187	-1.066	.373
CI1	168	.54636	-.096	.187	-.932	.373
CI2	168	.59976	-.421	.187	-.660	.373

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CI3	168	.56247	-.279	.187	-.849	.373
LC1	168	.58153	-.361	.187	-.724	.373
LC2	168	.58921	-.665	.187	-.511	.373
LC3	168	.59267	-.434	.187	-.672	.373
LC4	168	.61672	-.801	.187	.453	.373

All the variables in the construct 'value creation' fall under Kurtosis value of 1.96 and skewness value of 2.58, suggesting Kurtosis and Skewness was not problematic in this study (See Table 4.54) (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, the data were appropriate for parametric tests.

6. Competitive advantage

The construct ‘competitive advantage’ included twenty one statements.

I. Exploratory Factor Analysis (Competitive Advantage)

21 items on ‘competitive advantage’ were entered into SPSS 21.0 factoring together. In the process of exploratory factor analysis, six items were identified as outlying variables because they seemed to be unrelated to other items, and were deleted from further factor analysis. The resultant 18 items were re-analyzed following the same procedure, which generates final solution. Four meaningful factors were generated.

Table 4.55

KMO and Bartlett's Test (Competitive Advantage)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.845
Bartlett's Test of Sphericity	Approx. Chi-Square	1772.984
	df	105
	Sig.	.000

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.845 and the Bartlett test of spherisity was significant ($p<0.005$) with a chi square value of 1772.984 with 105 degrees of freedom which was considered to be very good for further analysis and provided support for the factorization (Table 4.55).

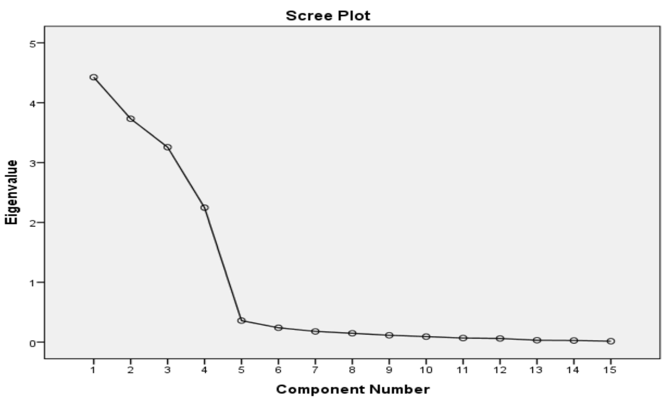

Fig 4.11: Scree plot- Competitive advantage

The Scree test (Figure 4.11) indicated that by laying a straight edge across the bottom portion of the roots, there were three factors before the curve becomes approximately a straight line (Neetha Eppan, 2014).

Naming of the four factors was based on the commonalities shared by the items and in accordance to their intended scales (Refer Table 4.57 for review support). Table 4.56 provides names of four factors along with factor loadings and percentage of variance explained. All the four factors have satisfactory loadings.

Table 4.56

Rotated Component Loadings (RCL) with Percentage of Variance (PV) (Competitive Advantage)

Factors	Statements	Code	RCL	PV
Differentiation/ relevancy	LSP improves the order handling process to make it easier for us and the end customers	D1	.911	**21.117**
	LSPs actively reviews the stock level of to ensure the stock availability	D2	.850	
	LSP actively improves the distribution solutions	D3	.824	
	LSP adopt unique and distinctive ordering process.	D4	.777	
Efficiency	LSP offers low priced distribution	E1	.912	**20.948**
	LSP handles orders efficiently	E2	.826	
	LSP offers adequate options of freight forwarder	E3	.810	
	LSP links production and sales functions efficiently	E4	.787	
Value adding process	LSP enables us to be more competent in the market place	VAP1	.863	**18.737**
	LSP plays a strategic role for the sales companies	VAP2	.780	

Factors	Statements	Code	RCL	PV
	LSP assists us to generate end-customer value	VAP3	.763	
	LSP adds value to the company	VAP4	.757	
Effectiveness	LSP offers most suitable transportation options	ES1	.869	**17.129**
	LSP maintains adequate stock level	ES2	.862	
	LSP enables us to sell more	ES3	.847	
Total Variance Extracted				**77.932**
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 4 iterations.				

Compared with the intended scales, the factor analysis results met the intended scales very well (See Table 4.58). Four items (See table 4.56) are about "differentiation/relevancy" accounting for over 21.117% of the total variance. Four items are about "efficiency" (accounting for over 20.948% of the total variance), four items are about "value added process" (accounting for over 18.737% of the total variance), and three items are about "effectiveness" (accounting for over 17.129% of the total variance).

Table 4.57

Factor Names and Reviews (Competitive Advantage)

Sl. No	Constructs	Authors
1	Effectiveness	Lumsden (1998), Bowersox. D and Closs. D (1996), Hieber (2002), Christopher (1998), Rusthon. A, Oxley. J and Croucher. P (2000), SCOR Version 5.0 handbook, supply chain council (2001), Lee. H, Padmanabhan, V, and Whang. S (1997),.

Sl. No	Constructs	Authors
2	Efficiency	Anna Berg, Konrad von Otter Choroszynski (2008), Baskontogruppen (2007), Aronsson (2002), Jonsson and Mattsson (2005), Christopher (2005), Lambert and Stock (2001), Anna Froderberg (2006).
3	Differentiation/ relevance.	Janet Godsell, Alan Harrison, Caroline Emberson and John Storey (2006), Pine and Gilmore (1999), Baker (2003), Hill (2000), Vollman and Cordon (1998), Heikkila (2002), Dibb and Wensley (2002), Childerhouse et al (2002), Gattorna (1998).
4	Value adding process.	Angel Martinez Sanchez, Manuela Perez Perez (2005), Barad. M, Sapir. D (2003), Jones. R, Ostroy. J (1984), Kickert. W.J (1985), Vickery. S, Calantone. R, Droge. C (1999), Vorkula. R.J, O'Leary-Kelly. S (2000).

II. Confirmatory Factor Analysis for the 'Competitive Advantage' Dimensions Identified.

The above exploratory factor analysis result was meaningful, the next step was to conduct a confirmatory factor analysis to confirm whether the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure

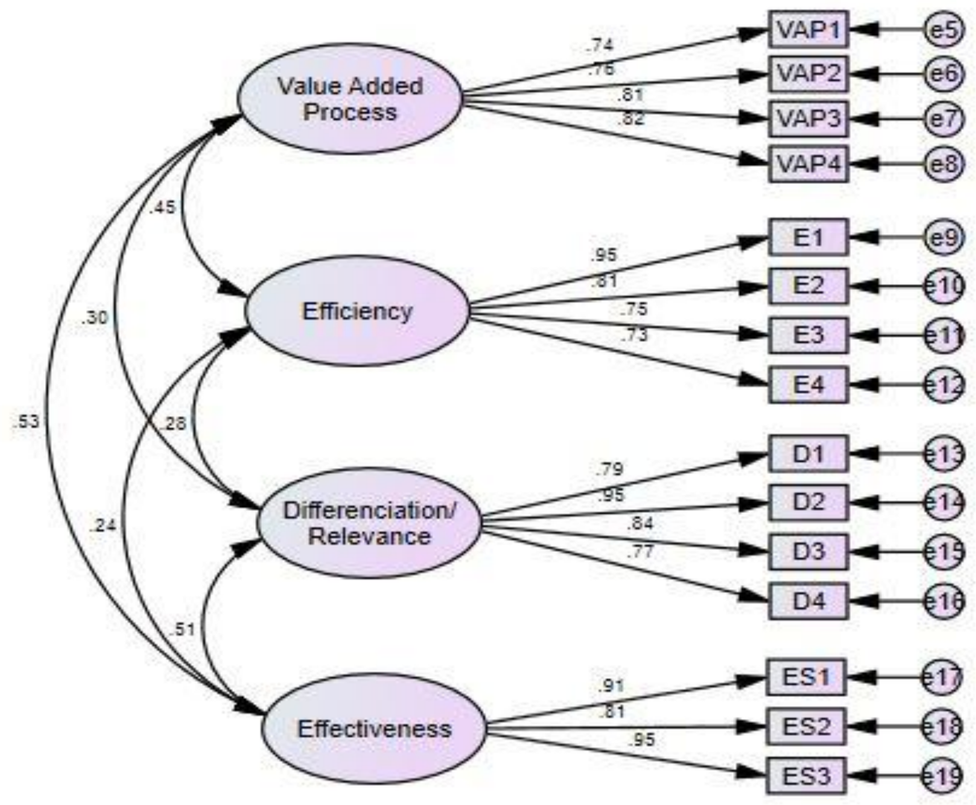

Fig 4.12: Measurement model - Competitive advantage.

Table 4.58

Fit Indices (Competitive Advantage.)

Variable	**CFI**	**GFI**	**TLI**	**NFI**	**RMSEA**
Measurement model	0.996	0.979	0.984	0.991	0.057
Standard	>0.9	>0.9	>0.9	>0.9	>0.05

Compared with the generally accepted model fit standards, the test outcomes seemed to fit the measurement model (See Table 4.58). Hence, it is confirms that the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure. The Table 4.59 shown below explains the details of factors after factor analysis. Overall reliability of the construct was 0.855.

Table 4.59

Variables after Confirmatory Factor Analysis (Competitive Advantage)

Factors	Items	No. of items	Cronbach's alpha	Overall cronbach's alpha
Efficiency	E1, E2, E3, E4	4	0.922	0.855
Differentiation/ relevance	D1, D2, D3, D4	4	0.921	
Value adding process	VAP1, VAP2, VAP3, VAP4	4	0.798	
Effectiveness	S1, ES2, ES3	3	0.891	

III. Validation of the Measurement Scale (Competitive Advantage)

a. Convergent validity (Competitive advantage): As shown in table 4.60, the factor loadings associated with the latent variables are greater than 0.5 and the p values associated with the loadings were all lower than 0.05, hence it was reasonable to assume that the measurement model for the construct 'competitive advantage' has acceptable convergent validity.

Table 4.60

Standardized Factor Loadings (SFA) of construct items

(Competitive Advantage)

	Competitive advantage	SFA	p value
Value adding process	LSP plays a strategic role for the sales companies	.740	<0.05
	LSP adds value to the company	.764	<0.05
	LSP enables us to be more competent in the market place	.809	<0.05
	LSP assists us to generate end-customer value	.820	<0.05

	Competitive advantage	SFA	p value
Efficiency	LSP offers low priced distribution	.954	<0.05
	LSP offers adequate options of freight forwarder	.812	<0.05
	LSP links production and sales functions efficiently	.754	<0.05
	LSP handles orders efficiently	.732	<0.05
Effectiveness	LSP offers most suitable transportation options	.911	<0.05
	LSP maintains adequate stock level	.814	<0.05
	LSP enables us to sell more	.952	<0.05
Differentiation/ relevancy	LSP improves the order handling process to make it easier for us and the end customers	.795	<0.05
	LSPs actively reviews the stock level of to ensure the stock availability	.952	<0.05
	LSP actively improves the distribution solutions	.838	<0.05
	LSP adopt unique and distinctive ordering process.	.767	<0.05

b. Composite reliability (Competitive advantage): As seen from the values depicted in table 4.61, composite reliability of the construct is 0.99 which is greater than the recommended value (Composite Reliability >0.80), hence, evidencing adequate internal consistency.

Table 4.61

Composite Reliability and AVE of Constructs (Competitive Advantage)

Construct	Composite Reliability	AVE
Value added process	0.98	0.97
Efficiency	0.98	0.97
Differentiation/ relevance	0.98	0.98
Effectiveness	0.98	0.98

c. Discriminant Validity (Competitive advantage): None of the correlations among variables were above 0.85 (See Table 4.62). In addition, All Average variance extracted (AVE) estimates in the Table 4.61 were larger than the squared inter construct correlation (SIC) provided in the Table 4.62. Therefore it was confirmed that the indicators have more in common with the construct they were associated with than they do with other constructs.

Table 4.62

Correlations among Constructs (Competitive Advantage)

	Estimate	**SIC**
Value added process <-> Efficiency	0.45	0.20
Value added process <-> Differentiation/ relevance	030	0.09
Value added process <-> Effectiveness	0.53	0.28
Efficiency <-> Differentiation/ relevance	0.28	0.08
Efficiency <-> Effectiveness	0.24	0.58
Differentiation/ relevance <-> Effectiveness	0.51	0.26

IV. Normality (Competitive Advantage)

The significance values of both Kolmogrov-Smirnov and Shapiro- Wilk test explains that none of the variables were normally distributed (See Table 4.63). Hence, go for Skewness and Kurtosis for assuming normality.

Table 4.63

Tests of Normality (Competitive Advantage)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
VAP1	.368	168	.000	.718	168	.000
VAP2	.329	168	.000	.706	168	.000
VAP3	.317	168	.000	.731	168	.000
VAP4	.338	168	.000	.733	168	.000
E1	.321	168	.000	.717	168	.000
E2	.307	168	.000	.752	168	.000
E3	.301	168	.000	.752	168	.000
E4	.299	168	.000	.760	168	.000
ES1	.348	168	.000	.674	168	.000
ES2	.351	168	.000	.697	168	.000
ES3	.341	168	.000	.661	168	.000
D1	.337	168	.000	.689	168	.000
D2	.354	168	.000	.660	168	.000
D3	.318	168	.000	.717	168	.000
D4	.363	168	.000	.658	168	.000
a. Lilliefors Significance Correction						

All the variables in the construct 'competitive advantage' fall under Kurtosis value of 1.96 and skewness value of 2.58, suggesting Kurtosis and Skewness was not problematic in this study (See Table 4.64) (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, the data were appropriate for parametric tests.

Table 4.64

Skewness and Kurtosis (Competitive Advantage)

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
VAP1	168	.54978	.048	.187	-.401	.373
VAP2	168	.55721	-.407	.187	-.876	.373
VAP3	168	.59579	-.517	.187	-.629	.373
VAP4	168	.57202	-.138	.187	-.630	.373
E1	168	.56155	-.258	.187	-.852	.373
E2	168	.60435	-.297	.187	-.636	.373
E3	168	.60764	-.333	.187	-.646	.373
E4	168	.61860	-.315	.187	-.639	.373
ES1	168	.52470	-.300	.187	-1.351	.373
ES2	168	.55788	-.571	.187	-.733	.373
ES3	168	.51274	-.039	.187	-1.683	.373
D1	168	.53279	-.120	.187	-1.223	.373
D2	168	.51107	.057	.187	-1.677	.373
D3	168	.56247	-.279	.187	-.849	.373
D4	168	.50908	.129	.187	-1.658	.373

7. Logistics Excellence

The construct 'logistics excellence' consists of nine statements.

I. Exploratory Factor Analysis (Logistics Excellence)

Principal component analysis was performed on the 9 items. As seen from the table below, the Kaiser-Mayer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO=0.976 (Marvellous according to Field, 2009). Bartlett test for Sphericity Chi-square (df =36) = 2259.698, $p<0.001$, indicated that correlations between items were sufficiently large for principal component analysis and the correlation matrix revealed factorability of the items (Table 4.65).

Table 4.65

KMO and Bartlett's Test (Logistics Excellence)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.976
Bartlett's Test of Sphericity	Approx. Chi-Square	2259.698
	df	36
	Sig.	.000

One factor extracted with Kaiser Criterion of eigenvalue>=1 in combination explained 86.060 percentage of the variance. The Scree test plot (figure 4.13) indicated that by laying a straight edge across the bottom portion of the roots, there was only one factor before the curve becomes approximately straight tine.

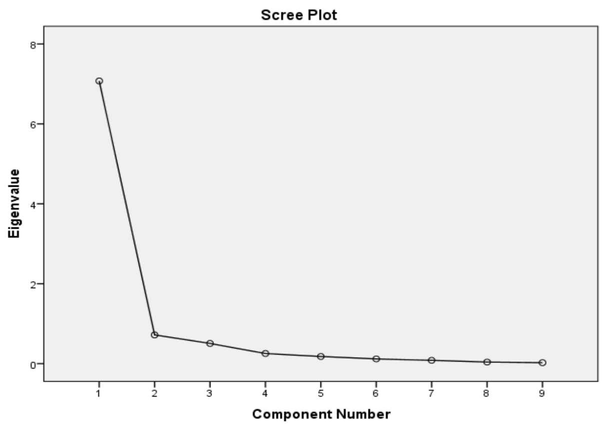

Fig 4.13: Scree plot-Logistics excellence

Table 4.66 shown below presents the factor names along with its items, component loadings and the percentage of variance explained. All the factors scored loadings of above 0.80.

Table 4.66

Rotated Component Loading (RCL) with Percentage of Variance (PV) Explained (Logistics Excellence)

Factor Name	Statements	Code	RCL	PV
Logistics excellence	Delivery	CA1	.980	85.356
	Costs of operation	CA2	.962	
	Productivity	CA3	.959	
	Profitability	CA4	.950	
	Customer service	CA5	.906	
	Competitive price	CA6	.904	
	Time to market	CA7	.900	
	Geographical reach	CA8	.899	
	Delivery	CA9	.845	
Total Variance Extracted				**85.356**

Extraction Method: Principal Component
a. 1 components extracted.

Only one factor was extracted in the final analysis, consisted of nine statements, all showed higher loadings of above 0.80 and explained 83.356 percentage of the variance. The factor name ‘logistics excellence’ remains unchanged (Refer table 4.67 for literature support).

Table 4.67

Factor Names and Reviews (Logistics Excellence)

Sl. No	Constructs	Authors
1	Logistics excellence.	Arthur. D. Little (2007), Prof. Dr. Matthias Klumpp, Dipl. Kfm. Sascha Bioly, Prof. Dr. Stephan Zelewski (2009), Lai (2004), Persson and Virum (2001), Marasco (2008), Selviaridis and Spring (2007), Berglund, Laarhoven, Sharman and Wandel (1999), Marasco (2008).

The above exploratory factor analysis result was meaningful (Table 4.66), because the derivation of factors and item distributions justified the intended scales. Then, the study carried out confirmatory factor analysis to assess whether the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure.

II. Confirmatory Factor Analysis for the 'Logistics Excellence' Dimension Identified

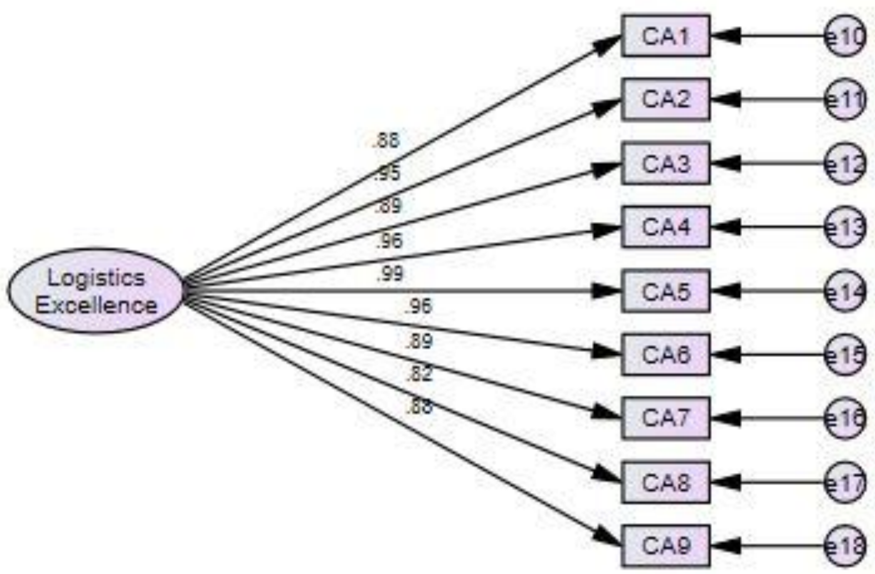

Fig 4.14: Measurement model -Logistics excellence

Table 4.68

Model Fit Indices (Logistics Excellence)

Variable	CFI	GFI	TLI	NFI	RMSEA
Measurement model	0.998	0.977	0.994	0.992	0.049
Standard	>0.9	>0.9	>0.9	>0.9	>0.05

From the table (See Table 4.68), it is clear that the measurement model fit very well with the data. Therefore, confirms exploratory factor analysis result. The coefficients were large in each item, which indicates strong loadings among the items in the factor (See Figure 4.14). The overall reliability of the measurement scale was 0.963.

Table 4.69

Variables after Confirmatory Factor Analysis (Logistics Excellence)

Factors	Items	No. of items	Cronbach's alpha
Logistics excellence	CA1, CA2, CA3, CA4, CA5, CA6, CA7, CA8, CA9	9	0.946

III. Validation of the measurement scale (Logistics Excellence)

Validation of the measurement model 'logistics excellence' consists of convergent validity, composite reliability and discriminant validity. Since there was only one factor for "logistics excellence", it is not appropriate for testing discriminant validity. Then the study adopted convergent validity and composite reliability.

a. Convergent validity (Logistics excellence): The loadings for each latent variable were all high. The P values associated with the loadings were all lower than 0.05. Since there were no indicators for which these criteria were not satisfied, there was no need to remove any of the indicators and the convergent validity of the scale was established (See Table 4.70).

Table 4.70

Standardized Factor Loadings (SFA) of construct items (Logistics Excellence)

	Logistics excellence	SFA	p-value
1	Geographical reach	.883	<0.005
2	Costs of operation	.946	<0.005
3	Productivity	.891	<0.005
4	Competitive price	.959	<0.005
5	Customer service	.987	<0.005

	Logistics excellence	SFA	p-value
6	Profitability	.963	<0.005
7	Quality	.889	<0.005
8	Time to market	.818	<0.005
9	Delivery	.884	<0.005

b. Composite reliability (Logistics excellence): The table 4.71 given below presents the composite reliability and the AVE of the construct. As seen from the table, composite reliability of the construct “logistics excellence” was .99 which is higher than the recommended value of 0.80, hence, evidencing adequate internal consistency.

Table 4.71

Composite Reliability and AVE of Constructs (Logistics Excellence)

Construct	Composite Reliability	AVE
Logistics excellence	0.99	0.99

IV. Normality (Logistics Excellence)

The test of Kolmogrov- Smirnov and Shapiro-Wilk tests revealed that none of the variables were normally distributed (See Table 4.72). Therefore, the study carried out test of kurtosis and skewness to assume whether the data normally distributed or not.

Table 4.72

Tests of Normality (Logistics Excellence)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CA1	.380	168	.000	.690	168	.000
CA2	.427	168	.000	.616	168	.000
CA3	.397	168	.000	.672	168	.000
CA4	.435	168	.000	.605	168	.000
CA5	.430	168	.000	.612	168	.000
CA6	.413	168	.000	.650	168	.000
CA7	.402	168	.000	.667	168	.000
CA8	.373	168	.000	.689	168	.000
CA9	.413	168	.000	.650	168	.000
a. Lilliefors Significance Correction						

All the variables in the construct 'logistics excellence' fall under Kurtosis value of 1.96 and skewness value of 2.58, suggesting Kurtosis and Skewness was not problematic in this study (See Table 4.73) (Hair, Black, Babin, Anderson, & Tatham, 2006). Therefore, the data were appropriate for parametric tests.

Table 4.73

Skewness and Kurtosis (Logistics Excellence)

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CA1	168	.54138	-.136	.187	.911	.373
CA2	168	.47642	.662	.187	-1.123	.373
CA3	168	.51048	.304	.187	-.732	.373
CA4	168	.46884	.748	.187	-.971	.373

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CA5	168	.47398	.690	.187	-1.075	.373
CA6	168	.49372	.464	.187	-.729	.373
CA7	168	.50571	.350	.187	-.655	.373
CA8	168	.56056	-.404	.187	1.899	.373
CA9	168	.49372	.464	.187	-.729	.373

Summary

The chapter discussed research methodology and measurement scale used the study. The rationale for each decision regarding data collection strategy, sample size determination, questionnaire design, scale validation and normality was explained. The study used qualitative approach during initial stage to finalize the conceptual framework and study constructs. Then the researcher moved to questionnaire design, data collection method, sample size determination and scale validation.

After factor analysis and scale validation, seventeen factors were extracted from seven constructs. Table 4.74 presents the details of measurement scale after conducting factor analysis and Scale validation.

Table 4.74

Measurement scale after Factor Analysis and Scale Validation

Dimensions	Factors (No of items)	Normality	Reliability	Convergent Validity	Discriminant Validity
Customer Service	Responsiveness (5)	Satisfied	0.945	Satisfied	Satisfied
	Reliability (5)	Satisfied	0.912	Satisfied	Satisfied
	Assurance (4)	Satisfied	0.861	Satisfied	Satisfied
	Empathy (4)	Satisfied	0.833	Satisfied	Satisfied
Customer Satisfaction	Inbound (8)	Satisfied	0.901	Satisfied	Satisfied
	Operations (4)	Satisfied	0.950	Satisfied	Satisfied
	Outbound (6)	Satisfied	0.926	Satisfied	Satisfied
Customer Success	Customer success (11)	Satisfied	0.975	Satisfied	Not Tested
Customer Accommo-dation	Customer accommodation (7)	Satisfied	0.961	Satisfied	Not Tested
Value Creation	Co-creation of value (6)	Satisfied	0.918	Satisfied	Satisfied
	Logistics capabilities (4)	Satisfied	0.835	Satisfied	Satisfied
	Customer integration (3)	Satisfied	0.921	Satisfied	Satisfied
	Efficiency (4)	Satisfied	0.922	Satisfied	Satisfied
	Effectiveness (3)	Satisfied	0.891	Satisfied	Satisfied
Competitive Advantage	Value adding process (4)	Satisfied	0.798	Satisfied	Satisfied
	Differentiation/ relevance (4)	Satisfied	0.921	Satisfied	Satisfied
	Efficiency (4)	Satisfied	0.922	Satisfied	Satisfied
	Effectiveness(3)	Satisfied	0.891	Satisfied	Satisfied
Logistics Excellence	Logistics excellence (9)	Satisfied	0.946	Satisfied	Not Tested

The next chapter presents the report of analysis done with the data collected.

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Chapter 5

Data Analysis and Interpretation

DATA ANALYSIS AND INTERPRETATIONS

5.1. Introduction

In the previous chapter the theoretical frame work of the concepts used for the study has been presented. In this chapter the results of the data analysis are presented. The data were collected and then processed in response to the problems posed in chapter one of this thesis. To evaluate the objectives of the study, the researcher classified the data analysis of the study into five sections.

Section one dealt with profile of the respondents. For this, frequency, mean and standard deviations were used. The second section discusses objective one of the study. It includes two parts; one is to analyze the reasons for logistics outsourcing. Based on the opinion from the experts, six reasons were identified. These are.., Complex customer clearance, order cycle length reduction, fixed asset reduction, customer service improvement, time saving, and logistics cost reduction. The second part dealt with the factors considered by the companies while deciding a logistics service provider. Eleven factors were identified. They are, service quality, service price, continuous improvement, experience-expertise-innovation, business scope and market, supporting business expansion, professional and staff, culture and strategy, suitable IT system, business type, and multiple services. Analytical Hierarchy Process (AHP) was used in this section.

The third section is associated with second objective of the study. This section explores how customers are accommodated. For this, descriptive statistics and Analysis of variance (ANOVA) were used. Section four dealt with the third objective of the study. Here the researcher explores how a company creates value through logistics. For this, structural equation modelling was used. Section five of the study dealt with fourth and main objective of the study. Here, the researcher explores the role of logistics service provider in achieving competitive advantage and logistics excellence. For this, structural equation modelling was used.

5.2. Section I- Profile of the Respondents

1. **Profile of the Respondents.**

On the basis of Industry, respondents were classified into three groups namely 'food processing industry', 'apparels and textiles industry' and 'rubber and agro products industry'. The details of the companies are as given below in table 5.1, 5.2 and 5.3.

Table 5.1

Demographic Profile of the Respondents'

Industry	Frequency	Percent	Valid percent	Cumulative percent
Food processing	70	41.7	41.7	41.7
Apparels and textiles	58	34.5	34.5	76.2
Rubber and agro products	40	23.8	23.8	100.0
Total	**168**	**100.0**	**100.0**	

(Source: Primary Data)

Of the 168 respondents, 41.7% of the sample was from food processing industry (70), 34.5% was from apparels and textiles industry (58), and the remaining 23.8%, from rubber and agro products industry (40).

Table 5.2

District wise details

		Frequency	Percent	Valid Percent
Districts	**Thiruvananthapuram**	20	11.9	11.9
	Kollam	9	5.4	5.4
	Pathanamthitta	5	3.0	3.0
	Alappuzha	0	0.0	0.0
	Idukki	5	3.0	3.0
	Kottayam	17	10.1	10.1
	Ernakulam	29	17.3	17.3
	Thrissur	12	7.1	7.1
	Palakkad	14	8.3	8.3
	Malappuram	14	8.3	8.3
	Kozhikode	24	14.3	14.3
	Kannur	12	7.1	7.1
	Wayanad	4	2.4	2.4
	Kasaragod	3	1.8	1.8
	Total	**168**	**100.0**	**100.0**

(Source: Primary Data)

Out of the 14 districts in Kerala, fourteen districts were selected for the study. As seen from the table above, majority of the respondents were from Ernakulum district accounting for 17.3 percentage of the total sample. Kozhikode comes second; Thiruvananthapuram comes third. Kasaragod and Wayanad were placed in the last two positions (Table 5.2). To make the analysis easier, the researcher grouped the districts into three geographical zones, i.e.., North zone, central zone and south zone.

Table 5.3

Districts and Industry wise comparison

		Industry		
		Food processing	Apparels and Textiles	Rubber and Agro products
		Count	Count	Count
District	South Zone			
	Thiruvananthapuram	11	9	0
	Kollam	8	1	0
	Pathanamthitta	5	0	0
	Alappuzha	0	0	0
	Kottayam	6	0	11
	Total	**30**	**10**	**11**
	Central Zone			
	Idukki	2	0	3
	Ernakulam	19	0	10
	Thrissur	1	4	7
	Palakkad	11	2	1
	Total	**33**	**6**	**21**
	North Zone			
	Malappuram	1	12	1
	Kozhikode	6	15	3
	Kannur	0	9	3
	Wayanad	0	3	1
	Kasaragod	0	3	0
	Total	**7**	**42**	**8**
Whole total		**70**	**58**	**40**

(Source: Primary Data)

In food processing sector, Ernakulam, Thiruvananthapuram and Palakkad have the maximum number of sample respondents, (19, 11, and 11 respectively). In the case of Apparels and Textiles, Kozhikode and Malappuram had 15 and 12 sample respondents. Kottayam and Ernakulam had more number of rubber and agro products companies (Table 5.3).

5.3. Section II- Objective 1

"To assess the reasons for logistics outsourcing and to assess the factors considered while selecting a logistics service provider".

Section II of the chapter dealt with objective one of the study. In order to analyse the reasons for logistics outsourcing and the criteria for selecting a logistics service provider, the Fuzzy Analytical Hierarchical Processing (FAHP) method was used.

i. Analytical Hierarchy Process (AHP)

AHP is a multi criteria decision making method that was originally developed by Prof. Thomas L. Saaty. It is based on inherent human ability to make sound judgement about the problem. AHP starts with the construction of hierarchies. Then it moves on prioritization to find out relative importance. Prioritization involves eliciting judgements in response to questions about the dominance of one element over another with respect to a property. The scales used for the same is given below;

Table 5.4

Analytical Hierarchy Process (AHP) Scales

Scales	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective.
3	Moderate importance	Experience and judgment slightly favour one activity over another.
5	Strong importance	Experience and judgment strongly favour one activity over another.
7	Very strong importance	An activity is favoured very strongly over another; its dominance demonstrated in practice.
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation.
2,4,6,8	For compromising between the above values.	Sometimes one needs to interpolate a compromise judgment numerically because there is no good word to describe it.

ii. Fuzzy Analytical Hierarchy Process (FAHP)

AHP is incapable of managing uncertainty associated with the mapping of one's perception to a number. Hence, Fuzzy Analytical Hierarchy Process (FAHP) is developed. It is the application of Fuzzy logic in AHP. It is an efficient tool to handle the fuzziness of the data involved in decision making. It uses triangular fuzzy numbers for making judgment. The present study is based on FAHP to find out the priorities.

iii. Algorithm of FAHP method

According to the method of Chang's extent analysis, each object is taken and extent analysis for each goal performed respectively. Therefore, m extent analysis values for each object can be obtained, with the following signs:

$$M^1{}_{gi}, M^2{}_{gi}, \ldots\ldots M^m{}_{gi}, \qquad i = 1, 2, \ldots, n\,,$$

Where M^j_{gi}(j=1, 2...3) all are Triangular Fuzzy Numbers (TFN's). The steps of Chang's extent analysis can be given as in the following;

Step 1: the value of fuzzy synthetic extent with respect to the i^{th} object is defined as;

$$S_i = \sum_{j=1}^{m} M_{gi}^{j} \otimes \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j} \right]^{-1}$$

To get $\sum_{j=1}^{m} M_{gi}^{j}$, perform the fuzzy addition operation of m extent analysis values for a particular matrix such that:

$$\sum_{j=1}^{m} M_{g}^{j} = \left(\sum_{j=1}^{m} l_j, \sum_{j=1}^{m} m_j, \sum_{j=1}^{m} u_j \right)$$

And to obtain $\left[\sum_{j=1}^{n}\sum_{j=1}^{m} M_{gi}^{j}\right]^{-1}$, perform the fuzzy addition operation of M^{j}_{gi} (J=1,2,...m) values such that:

$$\sum_{i=1}^{n}\sum_{j=1}^{m} M_{gi}^{j} = \left(\sum_{i=1}^{n} l_i, \sum_{i=1}^{n} m_i, \sum_{i=1}^{n} u_i\right)$$

And then compute the inverse of the vector above, such that:

$$\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{gi}^{j}\right]^{-1} = \left(\frac{1}{\sum_{i=1}^{n} u_i}, \frac{1}{\sum_{i=1}^{n} m_i}, \frac{1}{\sum_{i=1}^{n} l_i}\right)$$

Step 2: As $M_1=(l_1,m_1,u_1)$ and $M_2=(l_2,m_2,u_2)$are two triangular fuzzy numbers, the degree of possibility of $M_2=(l_2,m_2,u_2)\geq M_1=(l_1,m_1,u_1)$ defined as;

$$V\left(\tilde{M}_2 \geq \tilde{M}_1\right) = \sup_{y \geq x}\left[\min\left(\mu_{\tilde{M}_1}(x), \mu_{\tilde{M}_2}(y)\right)\right]$$

And can be equivalently expressed as follows;

$$V\left(\tilde{M}_2 \geq \tilde{M}_1\right) = hgt(\tilde{M}_1 \cap \tilde{M}_2) = \mu_{M_2}(d)$$

$$= \begin{cases} 1, & if \quad m_2 \geq m_1 \\ 0, & if \quad l_1 \geq u_2 \\ \dfrac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)}, & otherwise \end{cases}$$

Step 3: the degree possibility for a convex fuzzy number to be greater than k convex fuzzy $M_i(j=1,2,k)$ numbers can be defined by

$$V(M \geq M_1, M_2, \ldots M_k) = V[(M \geq M_1) \text{ and } (M \geq M_2) \text{ and} \ldots \text{and } (M \geq M_k)]$$
$$= \min V(M \geq M_i), \quad i = 1,2,3,\ldots,k$$

Assume that d (A_i) = minV ($S_i \geq S_k$)

For k=1, 2... n; k≠i. Then the weight vector is given by

$$W' = (d'(A_1), d'(A_2), \ldots\ldots, d'(A_n))^T$$

where $A_i = (i = 1,2,\ldots n)$ are n elements.

Step 4: Via normalization, the normalized weight vectors are

$$W = (d(A_1), d(A_2), \ldots\ldots, d(A_n))^T$$

Where W is a non-fuzzy number (Cakir, 2009).

5.3.1. Reasons for outsourcing.

The researcher has identified six main reasons of logistics outsourcing. Analytical Hierarchy Processing (AHP) technique has been used to assess the priority weights of each attributes/reasons selected for the study. As given in Table 5.5 below, the 6 X 6 reciprocal matrix was built using the averaged response of the respondents. The diagonal elements of the matrix are all equal to 1, since it is assumed that when a question is compared to itself, the relative importance is always equal. The values on the upper part of the diagonal within the matrix are the averaged values from the survey participants. The values on the lower part of the diagonal within the matrix are the reciprocal values of the upper part of the diagonal. Right end column in the matrix, priority weights of the variables are shown.

Table 5.5

Pair wise comparison and priority weights (Reasons for outsourcing)

	Customer clearance is too complicated	Customer service improvement	Order cycle length reduction	Fixed asset reduction	Time saving	Logistics cost reduction	Priority Weight (%)
Customer clearance is too complicated	1.000	0.255	0.244	0.222	0.225	0.249	**3.95**
Customer service improvement	3.923	1.000	0.251	0.238	0.224	0.225	**6.13**
Order cycle length reduction	4.095	3.988	1.000	0.218	0.239	0.228	**7.673**
Fixed asset reduction	4.500	4.202	4.595	1.000	0.219	0.211	**13.11**
Time saving	4.452	80.250	4.179	4.577	1.000	0.216	**33.51**
Logistics cost reduction	4.006	4.452	4.387	4.738	4.637	1.000	**35.64**

The priority weights of each variable are estimated and are given in Table 5.5. It can be said that higher the priority weight, stronger the contribution. Hence, 'Logistics cost reduction, and 'time saving' can be regarded as the strongest reason for logistics outsourcing. While 'Customer clearance is too complicated' is found to be the weakest reason for logistics outsourcing.

i. Consistency

In order to check the consistency of variables, consistency ratio (CR) for 6x6 matrix is calculated by using the equation as follows.

$$CR = \frac{CI}{RI}$$

$$CI = \frac{\lambda \max - n}{n - 1}$$

$$\mathbf{CR} = \frac{\mathbf{0.1025}}{\mathbf{1.25}} = \mathbf{8.2}\% < 10\%$$

As **CR**calculated < **CR**recommended, it can be said that the attributes follow a good level of consistency.

5.3.1.1. Reasons for outsourcing- Industry Wise

In order to get industry wise priority weights, separate Analytical Hierarchy Processing (AHP) tests were carried out for each industry.

1. **Food Processing Industry.**

The Table 5.6 shows the values of pair wise comparison and the priority weights of attributes. From the table, it can be observed that over 70 per cent of the priority weights belong to two variables, i.e... 'Logistics cost reduction (35%)' and 'time saving (34%)'.

Table 5.6

Pair wise comparison and Priority Weights (Reasons for outsourcing- Food Processing Industry)

	Customer clearance is too complicated	Order cycle length reduction	Fixed asset reduction	Customer service improvement	Time saving	Logistics cost reduction	Priority (in %)
Customer clearance is too complicated	1	0.248	0.232	0.259	0.258	0.242	4.18
Order cycle length reduction	3.314	1	0.233	0.227	0.225	0.176	5.60
Fixed asset reduction	3.764	4.381	1	0.117	0.225	0.189	7.267
Customer service improvement	3.791	4.612	5.114	1	0.228	0.224	13.05
Time saving	3.312	88.481	4.567	5.386	1	0.250	34.16
Logistics cost reduction	4.388	5.187	5.187	4.861	3.792	1	35.74

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1232}}{\mathbf{1.25}} = \mathbf{9.8}\% < 10\%$$

Since the Calculated Consistency Ration (CR) is less than the recommended CR, it can be inferred that the attributes follow a good level of consistency.

2. Textiles and Apparels

Based on the priority weights given in the Table 5.7, the variable 'logistics cost reduction' had the highest priority weight followed by 'Time Saving' and 'customer service improvement' inferred that the respondents outsource logistics services mainly because of these three reasons. 'Customer clearance is too complicated' is found to be the least contributing reason for logistics outsourcing.

Table 5.7

Pair wise comparison and Priority Weights (Reasons for outsourcing- Textiles and Apparels)

	Customer clearance is too complicated	**Order cycle length reduction**	**Fixed asset reduction**	**Customer service improvement**	**Time saving**	**Logistics cost reduction**	**Priority (in %)**
Customer clearance is too complicated	1.000	0.259	0.259	0.259	0.259	0.242	**4.135**
Order cycle length reduction	3.862	1.000	0.239	0.229	0.202	0.199	**6.004**
Fixed asset reduction	3.862	4.189	1.000	0.177	0.223	0.195	**7.234**
Customer service improvement	3.862	4.362	5.638	1.000	0.182	0.224	**13.164**
Time saving	3.862	89.069	4.482	5.500	1.000	0.259	**34.704**
Logistics cost reduction	4.1379	5.034	5.120	4.465	3.862	1.000	**34.760**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1088}}{\mathbf{1.25}} = \mathbf{8.7}\% < 10\%$$

The consistency ratio is found to be good for the variables.

3. **Rubber and Agro products.**

From the values given in table 5.8, ‘customer clearance is too complicated’ was identified as the least contributing reason for logistics outsourcing. As expected, ‘logistics cost reduction, and ‘time saving’ are the strongest reasons for logistics outsourcing.

Table 5.8

Pair wise comparison and Priority Weights
(Reasons for outsourcing- Rubber and Agro products)

	Customer clearance is too complicated	**Customer service improvement**	**Order cycle length reduction**	**Fixed asset reduction**	**Logistics cost reduction**	**Time saving**	**Priority (in %)**
Customer clearance is too complicated	1.00	.30	.21	.20	.20	.29	**4.09**
Customer service improvement	3.33	1.00	.32	.27	.30	.30	**6.60**
Order cycle length reduction	4.80	3.15	1.00	.30	.30	.30	**9.24**
Fixed asset reduction	5.08	3.75	3.33	1.00	.30	.30	**14.34**
Logistics cost reduction	3.35	3.33	3.33	3.33	1.00	3.33	**31.52**
Time saving	5.08	59.85	3.33	3.33	.30	1.00	**34.19**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1002}}{\mathbf{1.25}} = \mathbf{8.01}\% < 10\%$$

Consistency ratio (CR) explains good level of consistency for the variables.

5.3.1.2. Reasons for outsourcing- Zone wise.

Since the study included three geographical zones, separate AHP has been carried out for each geographical zone.

1. **North Zone.**

In north zone, over 69 per cent of the priority weights are possessed by two variables, i.e.., 'logistics cost reduction and 'time saving' (See Table 5.9). 'Customer service improvement' contributes 9 percentage weights. The remaining three variables altogether score about twenty two percentages.

Table 5.9

Pair wise comparison and Priority Weights (Reasons for outsourcing-North Zone)

	Customer clearance is too complicated	Order cycle length reduction	Fixed asset reduction	Customer service improvement	Time saving	Logistics cost reduction	Priority (in %)
Customer clearance is too complicated	1.00	.27	.25	.2252	.23	.23	**3.89**
Order cycle length reduction	3.67	1.00	.23	.23	.22	.22	**5.87**
Fixed asset reduction	3.94	4.27	1.00	.19	.23	.22	**7.49**
Customer service improvement	4.44	4.43	5.02	1.00	.21	.21	**13.29**
Time saving	4.29	82.71	4.32	4.71	1.00	.21	**33.35**
Logistics cost reduction	4.27	4.59	4.52	4.88	4.74	1.00	**36.11**

i. **Consistency**

$$\mathbf{CR} = \frac{\mathbf{0.0972}}{\mathbf{1.25}} = \mathbf{7.96}\% < 10\%$$

Since the Consistency ratio (CR) is 7.96%, less than 10 per cent indicating good consistency level for the variables.

2. Central Zone

In central zone, again, the variables ‘logistics cost reduction’ and ‘time saving’ scored the highest priority weights. ‘Customer clearance is too complicated’ had the least priority weight (See Table 5.10).

Table 5.10

Pair wise comparison and Priority Weights (Reasons for outsourcing- Central Zone

	Customer clearance is too complicated	Order cycle length reduction	Fixed asset reduction	Customer service improvement	Logistics cost reduction	Time Saving	Priority
Customer clearance is too complicated	1.00	0.30	0.30	0.30	0.30	0.25	**4.62**
Order cycle length reduction	3.29	1.00	0.25	0.23	0.27	0.22	**6.38**
Fixed asset reduction	3.29	4.07	1.00	0.18	0.30	0.22	**7.84**
Customer service improvement	3.29	4.29	5.50	1.00	0.20	0.26	**14.17**
Logistics cost reduction	3.93	4.47	4.55	3.89	3.29	1.00	**33.39**
Time saving	3.29	66.10	3.31	4.93	1.00	0.30	**33.59**

i. **Consistency**

$$\mathbf{CR} = \frac{\mathbf{0.1218}}{\mathbf{1.25}} = \mathbf{9.74}\% < 10\%$$

Since the calculated Consistency Ratio (CR) is less than the recommended Consistency Ratio, it is inferred that the variables show good amount of consistency.

3. **South Zone**

The Table 5.11 shows the priority details of companies in south zone. It is found that cost reduction and time saving are the prime reason for the companies to outsource logistics services.

Table 5.11

Pair wise comparison and Priority Weights
(Reasons for outsourcing- South Zone)

	Customer clearance is too complicated	Order cycle length reduction	Fixed asset reduction	Customer service improvement	Logistics cost reduction	Time Saving	Priority
Customer clearance is too Complicated	1.00	0.32	0.16	0.27	0.20	0.32	4.31
Order cycle length reduction	3.15	1.000	0.34	0.28	0.31	0.32	6.76
Fixed asset reduction	6.10	2.98	1.00	0.32	0.32	0.32	10.56
Customer service improvement	3.70	3.58	3.15	1.00	0.32	0.32	13.56
Logistics cost reduction	3.18	3.15	3.15	3.15	1.00	3.15	30.74
Time saving	4.90	56.70	3.15	3.15	.32	1.00	34.07

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.0889}}{\mathbf{1.25}} = \mathbf{7.11}\% < 10\%$$

The Consistency Ratio (CR) explains good level of consistency towards the variables.

5.3.2. Factors considered while selecting a logistics service provider

The researcher identified 11 factors. Those are listed below.

- SQ- Service Quality
- SP- Service Price
- CI- Continuous Improvement
- EEI- Experience, Expertise, innovation.
- BM- Business scope and Market
- BE- Supporting Business Expansion
- PS- Professional and Staff
- CS- Culture and Strategy
- IT- Suitable IT system
- BT- Business Type
- MS- Multiple Service

The AHP has been done in three main stages. Initially, the researcher has carried out prioritization of variables without considering industry wise and zonal wise differences. Thereafter, Industry wise and zonal wise analysis has been done.

The Table 5.12 depicts pair wise comparison and the priority weights. Higher priority weight indicates stronger importance and lower priority weight indicates weaker priority. It inferred from the table that four variables have priority weight of more than 10 percentages. Among these four variables, 'Service Quality (SQ)' has the highest mean score followed by ‘Service Price (SP)’, ‘Continuous Improvement (CI)’ and ‘Experience, Expertise, Innovation (EEI)’.

Table 5.12

Pair wise comparison and Priority Weights (Factors considered while selecting a logistics service provider)

	BT	**MS**	**IT**	**CS**	**BM**	**PS**	**BE**	**EEI**	**CI**	**SP**	**SQ**	**Priority (in %)**
BT	1.00	0.27	0.25	0.24	0.24	0.26	0.26	0.25	0.22	0.23	0.27	**2.07**
MS	3.73	1.00	0.25	0.24	0.24	0.26	0.26	0.25	0.22	0.23	0.22	**2.72**
IT	4.08	4.08	1.00	0.23	0.26	0.23	0.27	0.25	0.25	0.25	0.27	**3.88**
CS	4.14	4.14	4.31	1.00	0.27	0.25	0.25	0.25	0.27	0.27	0.26	**5.06**
BM	4.14	4.14	3.78	3.64	1.00	0.24	0.27	0.25	0.25	0.27	0.25	**6.00**
PS	3.83	3.83	4.29	3.99	4.23	1.00	0.25	0.25	0.27	0.27	0.26	**7.58**
BE	3.80	3.80	3.73	4.05	3.64	4.05	1.00	0.24	0.27	0.25	0.25	**8.82**
EEI	4.00	4.00	4.08	4.05	3.99	4.05	4.23	1.00	0.25	0.27	0.27	**11.27**
CI	4.45	4.45	4.05	3.74	4.05	3.74	3.64	4.05	1.00	0.26	0.24	**13.43**
SP	4.36	4.36	4.05	3.71	3.64	3.71	3.99	3.74	3.91	1.00	0.24	**16.48**
SQ	3.73	4.53	3.74	3.91	3.99	3.91	4.05	3.71	4.23	4.18	1.00	**22.68**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1361}}{\mathbf{1.51}} = \mathbf{9.01}\% < 10\%$$

Consistency Ratio of 9.01% explains good amount of consistency towards the variables.

5.3.2.1. Factors considered while selecting a logistics service provider- Industry Wise

In order to get industry wise priority weights, separate Analytical Hierarchy Processing (AHP) tests have been carried out.

1. **Food Processing**

Table 5.13

Pair wise comparison and Priority Weights (Factors considered while selecting a logistics service provider- Food Processing)

	BT	MS	IT	PS	BM	CS	BE	EEI	CI	SP	SQ	Priority In %
BT	1.00	0.19	0.19	0.19	0.18	0.19	0.19	0.18	0.17	0.18	0.19	**1.47**
MS	5.26	1.00	0.19	0.19	0.18	0.19	0.19	0.18	0.17	0.18	0.18	**2.27**
IT	5.26	5.26	1.00	0.17	0.17	0.16	0.19	0.19	0.19	0.18	0.19	**3.25**
PS	5.26	5.26	6.02	1.00	0.19	0.19	0.19	0.18	0.19	0.19	0.18	**4.43**
BM	5.44	5.44	5.98	5.26	1.00	0.17	0.19	0.19	0.19	0.19	0.19	**5.72**
CS	5.28	5.28	6.16	5.26	5.89	1.00	0.19	0.18	0.19	0.19	0.18	**7.25**
BE	5.14	5.14	5.26	5.26	5.26	5.26	1.00	0.17	0.19	0.19	0.19	**8.54**
EEI	5.56	5.56	5.26	5.44	5.26	5.44	5.89	1.00	0.18	0.19	0.19	**11.08**
CI	5.89	5.89	5.26	5.28	5.26	5.28	5.26	5.44	1.00	0.18	0.17	**13.53**
SP	5.68	5.68	5.44	5.14	5.26	5.14	5.26	5.28	5.56	1.00	0.18	**17.22**
SQ	5.26	5.67	5.28	5.56	5.26	5.56	5.26	5.14	5.89	5.68	1.00	**25.24**

It can be said that higher the priority weight, stronger the importance contributing to the decisions regarding whether to outsource logistics services or not. As seen from the table above (Table 5.13), it is inferred that over 66 percentages of the priority weights are possessed by four variables, i.e.., Service Quality (SQ), Service Price (SP), Continuous Improvement (CI), and Experience-Expertise-Innovation (EEI). The remaining seven variables together contribute around 34 percentage of the total contribution.

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1267}}{\mathbf{1.51}} = \mathbf{8.39}\% < 10\%$$

Since the calculated Consistency Ratio (CR) is less than Recommended Consistency Ratio, it suggests good amount of consistency towards the variables.

2. Textiles and Apparels

From the values shown in the Table 5.14, it is inferred that over 60 percentages of the priority weights are possessed by four variables, i.e.., Service Quality (SQ), Service Price (SP), Continuous Improvement (CI), and Experience-Expertise-Innovation (EEI). The remaining seven variables together contribute around 40 percentage of the total contribution.

Table 5.14

Pair wise comparison and Priority Weights (Factors considered while selecting a logistics service provider- Textiles and Apparels)

	BT	**BM**	**PS**	**CS**	**MS**	**IT**	**BE**	**EEI**	**CI**	**SP**	**SQ**	**Priority In %**
BT	1.00	0.25	0.23	0.19	0.21	0.23	0.25	0.29	0.25	0.25	0.29	**2.09**
BM	3.98	1.00	0.29	0.23	0.22	0.29	0.28	0.23	0.20	0.26	0.20	**2.68**
PS	4.28	3.50	1.00	0.25	0.28	0.27	0.27	0.26	0.23	0.21	0.27	**3.71**
CS	5.13	4.35	4.07	1.00	0.27	0.29	0.23	0.22	0.29	0.29	0.29	**5.31**
MS	4.73	4.50	3.63	3.72	1.00	0.25	0.29	0.29	0.23	0.29	0.29	**6.29**
IT	4.28	3.50	3.72	3.50	3.98	1.00	0.23	0.22	0.27	0.24	0.22	**7.05**
BE	4.05	3.63	3.72	4.35	3.50	4.35	1.00	0.26	0.24	0.25	0.22	**8.78**
EEI	3.50	4.30	3.92	4.50	3.50	4.50	3.92	1.00	0.19	0.22	0.29	**10.89**
CI	3.98	4.93	4.27	3.50	4.35	3.73	4.22	5.22	1.00	0.24	0.22	**13.96**
SP	3.97	3.80	4.72	3.50	3.50	4.22	3.98	4.62	4.22	1.00	0.24	**16.73**
SQ	3.50	5.08	3.72	3.50	3.50	4.62	4.58	3.43	4.47	4.20	1.00	**22.50**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1289}}{\mathbf{1.51}} = \mathbf{8.53}\% < 10\%$$

The calculated Consistency Ratio is less than the recommended consistency ratio. Hence, it is concluded that the variables show good amount of consistency.

Rubber and Agro products

In rubber and agro products industry, again, 'Service Quality (SQ)' and 'Service Price (SP)' have scored higher priority weights. 'Business Type (BT)' and 'Multiple Services (MS)' had the lower scores (See Table 5.15).

Table 5.15

Pair wise comparison and Priority Weights (Factors considered while selecting a logistics service provider- Rubber and Agro products)

	BT	**MS**	**IT**	**CS**	**PS**	**BM**	**BE**	**EEI**	**CI**	**SP**	**SQ**	**Priority In %**
BT	1.00	0.23	0.16	0.20	0.24	0.20	0.20	0.24	0.22	0.17	0.18	**1.59**
MS	4.37	1.00	0.24	0.17	0.18	0.22	0.25	0.19	0.21	0.26	0.17	**2.42**
IT	6.12	4.12	1.00	0.19	0.25	0.25	0.19	0.17	0.25	0.19	0.19	**3.51**
CS	4.96	5.76	5.14	1.00	0.24	0.22	0.17	0.18	0.24	0.17	0.18	**4.69**
PS	4.22	5.43	3.98	4.18	1.00	0.22	0.22	0.17	0.18	0.24	0.17	**5.28**
BM	5.06	4.59	4.02	4.47	4.47	1.00	0.18	0.22	0.25	0.19	0.20	**6.66**
BE	4.96	4.02	5.31	5.76	4.49	5.61	1.00	0.28	0.19	0.15	0.23	**9.09**
EEI	4.24	5.39	5.94	5.43	5.78	4.49	3.61	1.00	0.19	0.20	0.27	**10.96**
CI	4.47	4.75	4.04	4.24	5.45	4.00	5.29	5.29	1.00	0.19	0.19	**13.26**
SP	5.76	3.78	5.31	5.84	4.14	5.29	6.47	4.96	5.29	1.00	0.22	**18.41**
SQ	5.43	5.76	5.33	5.59	5.78	4.96	4.37	3.65	5.27	4.47	1.00	**24.13**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1378}}{\mathbf{1.51}} = \mathbf{9.12}\% < 10\%$$

The Consistency Ratio of 9.12 per cent confirms a high degree of consistency.

5.3.2.2. Factors considered for the selection of logistics service providers- Zone wise

In this section, the researcher has carried out separate analysis for the three zones. i.e.., North zone, central zone and south zone

1. North zone.

Higher priority percentages indicate the stronger importance towards the attribute. As given in the table below (Table 5.16), the variable 'Service Quality (SQ)' scored the highest priority weight followed by 'Service Price (SP)' and 'Continuous Improvement (CI)'. 'Supporting Business Expansion (BE)' and 'Business scope and Market (BM)' possess lower priority weights.

Table 5.16

Pair wise comparison and Priority Weights (Factors considered while selecting a logistics service provider- North Zone)

	BE	**BM**	**IT**	**CS**	**PS**	**MS**	**BT**	**EEI**	**CI**	**SP**	**SQ**	**Priority In %**
BE	1.00	0.24	0.24	0.24	0.23	0.24	0.24	0.22	0.21	0.22	0.24	**1.85**
BM	4.23	1.00	0.24	0.24	0.23	0.24	0.24	0.22	0.21	0.22	0.22	**2.62**
IT	4.23	4.23	1.00	0.21	0.18	0.17	0.24	0.24	0.24	0.23	0.24	**3.56**
CS	4.23	4.23	4.86	1.00	0.24	0.24	0.24	0.23	0.24	0.24	0.22	**4.70**

PS	4.40	4.40	5.51	4.23	1.00	0.21	0.24	0.24	0.24	0.24	0.24	**6.13**
MS	4.25	4.25	5.89	4.23	4.86	1.00	0.24	0.23	0.24	0.24	0.22	**7.68**
BT	4.11	4.11	4.23	4.23	4.23	4.23	1.00	0.21	0.24	0.24	0.24	**8.64**
EEI	4.53	4.53	4.23	4.40	4.23	4.40	4.86	1.00	0.23	0.24	0.24	**11.17**
CI	4.86	4.86	4.23	4.25	4.23	4.25	4.23	4.40	1.00	0.22	0.21	**13.39**
SP	4.65	4.65	4.40	4.11	4.23	4.11	4.23	4.25	4.53	1.00	0.22	**16.73**
SQ	4.23	4.63	4.25	4.53	4.23	4.53	4.23	4.11	4.86	4.65	1.00	**23.53**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1326}}{\mathbf{1.51}} = \mathbf{8.78}\% < 10\%$$

The calculated Consistency Ratio (CR) indicates high level of consistency among variables.

2. Central zone.

In central zone, ‘Service Quality (SQ)’ and ‘Service Price (SP)’ have scored higher priority scores. Together these two contribute over 38 percentage of weights (See Table 5.17).

Table 5.17

Pair wise comparison and Priority Weights (Factors considered while selecting a logistics service provider- Central Zone)

	BT	MS	BE	IT	PS	BM	CS	EEI	CI	SP	SQ	Priority In %
BT	1.00	0.27	0.27	0.22	0.21	0.27	0.27	0.27	0.24	0.24	0.27	**2.10**
MS	3.70	1.00	0.27	0.22	0.21	0.27	0.27	0.27	0.24	0.24	0.22	**2.75**
BE	3.70	3.70	1.00	0.27	0.27	0.27	0.27	0.27	0.22	0.21	0.27	**3.70**
IT	4.55	4.55	3.70	1.00	0.27	0.27	0.22	0.21	0.27	0.27	0.27	**5.12**
PS	4.70	4.70	3.70	3.70	1.00	0.24	0.27	0.27	0.22	0.27	0.27	**6.28**
BM	3.70	3.70	3.70	3.70	4.18	1.00	0.22	0.21	0.27	0.27	0.27	**7.25**
CS	3.70	3.70	3.70	4.55	3.70	4.55	1.00	0.24	0.27	0.27	0.22	**9.03**
EEI	3.70	3.70	3.70	4.70	3.70	4.70	4.18	1.00	0.21	0.27	0.27	**11.2**
CI	4.18	4.18	4.55	3.70	4.55	3.70	3.70	4.70	1.00	0.27	0.24	**13.8**
SP	4.17	4.17	4.70	3.70	3.70	3.70	3.70	3.70	3.70	1.00	0.24	**16.1**
SQ	3.70	4.48	3.70	3.70	3.70	3.70	4.55	3.70	4.18	4.17	1.00	**22.4**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1219}}{\mathbf{1.51}} = \mathbf{8.07}\% < 10\%$$

The lower Consistency Ratio (CR) of 8.07% indicates high level of consistency among variables.

3. South Zone

Four variables have scored priority weight of more than 10 per cent (See Table 5.18). Together these four variables contribute over 60 percentage of total contribution. The remaining seven variables have scored about 40 percentage of contribution.

Table 5.18

Pair wise comparison and Priority Weights (Factors considered while selecting a logistics service provider- South Zone)

	CS	**IT**	**MS**	**BT**	**PS**	**BM**	**BE**	**EEI**	**CI**	**SP**	**SQ**	**Priority in %**
CS	1.00	0.27	0.21	0.25	0.27	0.25	0.25	0.24	0.28	0.25	0.27	**2.15**
IT	3.67	1.00	0.21	0.25	0.27	0.25	0.25	0.24	0.28	0.25	0.23	**2.81**
MS	4.82	4.82	1.00	0.27	0.27	0.27	0.27	0.21	0.25	0.27	0.25	**4.27**
BT	4.04	4.04	3.67	1.00	0.27	0.21	0.25	0.27	0.25	0.25	0.24	**4.80**
PS	3.67	3.67	3.67	3.67	1.00	0.28	0.27	0.21	0.25	0.27	0.21	**5.63**
BM	3.98	3.98	3.67	4.82	3.63	1.00	0.25	0.27	0.25	0.25	0.24	**7.39**
BE	4.04	4.04	3.67	4.04	3.67	4.04	1.00	0.28	0.27	0.21	0.25	**8.80**
EEI	4.24	4.24	4.82	3.67	4.82	3.67	3.63	1.00	0.27	0.25	0.25	**11.14**
CI	3.63	3.63	4.04	3.98	4.04	3.98	3.67	3.67	1.00	0.24	0.28	**12.95**
SP	3.98	3.98	3.67	4.04	3.67	4.04	4.82	3.98	4.24	1.00	0.25	**17.27**
SQ	3.67	4.31	3.98	4.24	4.82	4.24	4.04	4.04	3.63	3.98	1.00	**22.78**

i. Consistency

$$\mathbf{CR} = \frac{\mathbf{0.1196}}{\mathbf{1.51}} = \mathbf{7.92}\% < 10\%$$

Since the Calculated Consistency Ratio (CR) is less than the recommended Consistency Ratio, the variables show good amount of consistency.

5.3.3. Summary of Section II

1. **Reasons for outsourcing**

Table 5.19

Summary of Reasons for outsourcing

Industry/ Zone	Most Contributing Reason (First Two)	Priority Weight	Least Contributing Reason (Least Two)	Priority Weight
Overall	Logistics cost reduction	35.64%	Customer clearance is too complicated	3.94%
	Time saving	31.51%	Customer Service Improvement	6.13%
Industry Wise				
Food Processing	Logistics cost reduction	35.75%	Customer clearance is too complicated	4.18%
	Time saving	34.16%	Order cycle length reduction	5.60%
Textiles and Apparels	Logistics cost reduction	34.76%	Customer clearance is too complicated	4.13%
	Time saving	34.70%	Order cycle length reduction	6.00%
Rubber and Agro Products	Time saving	34.19%	Customer clearance is too complicated	4.09%
	Logistics cost reduction	31.53%	Customer Service Improvement	6.60%
Zone Wise				
North Zone	Logistics cost reduction	36.11%	Customer clearance is too complicated	3.88%
	Time saving	33.35%	Order cycle length reduction	5.87%
Central Zone	Time saving	33.60%	Customer clearance is too complicated	4.62%
	Logistics cost reduction	33.39%	Order cycle length reduction	6.38%
South Zone	Time saving	34.07%	Customer clearance is too complicated	4.31%
	Logistics cost reduction	30.74	Order cycle length reduction	6.76

The Table 5.19 shows the summarised result of AHP analyses related to objective one of the study. Based on the information provided in the table, the variables 'Customer clearance is too complicated', 'customer service improvement' and 'order cycle length reduction' have been identified as weak reasons for logistics outsourcing. While, 'logistics cost reduction' and 'time saving' have been recorded as strong reason behind every logistics outsourcing decision. The remaining variable 'fixed asset reduction' has got mediocre response. To be more precise, it can be inferred from the table that the variable 'logistics cost reduction' is the strongest reason, and the variable 'customer clearance is too complicated' is the weakest.

2. **Factors considered while deciding a logistics service provider (LSP)**

From the Table 5.20, it is observed that' Service quality (SQ)' and 'Service Price (SP)' are the most important determinants in the selection of a logistics service provider. It is followed by 'Continuous improvement', 'Experience- Expertise-Innovation', 'Supporting Business Expansion', 'Business Scope and Market', and 'Professional and Staff'. Further, 'Business Type', and 'Multiple Service' are the least contributing determinants in the selection of a logistics service provider.

Table 5.20

Summary of 'factors considered while deciding a logistics service provider'

Industry/ Zone	Most Contributing Reason (First Two)	Priority Weight	Least Contributing Reason (Least Two)	Priority Weight
Overall	Service Quality (SQ)	22.68%	Business Type (BT)	2.07%
	Service Price (SP)	16.48%	Multiple Service (MS)	2.72%
Industry Wise				
Food Processing	Service Quality (SQ)	25.24%	Business Type (BT)	1.47%
	Service Price (SP)	17.22%	Multiple Service (MS)	2.27%
Textiles and Apparels	Service Quality (SQ)	22.50%	Business Type (BT)	2.09%
	Service Price (SP)	16.73%	Business scope and Market (BM)	2.68%

Industry/ Zone	Most Contributing Reason (First Two)	Priority Weight	Least Contributing Reason (Least Two)	Priority Weight
Rubber and Agro Products	Service Quality (SQ)	24.13%	Business Type (BT)	1.59%
	Service Price (SP)	18.41%	Multiple Service (MS)	2.42%
Zone Wise				
North Zone	Service Quality (SQ)	23.53%	Supporting Business Expansion (BE)	1.85%
	Service Price (SP)	16.73%	Business scope and Market (BM)	2.62%
Central Zone	Service Quality (SQ)	22.40%	Business Type (BT)	2.10%
	Service Price (SP)	16.10%	Multiple Service (MS)	2.75%
South Zone	Service Quality (SQ)	22.78%	Culture and Strategy (CS)	2.15%
	Service Price (SP)	17.27%	Suitable IT system (IT)	2.81%

5.4. Section III- Objective 2

"To assess how the customers are accommodated through logistics service outsourcing"

Bowersox, Closs and Cooper (2010) advocated that organizations build their platform of customer accommodation on three levels of increasing commitment. The first is the basic level of customer service which balances reliability, responsiveness, assurance and empathy for all customers. The second level, customer satisfaction, is focused on the performance of the service provider. The third level is the customer success, which is focused on the delivery of products and services. In order to evaluate the customer accommodation process, the researcher analysed each level of 'customer accommodation' separately.

5.4.1. Level I: Customer Service

Eighteen statements were used to measure 'customer service'. The respondents were asked to give responses on a five-point scale with 1 indicating 'strongly disagree' and 5 indicating 'strongly agree'. The descriptive statistics for the four factors that extracted in the factor analysis is presented below.

Table 5.21

Customer accommodation level 1-Customer Service

S. no	Variables	Industry			Overall Mean Score
		Food processing	Apparels and Textiles	Rubber and Agro products	
		Mean	Mean	Mean	
1	Reliability	3.50	3.61	3.51	**3.54**
2	Responsiveness	3.50	3.59	3.52	**3.54**
3	Assurance	3.51	3.55	3.53	**3.53**
4	Empathy	3.54	3.51	3.52	**3.52**
	Total	**3.51**	**3.56**	**3.52**	**3.53**

Source: Primary Data

Based on the values shown in the Table 5.21, it can be observed that ‘Reliability” has the highest mean score and ‘Assurance’ has the lowest mean score. In case of industry, ‘Apparels and textiles’ has the highest mean score and ‘rubber and agro products’ has the lowest mean score. Yet, only slight variations are seen in the mean scores of different industries. The researcher can’t draw any statistical inferences with these figures. Therefore, test of homogeneity of variances and test of Analysis of variance (ANOVA) were conducted to check whether the industries differ significantly on this or not.

H_{01}: There is no significant difference in customer service among the three industries.

Table 5.22

Test of Homogeneity of Variances- Customer Service

Customer Service			
Levene Statistic	**df1**	**df2**	**Sig.**
46.350	2	165	.000

Levene’s test of homogeneity of variances revealed that Levene’s test of homogeneity of variances is significant ($p<0.001$), therefore, it can be concluded that the population variances among different groups were not equal (Table 5.22). The result of test of ANOVA is given in Table 5.22.

Table 5.23

ANOVA- Customer Service

Customer Service					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	.137	2	.068	.493	.612
Within Groups	22.869	165	.139		
Total	23.006	167			

The F-value was 0.493 and it was not significant at 5 percentage level (p=0.612 value) (See Table 5.23). Therefore the null hypothesis was accepted. Hence, it is found that there is no significant difference between customer service and industry.

Based on the values given in the Table 5.21, the mean scores of variables ranged from 3.50 to 3.61. It implies that majority of the respondents expressed agreement towards the measurement statements. While there appears to be room for improvements in the basic requirements of customer service, it is apparent that logistics service providers are attempting to attain the next level of customer accommodation, i.e., customer satisfaction.

5.4.2. Level II: Customer Satisfaction

The construct 'customer satisfaction' was measured with eighteen statements. Respondents were asked to rate the construct on a five point Likert's scale with 1 representing 'strongly disagree' and 5 representing 'strongly agree'. Three variables, 'inbound', 'operations' and 'outbound', were the factors that were explored through factor analysis.

Table 5.24

Customer Accommodation level 1I-Customer Satisfaction

S. no	Variables	Industry			Overall Mean Score
		Food processing	Apparels and Textiles	Rubber and Agro products	
		Mean	Mean	Mean	
1	Inbound	3.69	3.97	3.93	**3.86**
2	Operations	3.61	3.66	3.53	**3.60**
3	Outbound	3.60	3.59	3.51	**3.57**
	Total	**3.63**	**3.74**	**3.66**	**3.68**

Source: Primary Data

The descriptive statistics for the three variables are presented in the Table 5.24. It can be observed that 'inbound' has the highest mean score followed by 'operations. While 'outbound' has the lowest mean score. Mean value of each industry shows only slight variation from others. In order to draw in-depth statistical inferences, test of homogeneity of variances and test of Analysis of variance (ANOVA) were used.

H_{02}: There is no significant difference in customer satisfaction among the three industries.

Table 5.25

Test of Homogeneity of Variances- Customer Satisfaction

Customer Satisfaction			
Levene Statistic	**df1**	**df2**	**Sig.**
40.240	2	165	.000

Levene's test of homogeneity (Table 5.25) revealed that the homogeneity of variance is significant at 1 percentage level ($p<0.001$). Hence, it is concluded that the population variances for each group of industry were not the same.

Table 5.26

ANOVA- Customer Satisfaction

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	.419	2	.209	1.463	.234
Within Groups	23.598	165	.143		
Total	24.017	167			

Based on one way ANOVA test (Table 5.26), having F value of 1.463 and p value of 0.234, the null hypothesis that there is no significant difference in customer satisfaction among the three industries is accepted. Hence, it is inferred that customer satisfaction among the three selected industries was the same.

As seen from the values presented in Table 5.24, it can be concluded that the respondents are satisfied with the services of logistics service provider. Specifically, the mean values of all the variables are between 3 and 4, and this indicates that respondents have not yet perceived high satisfaction from the services of logistics service providers.

5.4.3. Level III: Customer Success

The construct 'customer success' was measured with eleven statements. Respondents were asked to rate response on a five point Likert's scale with 1 being 'strongly disagree' and 5 being 'strongly agree'. The descriptive statistics for the 'customer success' are presented in Table 5.27 below.

Table 5.27

Customer accommodation level III-Customer Success

S.no	Variables	Industry			Overall Mean Score
		Food processing	Apparels and Textiles	Rubber and Agro products	
		Mean	Mean	Mean	
1	Customer Success	3.64	3.68	3.69	**3.67**

Source: Primary Data

The customer success, the third level of customer accommodation, is based on customers' requirements and needs. Customer success also implies the role of a logistics service provider in enhancing the competitiveness of the firm. As seen from the table above, Mean value of each industry shows only slight variation from others. All the three industries have scored mean scores of more than 3.60. Hence, it can be concluded that the respective logistics service providers were good at satisfying respondent's logistical requirements and needs.

The test of homogeneity of variances and the test of Analysis of variance (ANOVA) were conducted to check whether there was any significant difference among industries.

H_{03}: *There is no significant difference between customer success and industry.*

Table 5.28

Test of Homogeneity of Variances- Customer Success

Customer Success			
Levene Statistic	**df1**	**df2**	**Sig.**
.145	2	165	.865

The test of homogeneity (Table 5.28) revealed that the population variances for each group are approximately equal (p>0.05).

Table 5.29

ANOVA - Customer Success

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	.231	2	.116	.393	.675
Within Groups	48.527	165	.294		
Total	48.758	167			

As seen from the values depicted in the Table 5.29 shown above, the results of ANOVA revealed that there is no significant difference in customer success among industries.

5.4.4. Summary of Section III

The starting point of customer accommodation is the basic level of customer service, progressing to customer satisfaction and ultimately, customer success. The Table 5.30 given below shows the summarised result of analysis related to objective two of the study.

Table 5.30

Summary of Section III

<table>
<tr><th rowspan="2">Level of Customer Accommodation</th><th rowspan="2">Factors</th><th colspan="4">Mean Scores</th><th colspan="2">ANOVA Result</th><th>Analysis Result</th></tr>
<tr><th>Aggregate</th><th>Food Processing</th><th>Textiles and Apparels</th><th>Rubber and Agro-products</th><th>Sig.</th><th>Accept/ Reject</th><th>*Positive/ Negative</th></tr>
<tr><td rowspan="4">Level 1- Customer Service</td><td>Reliability</td><td>3.54</td><td>3.50</td><td>3.61</td><td>3.51</td><td rowspan="4">0.612</td><td rowspan="4">Accept</td><td>Positive</td></tr>
<tr><td>Responsive-ness</td><td>3.54</td><td>3.50</td><td>3.59</td><td>3.52</td><td>Positive</td></tr>
<tr><td>Assurance</td><td>3.53</td><td>3.51</td><td>3.55</td><td>3.53</td><td>Positive</td></tr>
<tr><td>Empathy</td><td>3.52</td><td>3.54</td><td>3.51</td><td>3.52</td><td>Positive</td></tr>
<tr><td rowspan="3">Level II- Customer Satisfaction</td><td>Inbound</td><td>3.86</td><td>3.69</td><td>3.97</td><td>3.93</td><td rowspan="3">0.234</td><td rowspan="3">Accept</td><td>Positive</td></tr>
<tr><td>Operations</td><td>3.60</td><td>3.61</td><td>3.66</td><td>3.53</td><td>Positive</td></tr>
<tr><td>Outbound</td><td>3.57</td><td>3.60</td><td>3.59</td><td>3.51</td><td>Positive</td></tr>
<tr><td>Level III- Customer Success</td><td>Customer Success</td><td>3.67</td><td>3.64</td><td>3.68</td><td>3.69</td><td>0.865</td><td>Accept</td><td>Positive</td></tr>
<tr><td colspan="9">* mean score 1 to 2.99= Negative, 3 to 3.49= Mediocre, 3.5 to 5= Positive.</td></tr>
</table>

As seen from Table 5.30, the following inferences can be drawn

- Aggregate mean scores of all the variables are greater than 3.50
- Each industry has scored mean score above 3.50.
- Mean value of each industry shows only slight variation from others.
- The significance values of ANOVA test were greater than 0.05 in all the three cases.
- Finally, analysis results given in the table are positive.

Therefore, it can be concluded that the respondents accommodated successfully by the logistics service providers.

5.5. Section IV- Objective 3

"To explore how a company can create value through logistics"

The purpose of this section is to identify ways to add value or create value for the companies. Bowersox, Closs and Cooper (2010) define that customers have at least three perspective of value: The convention perspective of value is economic value. Economic value builds on economy of scale in operations as the source of efficiency. The focus of economic value is efficiency of product/service creation. The customer's take-away of economic value is high quality at a low price. A second value perspective is market value. Market value is about presenting an attractive assortment of products at the right time and place to realize effectiveness. Market value focuses on achieving economy of scope in product/service presentation. The customer's take-away of market value is convenient product/service assortment and choice. The third value perspective is relevancy. Relevancy involves customization of value-adding services, over and above product and positioning, which make a significant difference to customers. Relevancy value means the right products and services, as reflected by market value, at the right place, as reflected by economic value, modified, sequenced, synchronized and otherwise positioned in a manner that creates valuable segmental diversity (Kong, Berky and Choe, Mae Fong, 2011).

In order to assess objective three of the study, the analysis was done in four stages. For this, four Structural models were developed. First model represents aggregate model and remaining models represents respective industries. In order to measure the extent of value creation process through logistics outsourcing, following hypotheses were developed

- **H_{04}:** There is no significant relationship between efficiency and value creation
- **H_{05}:** There is no significant relationship between effectiveness and value creation

- **H_{06}:** There is no significant relationship between ‘Differentiation/Relevance’ and value creation.

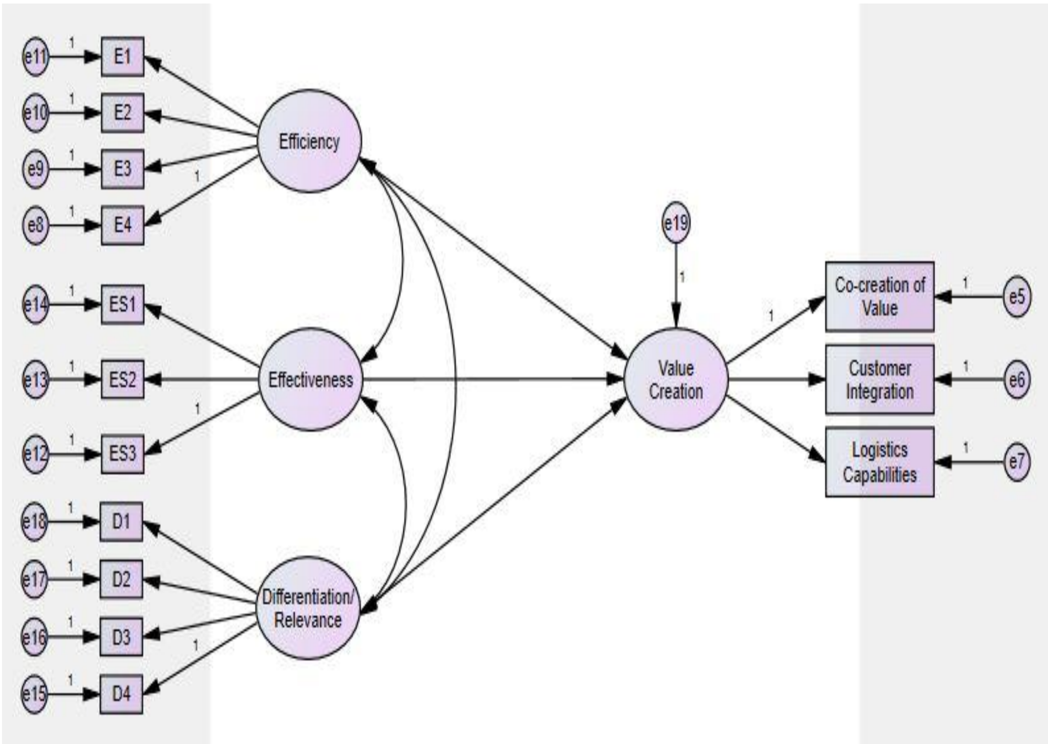

Fig 5.1: Measurement model for value creation.

5.5.1. Analysis of relationship (for entire sample)

The structural model (See Figure 5.2) consists of four latent variables and fourteen observed variables. “Co-creation of value, customer integration and logistics capabilities” are the indicators of the latent variable “value creation”. The latent construct “efficiency” has four indicators; namely, E1, E2, E3 and E4. ES1, ES2 and ES3 are the indicators of the latent variable “Effectiveness”. Finally, The unobserved variable “differentiation/ relevancy” has four indicators; namely, D1, D2, D3 and D4 (See Appendix).

Table 5.31

Model Fit Indices (for entire sample)

	GFI	AGFI	GFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	.944	.907	.944	.924	.892	.984	.989	.03
Recommended	>.90	>.90	>.90	>.90	>.90	>.90	>.90	<.08

The model fit indices like Comparative Fit Indices (CFI), the Goodness of Fit Indices (GFI), Adjusted Goodness of Fit Index (AGFI), Relative Fit Index (RFI), Normed Fit Index (NFI), Tucker Lewis Index (TLI) and Root Mean Square Error Approximation (RMSEA) were selected to measure model fit. In order to obtain an acceptable fit with data, CFI, GFI, AGFI, RFI, NFI and TLI should be around 0.9 and RMSEA value must be lower than 0.08. The table below explains model fit indices. The values depicted in the table suggested that the model developed was valid with regard to fit indices (See Table 5.31).

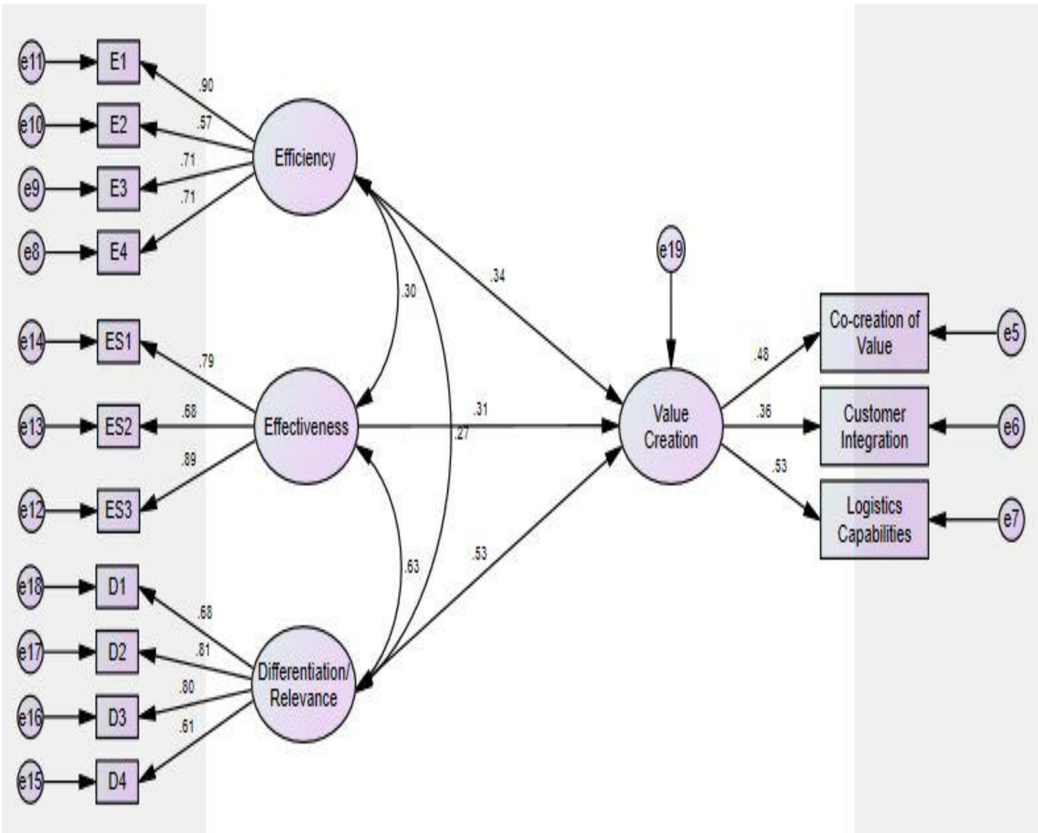

Fig 5.2: Measurement model for value creation- Tested

Results of hypothesis testing (for entire sample)

On verification of p values for the path co-efficients from each variable to the latent construct 'Value creation', it was found that, 'Efficiency', 'effectiveness' and 'differentiation/ relevancy' have significant positive relation with value creation ($p<0.001$) at 0.001 level (See Table 5.32 and figure 5.2).

Table 5.32

Results of hypothesis testing (for entire sample)

Hypotheses	Path	Path coefficient	P value	Result
H01	Efficiency→ Value creation	0.34	<0.001	Reject
H02	Effectiveness→ Value creation	0.31	<0.001	Reject
H03	Relevance→ Value creation	0.53	<0.001	Reject

The beta coefficient standardized direct effect of 'efficiency' on 'value creation' is 0.34. This means that a 1 point increase in 'efficiency' predicts 0.34 point increase on 'value creation'. The standardized path coefficient for 'effectiveness' on 'value creation' is 0.31, Thus, a 1 point increase in 'effectiveness' predicts 0.31 point increase on 'value creation'. Finally, the beta coefficient standardized direct effect of 'efficiency' on 'value creation' is 0.53. This means that a 1 point increase in 'relevancy/differentiation' predicts 0.53 point increase on 'value creation'.

5.5.2. Analysis of relationship (For each Industry)

In order to done industry wise analysis, following structural modelling analyses were conducted. Figures 5.3, 5.4 and 5.5 represent structural models for the three industries.

1. **Food Processing Industry.**

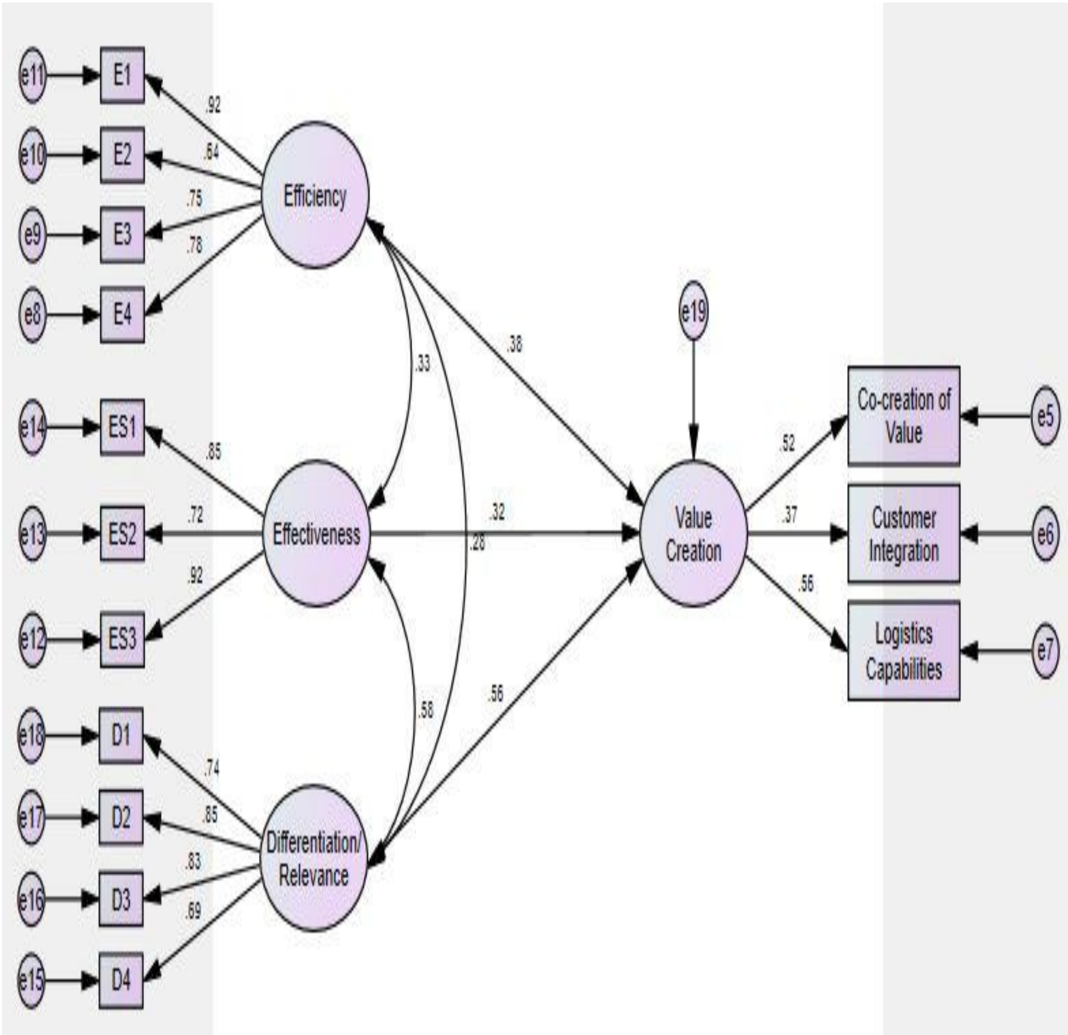

Fig 5.3: Structural equation model for value creation -food processing industry

Goodness of fit index (GFI) obtained was 0.921, and the Adjusted Goodness of Fit Index (AGFI) was 0.906. The Normed Fit Index (NFI), Relative Fit Index (RFI), Comparative Fit Index (CFI) and Tucker Lewis Index were 0.914, 0.909, 0.932 and 0.924 respectively. Root Mean Square Error Approximation (RMSEA) was 0.06 (See Table 5.33). Hence, the model shows an acceptable fit.

Table 5.33

Model Fit Indices - food processing industry

	GFI	AGFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	0.921	0.906	0.914	0.909	0.924	0.932	0.06
Recommended	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	<0.08

2. **Textiles and Apparels Industry**

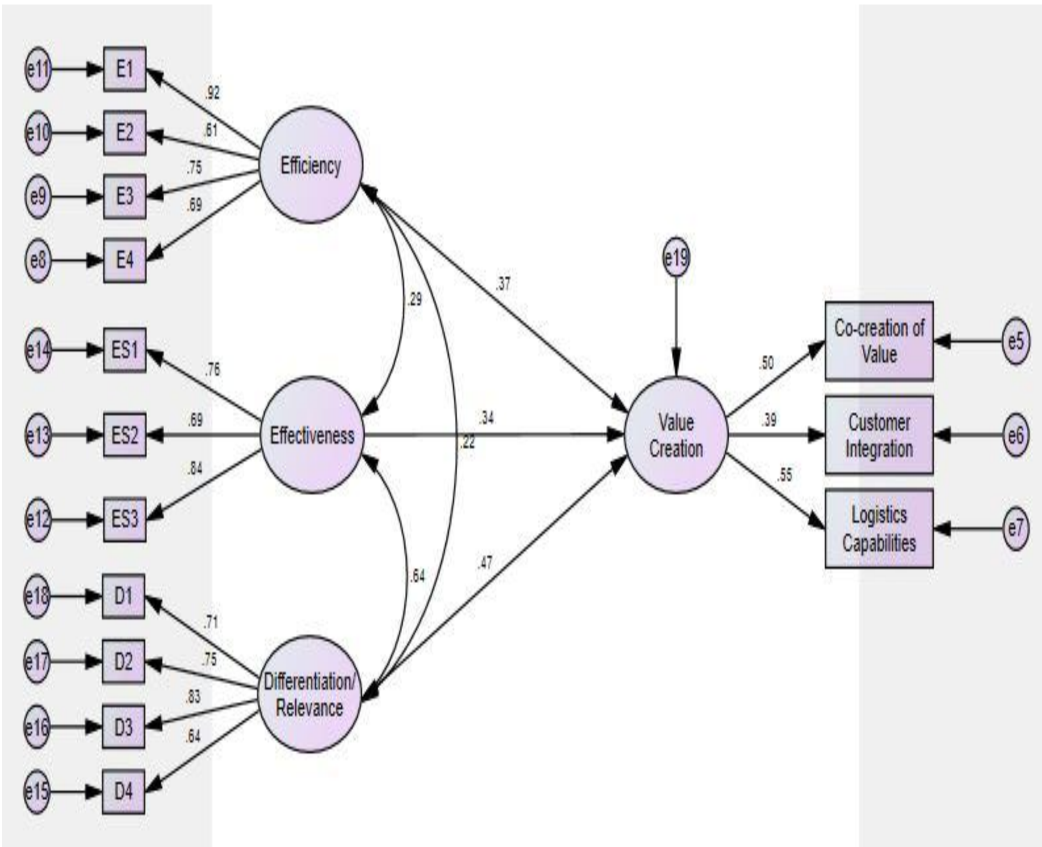

Fig 5.4: Structural equation model for value creation -textiles and apparels industry

Goodness of fit index (GFI) obtained was 0.914 and the Adjusted Goodness of Fit Index (AGFI) was 0.908. The values of Normed Fit Index (NFI), Relative Fit Index (RFI), Comparative Fit Index (CFI) and Tucker Lewis Index were 0.922, 0.917, 0.930 and 0.924 respectively. Root Mean Square Error Approximation (RMSEA) was 0.05 (See Table 5.34). Hence, the model shows an acceptable fit.

Table 5.34

Model Fit Indices- textiles and apparels industry

	GFI	AGFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	**0.914**	**0.908**	**0.922**	**0.917**	**0.924**	**0.930**	**0.05**
Recommended	**>0.90**	**>0.90**	**>0.90**	**>0.90**	**>0.90**	**>0.90**	**<0.08**

3. Rubber and Agro-Products Industry

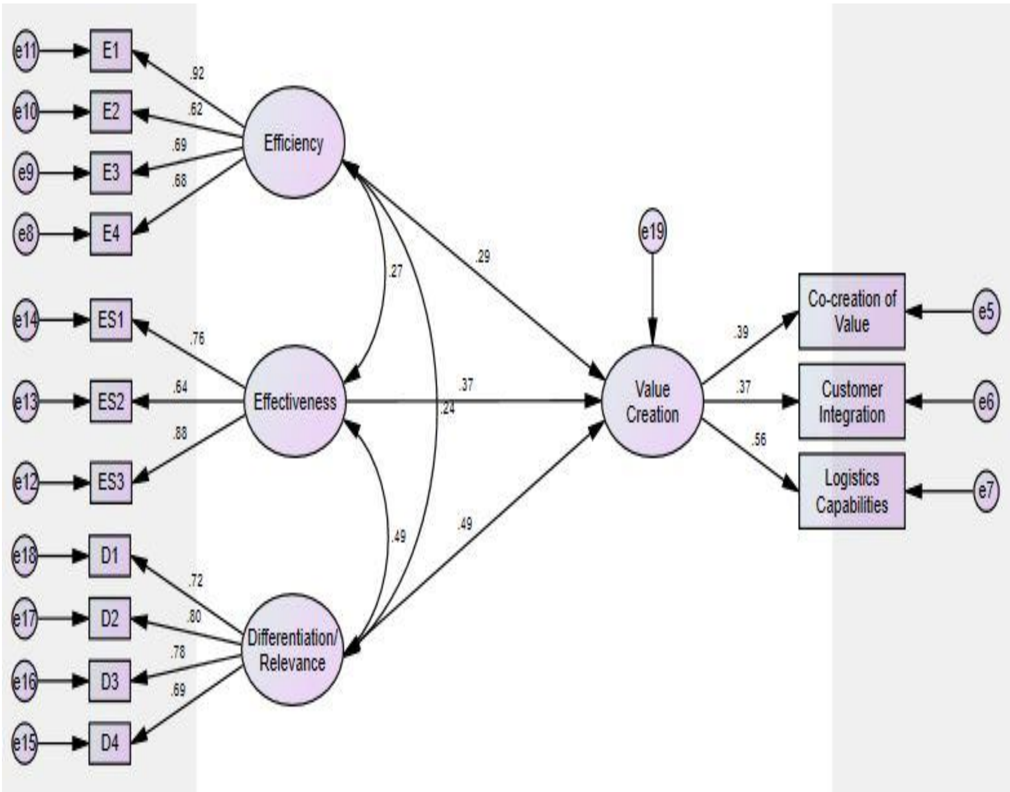

Fig 5.5: Structural equation model for value creation -rubber and agro products industry

Goodness of fit index (GFI) obtained was 0.905 and the Adjusted Goodness of Fit Index (AGFI) was 0.900. The values of Normed Fit Index (NFI), Relative Fit Index (RFI), Comparative Fit Index (CFI) and Tucker Lewis Index were 0.920, 0.911, 0.914 and 0.922 respectively. Root Mean Square Error Approximation (RMSEA) was 0.06 (See Table 5.35). Hence, the model has an acceptable fit.

Table 5.35

Model Fit Indices- Rubber and Agro-Products Industry

	GFI	AGFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	0.905	0.900	0.920	0.911	0.914	0.922	0.06
Recommended	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	<0.08

Results of hypothesis testing (for each industry)

All the structural models were examined. There were nine hypotheses and all these hypotheses were rejected. Therefore, it was found that efficiency, effectiveness and relevance/ differentiation have significant relation with value creation ($p<0.001$) at 0.001 level (See Table 5.36 and figure 3, 4 and 5). The path coefficients were positive and significant in all models, hence, it is concluded that the relationship between independent variables with the dependant variable were significant and positive. This indicates that as the independent variables increase, the dependent variable increases.

Table 5.36

Results of hypothesis testing- (for each industry)

Industry	Hypotheses	Path coefficient	P value	Result
Food Processing	Efficiency→ Value creation	0.38	<0.001	Reject
	Effectiveness→ Value creation	0.32	<0.001	Reject
	Relevance→ Value creation	0.56	<0.001	Reject
Textile and Apparels	Efficiency→ Value creation	0.37	<0.001	Reject
	Effectiveness→ Value creation	0.34	<0.001	Reject
	Relevance→ Value creation	0.47	<0.001	Reject
Rubber and Agro Products	Efficiency→ Value creation	0.29	<0.001	Reject
	Effectiveness→ Value creation	0.37	<0.001	Reject
	Relevance→ Value creation	0.49	<0.001	Reject

5.5.3. Summary of Section IV

In order to assess third objective, four models were developed as illustrated in Figure 5.2 , 5.3, 5.4 and 5.5 and were estimated using SPSS Amos 21.0. The model developed was valid model with regard to fit indices (See Tables 5.32, 5.33, 5.34 and 5.35). From the results, it is found that none of the relationships are insignificant at 0.01 level. In all the cases, relationship between dependant variables and independent variables were positive, which indicates the presence of strong positive relationship between the variables. Therefore, it is found that 'efficiency', 'effectiveness' and 'relevancy/ differentiation' have significant positive impact on 'value creation'. Therefore, it can be concluded that better logistics services create customer value by generating efficiency, effectiveness and relevancy/ differentiation for the customers.

Table 5.37

Results of hypothesis testing

Industry	Hypotheses	Path coefficient	P value	Result
For entire sample	Efficiency→ Value creation	0.34	<0.001	Reject
	Effectiveness→ Value creation	0.31	<0.001	Reject
	Relevance→ Value creation	0.53	<0.001	Reject
Food Processing	Efficiency→ Value creation	0.38	<0.001	Reject
	Effectiveness→ Value creation	0.32	<0.001	Reject
	Relevance→ Value creation	0.56	<0.001	Reject
Textile and Apparels	Efficiency→ Value creation	0.37	<0.001	Reject
	Effectiveness→ Value creation	0.34	<0.001	Reject
	Relevance→ Value creation	0.47	<0.001	Reject
Rubber and Agro Products	Efficiency→ Value creation	0.29	<0.001	Reject
	Effectiveness→ Value creation	0.37	<0.001	Reject
	Relevance→ Value creation	0.49	<0.001	Reject

5.6. Section V- Objective 4

"To assess the role of logistics service providers in achieving competitive advantage and logistics excellence"

In order to assess objective four of the study, the analysis was conducted in four stages. For this, four Structural models were developed. The first one is for aggregate analysis and the remaining models, for respective industries.

5.6.1. Aggregate Structural Equation Model

This structural model (See Figure 5.6) consists of seven latent variables and forty one observed variables. Reliability, responsiveness, assurance and empathy are the indicators of the latent variable "customer service". Inbound operations and outbound are the indicators of the latent variable "customer satisfactions". CS1 to CS11 are the indicators of the latent variable "customer success". "Customer accommodation" has 7 indicators, named as CAC 1, CA2, CA3, CA4, CA5, CA6 and CAC7. Co-creation of value, customer integration and logistics capabilities are the three indicators of the latent variable "value creation". The unobserved variable "competitive advantages" has four indicators; namely, value added processes, efficiency, effectiveness and differentiation/ relevance. Finally, "Logistics excellence" has 9 indicators, i.e., CA1, CA2, CA3, CA4, CA5, CA6, CA7, CA8 and CA9.

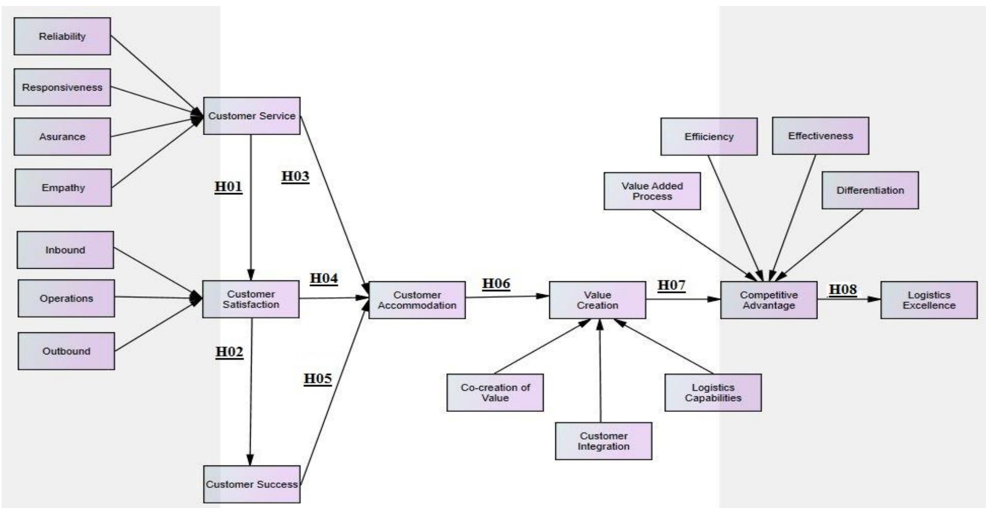

Fig. 5.6: Structural model for the study.

I. Fitting of hypotheses

Eight hypotheses were fitted in the structural model. All these hypotheses in the path model were based on the objectives fixed for the study.

- **$H_{07:}$** There is no significant relationship between Customer service and customer satisfaction
- **$H_{08:}$** There is no significant relationship between Customer satisfaction and customer success.
- **$H_{09:}$** There is no significant relationship between Customer service and customer accommodation.
- **$H_{10:}$** There is no significant relationship between Customer satisfaction and customer accommodation.
- **$H_{11:}$** There is no significant relationship between Customer success and customer accommodation.
- **$H_{12:}$** There is no significant relationship between Customer accommodation and value creation.
- **$H_{13:}$** There is no significant relationship between Value creation and competitive advantage
- **$H_{14:}$** There is no significant relationship between Competitive advantage and Logistics excellence.

II. Testing of structural relationships

The structural model (See Figure 5.7) consists of seven latent variables, forty one observed variables and forty eight error terms. One directional arrow within the model represents structural regression coefficients and thus indicates the impact of one on another. The unidirectional arrows leading from the seven latent constructs are the observed variables of the respective latent constructs. The one way arrows pointing from the enclosed error terms (e11 to e51) indicate the impact of measurement error on the observed variables, and from e52 to e58, the impact of error in the prediction of latent constructs.

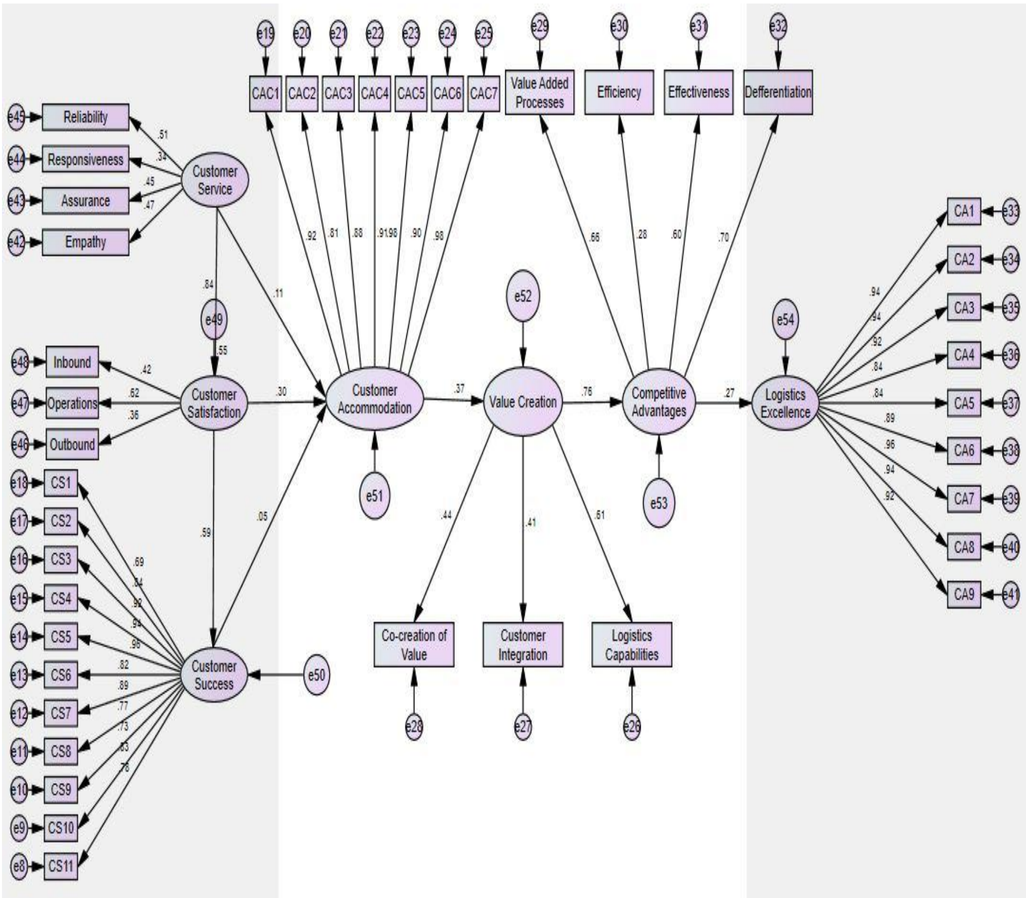

Figure 5.7: Tested structural equation model.

III. Assessing the structural model fitness

A structural model must satisfy certain conditions, and then only it can be designated as a valid model. Model fit indices are the most important element to decide whether the model fits well with the data or not. Eight indices generated by the AMOS 21.0 output were used in this study to assess the model fit criteria. They are given in the table 5.38 shown below.

Table 5.38

Model Fit Indices- aggregate model

	GFI	AGFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	.901	.900	.908	.911	.920	0.928	0.04
Recommended	>.90	>.90	>.90	>.90	>.90	>.90	<.08

Goodness of fit index (GFI) obtained was 0.901and the Adjusted Goodness of Fit Index (AGFI) was 0.900. The Normed Fit Index (NFI), Relative Fit Index (RFI), Comparative Fit Index (CFI) and Tucker Lewis Index were 0.908, 0.911, 0.928 and 0.920 respectively. Root Mean Square Error Approximation (RMSEA) was 0.04 (Table 5.38). Hence, the model has an acceptable fit.

IV. Testing of hypotheses

The beta coefficient standardized direct effect of customer service on customer satisfaction is 0.84. This means that a one point increase in the customer service predicts 0.84 point increase on customer satisfaction. The standardized path coefficient for customer satisfaction on customer success is 0.59. Thus, a one point increase in customer satisfaction predicts 0.59 point increase in customer success. The standardized coefficients for the direct effect of customer service, customer satisfaction and customer success on customer accommodations are, 0.11, 0.30, and 0.05 respectively, that is, a level of customer service one full standard deviation above the mean predicts a customer accommodation level just over 0.10 standard deviation below the mean, holding customer satisfaction and customer success constant. Likewise, a level of customer satisfaction one full standard deviation above the mean is associated with a customer accommodation level about 0.30 standard deviation above the mean, keeping customer service and customer success as controlled variables. In the same way, a level of customer success one full standard deviation above the mean is associated with a customer accommodation level about 0.05 standard deviations above the mean, by holding customer service and customer satisfaction.

The direct effect of customer accommodation on value creation is positive (the standardized path coefficient is 0.37), and higher levels of value creation predicts higher competitive advantage (the standardized path coefficient is 0.76). Likewise, higher levels of competitive advantage predicts higher logistics excellence (the standardized path coefficient is 0.27)

Table 5.39

Results of hypotheses testing- aggregate model

No	Hypotheses	β Value	Nature of relationship	P Value	Supported/ Not Supported
1	Customer service → customer satisfaction.	0.68	Positive	<0.001	Not Supported
2	Customer satisfaction → customer success.	0.48	Positive	<0.001	Not Supported
3	Customer service→ customer accommodation.	0.26	Positive	<0.001	Not Supported
4	Customer satisfaction→ customer accommodation.	0.48	Positive	<0.001	Not Supported
5	Customer success → customer accommodation.	0.20	Positive	<0.001	Not Supported
6	Customer accommodation→ value creation.	0.77	Positive	<0.001	Not Supported
7	Value creation → competitive advantage	0.77	Positive	<0.001	Not Supported
8	Competitive advantage → logistics excellence.	0.57	Positive	<0.001	Not Supported

As shown in the table above, all the tested hypotheses were rejected. It is found that all the relationships within the path diagram were positive and significant at 0.01 level.

5.6.2. Assessment of relationship (For each Industry)

To find out the relationship between observed variables with the latent variable, following structural modelling analyses were done. Figures 5.8, 5.9 and 5.10 represent structural models for the three industries.

1. **Food Processing Industry**

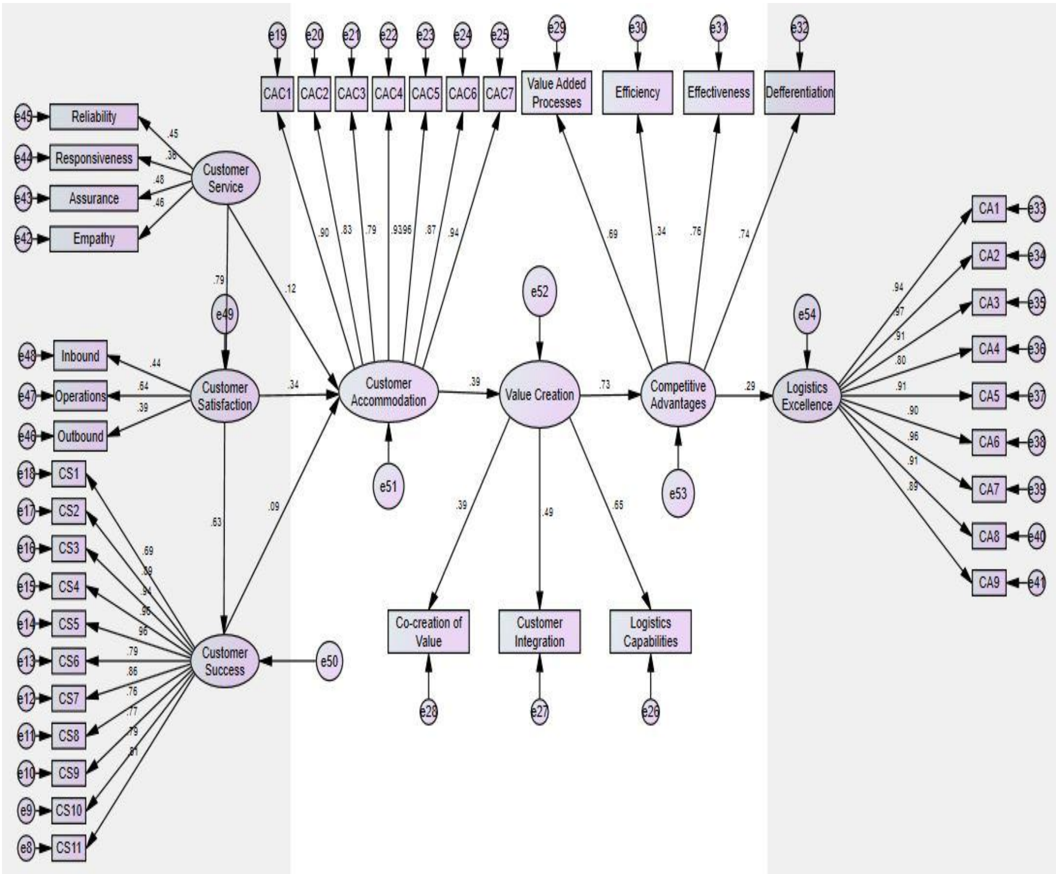

Fig 5.8: Structural model for food processing industry.

Table 5.40

Model Fit Indices- food processing industry

	GFI	AGFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	0.911	0.909	0.918	0.922	0.920	0.934	0.05
Recommended	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	<0.08

Goodness of fit index (GFI) obtained was 0.911 and the Adjusted Goodness of Fit Index (AGFI) was 0.909. The Normed Fit Index (NFI), Relative Fit Index (RFI), Comparative Fit Index (CFI) and Tucker Lewis Index were 0.918, 0.922, 0.934 and

0.920 respectively. Root Mean Square Error Approximation (RMSEA) was 0.05 (Table 5.40). Hence, the model has an acceptable fit.

Table 5.41

Results of hypothesis testing- food processing industry

No	Hypotheses	β Value	Nature of relationship	P Value	Supported/ Not Supported
1	Customer service →customer satisfaction.	0.79	Positive	<0.001	Not Supported
2	Customer satisfaction → customer success.	0.63	Positive	<0.001	Not Supported
3	Customer service→ customer accommodation.	0.12	Positive	<0.001	Not Supported
4	Customer satisfaction→ customer accommodation.	0.34	Positive	<0.001	Not Supported
5	Customer success → customer accommodation.	0.09	Positive	<0.001	Not Supported
6	Customer accommodation → value creation.	0.39	Positive	<0.001	Not Supported
7	Value creation →competitive advantage	0.79	Positive	<0.001	Not Supported
8	Competitive advantage → logistics excellence.	0.29	Positive	<0.001	Not Supported

The beta coefficient standardized direct effect of customer service on customer satisfaction is 0.79. The standardized path coefficient for customer satisfaction on customer success is 0.63. The standardized coefficients for the direct effect of customer service, customer satisfaction and customer success on customer accommodations are, respectively, 0.12, 0.34, and 0.09 respectively. The direct effect of customer accommodation on value creation is positive (the standardized path coefficient is 0.39), and higher levels of value creation predict higher competitive advantage (the standardized path coefficient is 0.73). Likewise, a higher level of competitive advantage predicts higher logistics excellence (the standardized path coefficient is 0.29) (See Table 5.41 and Figure5.8).

2. **Textiles and Apparels Industry**

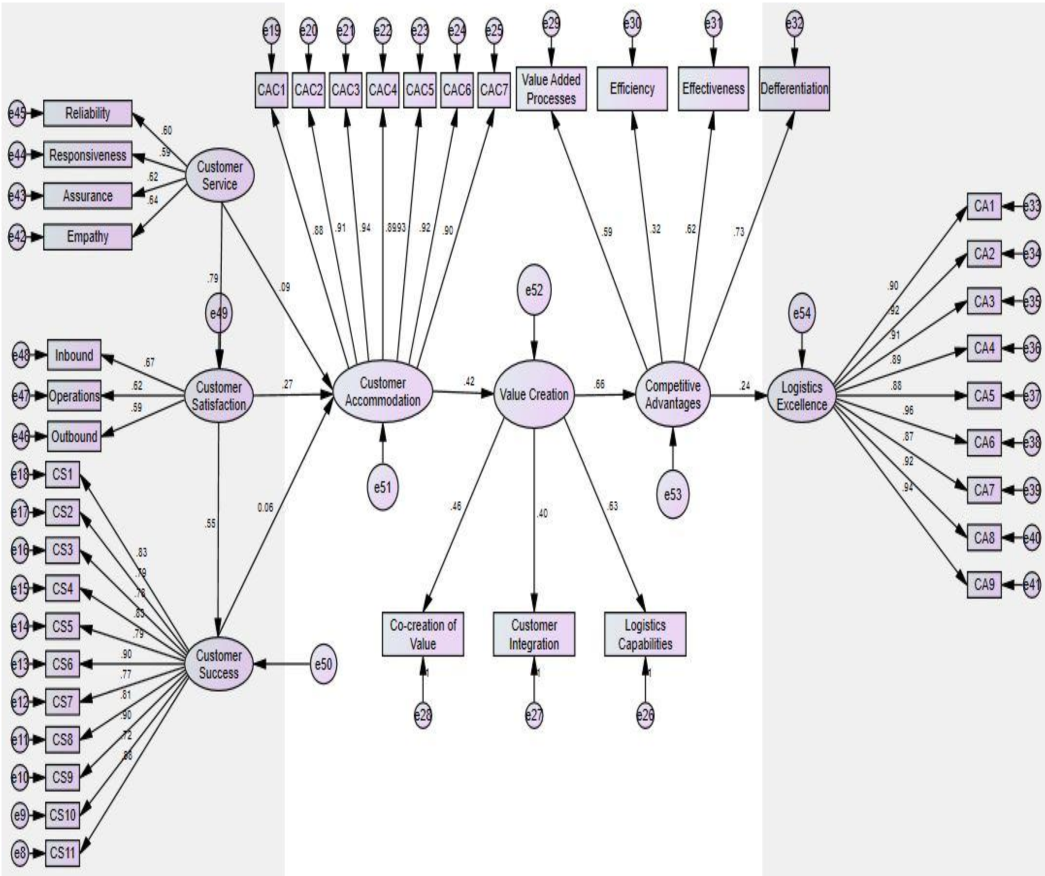

Fig 5.9: Structural model for textiles and apparels industry

Table 5.42

Model Fit Indices- textiles and apparels industry

	GFI	AGFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	.908	.912	.915	.912	.918	.929	.04
Recommended	>.90	>.90	>.90	>.90	>.90	>.90	<.08

Goodness of fit index (GFI) obtained was 0.908 and the Adjusted Goodness of Fit Index (AGFI) was 0.912. The values of Normed Fit Index (NFI), Relative Fit Index

(RFI), Comparative Fit Index (CFI) and Tucker Lewis Index were 0.915, 0.912, 0.929 and 0.918 respectively. Root Mean Square Error Approximation (RMSEA) was 0.04 (Table 5.42). Hence, the model enjoys an acceptable fit.

Table 5.43

Results of hypothesis testing- textiles and apparels industry

No	Hypotheses	β Value	Nature of relationship	P Value	Supported/ Not Supported
1	Customer service → customer satisfaction.	0.79	Positive	<0.001	Not Supported
2	Customer satisfaction → customer success.	0.55	Positive	<0.001	Not Supported
3	Customer service→ customer accommodation.	0.09	Positive	<0.001	Not Supported
4	Customer satisfaction→ customer accommodation.	0.27	Positive	<0.001	Not Supported
5	Customer success → customer accommodation.	0.06	Positive	<0.001	Not Supported
6	Customer accommodation → value creation.	0.42	Positive	<0.001	Not Supported
7	Value creation → competitive advantage	0.66	Positive	<0.001	Not Supported
8	Competitive advantage → logistics excellence.	0.24	Positive	<0.001	Not Supported

The beta coefficient standardized direct effect of customer service on customer satisfaction is 0.79. The standardized path coefficient for customer satisfaction on customer success is 0.55. The standardized coefficients for the direct effect of customer service, customer satisfaction and customer success on customer accommodations are 0.09, 0.27, and 0.06 respectively. The direct effect of customer accommodation on value creation is positive (the standardized path coefficient is 0.42), and higher levels of value creation predicts higher competitive advantage (the standardized path coefficient is 0.66). Similarly, a higher level of competitive advantage predicts higher logistics excellence (the standardized path coefficient is 0.24) (See Table 5.43 and Figure5.9).

3. Rubber and Agro Products Industry

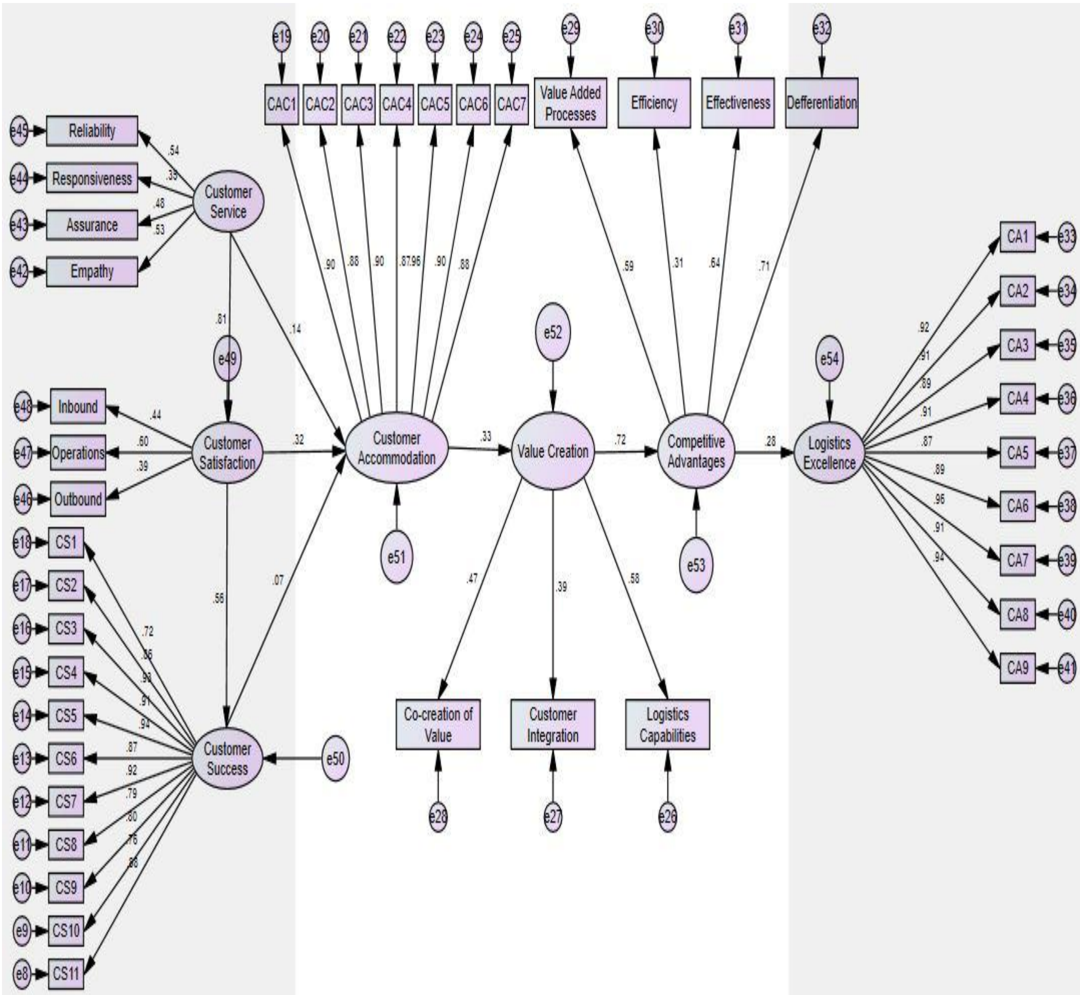

Fig 5.10: Structural model for rubber and agro products industry

Table 5.44

Model Fit Indices- rubber and agro products industry

	GFI	AGFI	NFI	RFI	TLI	CFI	RMSEA
Obtained	.922	.926	.928	.935	.926	.938	.04
Recommended	>.90	>.90	>.90	>.90	>.90	>.90	<.08

Goodness of fit index (GFI) obtained was 0.922 and the Adjusted Goodness of Fit Index (AGFI) was 0.926. The Normed Fit Index (NFI), Relative Fit Index (RFI), Comparative Fit Index (CFI) and Tucker Lewis Index were 0.928, 0.935, 0.938 and 0.926 respectively. Root Mean Square Error Approximation (RMSEA) was 0.04 (See Table 5.40), Hence, the model fulfils acceptable fit.

Table 5.45

Results of hypothesis testing- rubber and agro products industry

No	Hypotheses	β Values	Nature of relationship	P Value	Supported/ Not Supported
1	Customer service → customer satisfaction.	0.81	Positive	<0.001	Not Supported
2	Customer satisfaction → customer success.	0.56	Positive	<0.001	Not Supported
3	Customer service→ customer accommodation.	0.14	Positive	<0.001	Not Supported
4	Customer satisfaction→ customer accommodation.	0.32	Positive	<0.001	Not Supported
5	Customer success → customer accommodation.	0.07	Positive	<0.001	Not Supported
6	Customer accommodation → value creation.	0.33	Positive	<0.001	Not Supported
7	Value creation →competitive advantage	0.72	Positive	<0.001	Not Supported
8	Competitive advantage →Logistics excellence.	0.28	Positive	<0.001	Not Supported

The beta coefficient standardized direct effect of customer service on customer satisfaction is 0.81. The standardized path coefficient for customer satisfaction on customer success is 0.56. The standardized coefficients for the direct effect of customer service, customer satisfaction and customer success on customer accommodations are 0.14, 0.32, and 0.07 respectively. The direct effect of customer accommodation on value creation is positive (the standardized path coefficient is 0.33), and higher levels of value creation predicts higher competitive advantage (the standardized path coefficient is 0.72). In the same way, a higher level of competitive advantage predicts higher logistics excellence (the standardized path coefficient is 0.28) (See Table 5.45 and Figure 5.10).

5.6.3. Summary of Section V

In order to satisfy fourth objective, four models were developed as illustrated in Figure 5.7 , 5.8, 5.9 and 5.10 and was estimated using SPSS AMOS 21.0. The model developed was valid with regard to fitness indices (See Tables 5.38, 5.40, 5.42 and 5.44). From the models, it was found that none of the relationships is insignificant at 5 percentage level of significance. In all the cases, relationships between dependant variables and independent variables were positive, which indicates the presence of strong positive relationship between the variables. Therefore, it can be concluded that logistics service providers significantly impacted the companies in creating competitive advantage and logistics excellence.

5.7. Conclusion

The chapter dealt with the analysis of data and results of data analysis. The analysis was conducted in five sections. Section one of the chapter explained demographic profile of the respondents. Section two described the priority matters regarding the reason for logistics outsourcing and the criteria for selecting a logistics service provider by using Analytical Hierarchy Process (AHP) technique.

Section three discussed how the customers are accommodated through logistics outsourcing. For this, descriptive statistics and Analysis of variance (ANOVA) were used. It was found from the analysis that the respondents were accommodated successfully by the logistics service provider. Section four explored the ways to add or create value by the company through logistics. For this, Structural equation modelling technique was used. From the analysis, it is found that 'efficiency', 'effectiveness' and 'relevancy' have significantly impacted value creation. Therefore, it can be concluded that better logistics services create customer value by generating efficiency, effectiveness and relevancy/ differentiation for the customers.

Finally, section five discussed the role of logistics service providers in achieving competitive advantage and logistics excellence. For this, Structural equation modelling was used. From the results, it was found that all of the relationships are significant and positive. Hence, it can be concluded that logistics service providers significantly impacted the companies in creating competitive advantage and logistics excellence.

The next chapter deals with a discussion on the results of the study, major findings of the study, recommendation derived from the study and the conclusions drawn from the discussions and findings.

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Chapter 6

Summary, Findings and Recommendations

SUMMARY, FINDINGS AND RECOMMENDATIONS

6.1. Introduction

This chapter presents summary of the study, findings and recommendations from the study. The main findings with regard to the research objectives are summarised and conclusions based on the findings of the studies are presented and discussed with empirical evidences from previous studies. This chapter concludes with recommendations for different parties to enhance logistics performance and to remain competitive in ever changing environment.

6.2. Summary

The study examined in detail the role of logistics service providers in building competitive advantage and logistics excellence of firms in selected industries in Kerala. Three industries were selected for the study, i.e, food processing industry, textiles and apparels industry, rubber and agro-product industry. The researcher took 168 companies as sample. A comprehensive questionnaire was developed and tested. It had sections to capture data on profile of sample companies, reasons for outsourcing, factors considered for the selection of service provider, customer service, customer satisfaction, customer success, customer accommodation, value creation, competitive advantages and logistics excellence.

The researcher took objectives of the study one by one and analysed the data relevant with sophisticated statistical tools including SPSSS and AMOS. The results are presented in five sections. Section one explained profile of the respondents. Section two described the prioritised reasons for logistics outsourcing and the criteria for selecting a logistics service provider by using Analytical Hierarchy Process (AHP) technique. It is found from the detailed analysis that 'logistics cost reduction' is the strongest reason for outsourcing and the 'service quality' is found to be the strongest factor considered for selection of logistics service provider.

Section three dealt with the way customers are accommodated through logistics outsourcing. For this, descriptive statistics and Analysis of variance (ANOVA) were used. It was found from the analysis that the customers were accommodated successfully by the logistics service provider. Section four explored the ways to add or create value by the company through logistics. For this, Structural equation modelling technique was used. From the analysis, it is found that 'efficiency', 'effectiveness' and 'relevancy' have significantly impacted value creation. Therefore, it can be concluded that better logistics services create higher customer value by generating efficiency, effectiveness and relevancy/ differentiation for the customers.

Finally, section five discussed the role of logistics service providers in achieving competitive advantage and logistics excellence in respondent companies. For this, Structural Equation Modelling was used. From the results, it was found that all of the relationships are significant and positive. Hence, it is concluded that logistics service providers significantly impacted the companies in creating competitive advantage and building logistics excellence.

6.3 Section I- Findings

The findings are presented in three parts: Findings on reasons for outsourcing, findings on factors for selection of logistics service providers, findings on customer accommodation by the companies and findings on company's ability to created value with logistics and findings on the role of logistics service providers in achieving competitive advantage and logistics excellence

6.3.1. Findings on reasons for outsourcing

1. Across the industries, six reasons were identified for outsourcing, viz, time saving, order cycle length reduction, fixed asset reduction, customer service improvement, customer clearance is too complicated and logistics cost reduction. The priority weights of the variables were estimated. Higher the priority weight, stronger the contribution. Hence, 'Logistics cost reduction'

and ‘time saving’ are found to be the strongest reasons for logistics outsourcing. While, ‘customer clearance is too complicated’ is found to be the weakest reason for logistics outsourcing.

2. Within the selected industries, food processing industry was considered first. Companies in the food processing industry assigned the highest priority weight to ’logistics cost reduction’ and the lowest to ‘customer clearance is too complicated’. Over 70 per cent of the priority weights belonged to two variables. i.e, ‘logistics cost reduction’ (35%) and ‘time saving’ (34%). Hence, ‘logistics cost reduction’ is the most important reason for outsourcing and ‘customer clearance is too complicated’ has turned out to be the least important reason for logistics outsourcing.
3. In textiles and apparels industry, the variable ‘logistics cost reduction’ had the highest priority weight followed by ‘time saving’ and ‘customer service improvement’. The companies outsource logistics services mainly because of these three reasons. ‘Customer clearance is too complicated’ is found to be the least contributing reason for logistics outsourcing.
4. In rubber and agro-products industry group, ‘customer clearance is too complicated’ is identified as the least contributing reason for logistics outsourcing, whereas, ‘logistics cost reduction’ and ‘time saving’ are found to be the strongest reasons for logistics outsourcing.
5. The companies across the three geographical zones were analyzed in terms of their outsourcing decisions. In the north zone, over 69 per cent of the priority weights were shared by two variables, i.e, ‘logistics cost reduction’ and ‘time saving’. ‘Customer service improvement’ got 9 percentage priority weights. The remaining three variables altogether scored about twenty two percentage of the total priority weight.
6. In the central zone, the variable ‘logistics cost reduction’ had the highest priority weight followed by ‘time saving and ‘customer service improvement’. ‘Customer clearance is too complicated’ had the lowest priority weight. Hence, it is identified as the least contributing reason for outsourcing.

7. In south zone, the variable ‘time saving’ had the highest priority weight followed by ‘logistics cost reduction’ and ‘customer service improvement’. While, ‘customer clearance is too complicated’ had the least priority weight.

6.3.2. Findings on factors considered in logistics service provider selection

1. Eleven factors were identified for the study, Viz, service quality, service price, continuous improvement, experience-expertise-innovation, business scope and market, supporting business expansion, professional and staff, culture and strategy, suitable IT system, business type and multiple services. From the analysis, it is found that four variables had priority weight of more than 10 percentage. Among them, service quality had the highest mean score followed by ‘service price’, ‘continuous improvement’, and ‘experience-expertise-innovation’. Hence, ‘service quality’ is identified as the most important factor considered by the companies for the selection of logistics service providers, while, ‘business type’ is identified as the least important factor.
2. In the food processing industry, it is found that over 66 percentage of the priority weights was shared by four variables, i.e, ‘service quality’, ‘service price’, ‘continuous improvement’, and ‘experience-expertise-innovation’. Among them, ‘service quality’ is identified as the most important factor in the selection of logistics service providers. The remaining seven variables together contributed around 34 percentages to the total weight. Among them, ‘business type’ has turned out to be the least contributing factor in the selection of logistics service providers.
3. In the textiles and apparels industries, the variable ‘service quality’ is found to be the most important factor for the selection of logistics service providers and the variable ‘business type’ is found to be the least important factor in the selection of logistics service providers.. Among the variables, ‘service quality’, ‘service price’, ‘continuous improvement’ and ‘experience-expertise-innovation’ contributed over 64 percentages to the total priority

weight. The remaining seven variables together accounted around 36 percentage of the total weight.

4. In the rubber and agro-products industry, ‘service quality’, ‘service price’, ‘continuous improvement’ and ‘experience-expertise-innovation’ had over 65 percentages of the priority weights. Among them, the variable ‘service quality’ was found to be the most important factor in the selection of logistics service providers. While, ‘Business type’ has turned out to be the least contributing factor in the selection of logistics service providers.
5. Companies across the three zones were analyzed. In the north zone, the variable ‘service quality’ scored the highest priority weight followed by ‘service price’ and ‘continuous improvement’. ‘Supporting business expansion’ and ‘business scope and market’ had lower priority weights. Therefore, ‘service quality’ is found to be the most important factor in the selection of logistics service providers and ‘Supporting business expansion’ is found to be the least important deciding factor in selection of logistics service providers.
6. In the central zone, the variable ‘service quality’ had the highest priority weight followed by ‘service price’. Together these two accounted for over 38 percentage of the total weight. While, ‘business type’ and ‘multiple services’ scored lower priority weights. Therefore, ‘service quality’ is found to be the most important factor for the selection of logistics service providers, whereas, ‘business type’ is found to be the least contributing factor.
7. In the south zone, the variable ‘service quality’ is found to be the most important factor for the selection of logistics service providers and the variable ‘culture and strategy’ is found to be the least important factor for the selection of logistics service providers.. Among the variables, ‘service quality’, ‘service price’, ‘continuous improvement’ and ‘experience-expertise-innovation’ contributed over 62 percentages to the total priority weights. The remaining seven variables together accounted for around 38 percentage of the total weight.

6.3.3. Findings relating to customer accommodation

Level 1- Customer Service

1. Four factors extracted from exploratory factor analysis. Among them, ‘Responsiveness’ is found to be the most contributing factor towards ‘customer service’. The second most contributing factor pertaining to ‘customer service’ is reliability which is then followed by ‘assurance’ and ‘empathy’.
2. Customer service at the basic level balances ‘reliability’, ‘responsiveness’, ‘assurance’ and ‘empathy’ for all customers. From the empirical findings, it is found that the companies were generally satisfied about logistics service provider’s performance towards the basic elements of customer service.
3. Across the industries, from the result of descriptive statistics, it is found that, among the four factors, ‘reliability’ and ‘responsiveness’ had higher mean scores. While, ‘empathy’ and ‘assurance’ had lower mean scores. Only slight variations are seen in the mean scores of different factors of this construct (customer service). From the analysis, the companies agreed that the logistics service providers had achieved the level of responsiveness and reliability as demanded by them. The companies opined that their respective logistics service providers performed the promised services dependably, accurately, promptly and ethically. The companies also believed that their logistics service providers did caring and individual attention.
4. In food processing industry, it is found that ‘empathy’ had the highest mean score followed by ‘assurance’. ‘Reliability’ and ‘responsiveness’, both had equal mean scores. In case of textiles and apparels industry, ‘reliability’ had the highest mean score and ‘empathy’ had the lowest mean score. In case of rubber and agro industries, ‘assurance’ had the highest mean score and ‘reliability’ had the lowest mean score.
5. On the basis of industry wise comparison, it is found that there is no significant difference among the three industries with respect to ‘customer service’. There exists no significant difference between food processing

industry, textiles and apparels industry and rubber and agro products industry with regard to customer service.

Level 11- Customer Satisfaction

1. Three factors extracted from exploratory factor analysis. Among the three factors of customer satisfaction, such as 'inbound', operations' and 'outbound'; 'operations' is found to be the most contributing factor of customer satisfaction. 'Inbound' has turned out to be the least contributing factor of customer satisfaction.
2. Across the three industries, from the result of descriptive statistics, it is found that 'inbound' had the highest mean score followed by 'operations'. Whereas, 'outbound' showed the lowest mean score. Mean value of each factor shows only slight variations from others. Since the 'customer satisfaction' score is greater than 3.51, this indicates that the companies are satisfied with the performance of existing logistics service providers, but still have lot more to improve.
3. It is found from the industry wise analysis of 'customer satisfaction', all the factors had good mean scores (more than 3.51) in food processing industry. In all the three industries, the factor 'inbound' had scored the highest mean score and the factor 'outbound' had scored the lowest mean score. The companies opined that the respective logistics service providers did better in managing three phases of logistics activities.
4. There exists no significant difference between food processing industry, textiles and apparels industry and rubber and agro products industry with respect to customer satisfaction.

Level 111- Customer Success

1. Only one factor extracted from exploratory factor analysis. From findings of descriptive statistics, it is found that all the three industries had mean score more than 3.60. hence, it can be inferred that the respective logistics service providers were good at satisfying companies logistics requirement and needs
2. It is inferred from the analysis that, there is no significant difference among the industries with regard to the construct ‘customer success’
3. It is found from the analysis that the respective logistics service providers are successful at accommodating companies’ logistics requirements and need.

6.3.4. Findings relating to company’s ability to create value through logistics

1. The variable ‘Efficiency” is found to have a significant positive effect on the variable “Value creation” (β coefficient value = 0.34 and p value < 0.05). Hence the null hypothesis is rejected, which implies ‘efficiency’ is having a significant positive impact on the value creation process. From the empirical findings, the companies agreed that the logistics service providers performed well at providing high quality logistics services at a lower price (Efficiency)
2. “Effectiveness” is ascertained to have a significant positive impact on the value creation process (β coefficient value = 0.31, and p value < 0.05). Hence the null hypothesis is rejected, which implies ‘effectiveness’ is having a significant positive impact on the value creation process. From the empirical analysis, the companies agreed that the logistics service providers performed well at providing services at the right time, right place, and right conditions (Effectiveness).
3. The variable “Differentiation/ Relevancy” is found to have an effect on the variable “Value creation”. The β coefficient value of the relationship between “differentiation/ Relevancy” and “value creation” is 0.05 and the p value is less than 0.05, which implies that the differentiation/ relevancy has a significant positive effect on the value creation process. From the analysis,

the companies opined that they received customized value adding services from the logistics service providers (Differentiation/ Relevancy).

4. In the food processing industry, 'Efficiency', 'effectiveness' and 'differentiation/ relevancy' are found to have impact on the value creation process (β coefficient values are 0.38, 0.32 and 0.56 respectively for efficiency, effectiveness and differentiation/ relevancy, p values < 0.05), therefore the hypothesis rejected. Hence, identified positive significant relationship between the variables.
5. In the textiles and apparels industry, 'Efficiency', 'effectiveness' and 'differentiation/ relevancy' are found to have impact on the value creation process. (β coefficient values are 0.37, 0.34 and 0.47 respectively for efficiency, effectiveness and differentiation/ relevancy, p values < 0.05), therefore the hypothesis rejected. Hence, identified positive significant relationship between the variables.
6. In the rubber and agro products industry, 'Efficiency', 'effectiveness' and 'differentiation/ relevancy' are found to have significant impact on the value creation process (β coefficient values are 0.29, 0.37 and 0.49 respectively for efficiency, effectiveness and differentiation/ relevancy, p values < 0.05), therefore the hypothesis rejected. Hence, identified positive significant relationship between the variables.
7. In food processing industry, from the analysis, it is found that the companies had agreement on whether logistics service providers co-create value and integrate with them. The companies also opined that they had developed synergy with the logistics service provider.
8. In textiles and apparels industry, from the analysis, it is found that the companies made agreement on the statements that logistics service providers co-create logistics value with them. The companies also opined that logistics service providers had the capabilities to fulfil to their logistical needs and requirements.

9. In rubber and agro-products industry, from the analysis, it is found that the companies had the agreement stance on logistics service providers' ability to co-create value, integrate with customers and show logistics capabilities.

6.3.5. Findings relating to role of logistics service providers in achieving competitive advantage and logistics excellence

1. 'Customer service' creates positive impact and significant relationship with 'customer satisfaction' (β coefficient value = 0.84, p value < 0.05). Therefore, the hypothesis is rejected. Hence, 'customer service' impacts 'customer satisfaction' positively.

2. 'Customer satisfaction' creates positive impact and significant relationship with customer success (β coefficient = 0.59, p value < 0.05). The null hypothesis is not supported by the test. Hence, it can be concluded that 'customer satisfaction' influences 'customer success' positively and significantly.

3. 'Customer success' creates positive impact and significant relationship with customer accommodation (β coefficient = 0.05, p value < 0.05). The hypothesis does not get support from the test. Hence, customer success creates positive and significant impact on customer accommodation.

4. Customer service, customer satisfaction and customer success have positive impact and significant relationship with customer accommodation. The relation between 'customer satisfaction' and 'customer accommodation' appears to be stronger than others (β coefficient values are 0.11, 0.30, and 0.05 respectively, p values < 0.05). Therefore, customer service, customer satisfaction and customer success have positive and significant impact on customer accommodation.

5. Customer accommodation creates positive impact and significant relationship with value creation (β coefficient = 0.37, p value < 0.05). Therefore, the null hypothesis is rejected. Hence, Customer accommodation impacted positively and significantly the value creation process.

6. Value creation creates positive impact and significant relationship with competitive advantage (β coefficient value = 0.76, p value < 0.05). Therefore, the null hypothesis is rejected. Hence, the supports the alternate hypothesis that value creation leads to positive and significant impact on competitive advantage.
7. Competitive advantage creates positive impact and significant relationship with logistics excellence (β coefficient value = 0.27, p value < 0.05). Therefore, the null hypothesis is rejected. Hence, it is establishes that competitive advantage creates positive and significant impact on logistics excellence.

Food processing industry

1. Customer service creates significant positive impact on customer satisfaction (β coefficient value = 0.79, p value < 0.05) as the null hypothesis is not supported by the test. Hence, customer service impacts customer satisfaction directly and positively.
2. The customer satisfaction is found to have positive and significant impact on customer success (β coefficient = 0.63, p value < 0.05), as the null hypothesis is not supported by the test. Hence, it is concluded that customer satisfaction leads to customer success positively and significantly.
3. Customer success enjoys positive and significant relationship with customer accommodation (β coefficient = 0.09, p value < 0.05). Hence, customer success creates positive and significant impact on customer accommodation.
4. Customer service, customer satisfaction and customer success create positive impact on, and significant relationship with, customer accommodation, (β coefficient values are 0.12, 0.34, and 0.09 respectively, p values < 0.05). Therefore, customer service, customer satisfaction and customer success create positive and significant impact on customer accommodation.
5. Customer accommodation leads to positive impact on and significant relationship with value creation (β coefficient value = 0.39, p value < 0.05).

Hence, Customer accommodation positively and significantly impacts value creation process.

6. Value creation creates positive impact on and significant relationship with competitive advantage (β coefficient value = 0.73, p value < 0.05), as the test does not support the null hypothesis. Hence, Value creation creates positive and significant relationship with competitive advantage.
7. Competitive advantage generates positive impact on, and significant relationship with, logistics excellence (β coefficient = 0.29, p value < 0.05) since the test does not support the null hypothesis. Hence, competitive advantage creates positive and significant impact on logistics excellence.

Textiles and Apparels Industry

1. Customer service has significant relationship with 'customer satisfaction' (β value = 0.79, p value < 0.05), as the hypothesis is not supported by the test. Hence, customer service impacts customer satisfaction positively.
2. Customer satisfaction creates positive impact on, and significant relationship with, customer success (β coefficient = 0.55, p value < 0.05), as the test does not support the null hypothesis. Hence, it can be concluded that customer satisfaction impacts customer success positively and significantly.
3. Customer success is found to have positive impact on, and significant relationship with, customer accommodation (β coefficient= 0.06, p value < 0.05). Hence, customer success creates positive and significant impact on customer accommodation.
4. Customer service, customer satisfaction and customer success create positive impact on, and significant relationship with, customer accommodation (β coefficient values are 0.09, 0.27, and 0.06 respectively, p values <0.05). Therefore, customer service, customer satisfaction and customer success create positive and significant impact on customer accommodation.
5. Customer accommodation is found to have positive impact on, and significant relationship with, value creation (β coefficient = 0.42, p value <

0.05). Therefore, customer accommodation impacts the value creation process positively and significantly.

6. Value creation creates positive impact on, and significant relationship with, competitive advantage (β coefficient value = 0.66, p value < 0.05). Hence, value creation leads to positive and significant impact on competitive advantage.
7. Competitive advantage is found to have positive impact on, and significant relationship with, logistics excellence (β coefficient = 0.24, p value < 0.05). Hence, competitive advantage creates positive and significant impact on logistics excellence.

Rubber and Agro Products Industry

1. Customer service creates positive impact on, and significant relationship with, customer satisfaction (β value = 0.81, p value < 0.05). Hence, customer service impacts 'customer satisfaction' positively.
2. Customer satisfaction creates positive impact on, and significant relationship with, customer success (β coefficient = 0.56, p value < 0.05) as the null hypothesis is rejected. Hence, it can be concluded that customer satisfaction impacts customer success positively and significantly.
3. Customer success creates positive impact on, and significant relationship with, customer accommodation (β coefficient = 0.07, p value < 0.05), as the null hypothesis is rejected. Hence, customer success creates positive and significant impact on customer accommodation.
4. Customer service, customer satisfaction and customer success create positive impact on, and significant relationship with, customer accommodation, (β values= 0.14, 0.32, and 0.07 respectively, p values <0.05). Therefore, customer service, customer satisfaction and customer success create positive and significant impact on customer accommodation.
5. Customer accommodation creates positive impact on, and significant relationship with, value creation process (β coefficient= 0.33, p value <

0.05). Therefore, the null hypothesis is not accepted. Hence, customer accommodation significantly and positively impacts value creation process.

6. Value creation creates positive impact on, and has significant relationship with, competitive advantage (β coefficient = 0.72, p value <0.05). Therefore, the null hypothesis is rejected. Hence, value creation has significant positive impact on competitive advantage.
7. Competitive advantage is found to have positive and significant impact on logistics excellence (β coefficient= 0.28, p value < 0.05). Hence, competitive advantage creates positive and significant impact on logistics excellence.

6.4. Section II- Recommendations

Based on the findings from the analysis the following recommendations are made to improve the logistics performance of companies in Kerala.

6.4.1. For the companies

1. Companies must conduct logistics performance gap analysis periodically to compare key performance indicators of logistics with corresponding world class standards. The performance gap analysis is a formal way to assess logistics performance relative to world-class standards, industry norms, competitors, and/or internal organizations. The analyses will help the companies to decide whether to outsource logistics services or to follow own logistics system. Logistics performance gap analysis helps the companies to:
    - identify logistics strength and weaknesses
    - bench mark performance and assessment of performance
    - select from among competing vendor proposals , and,
    - justify logistics projects
2. It is found from the analysis that, logistics cost reduction and time saving are the crucial reasons for logistics outsourcing. Hence, it can be concluded that

cost and time delays are the main problems faced by the respondents. In order to manage cost and time, following practices can be adopted:

- Concentrate on safety
- Concentrate on labor cost
- Concentrate on preventive maintenance
- Concentrate on the use of improved technology
- Concentrate on supply chains for logistics cost reduction
- Concentrate on the customers.

3. When selecting a strategy of outsourcing, a company must objectively evaluate its operations relative to outsourcing options. An outsourcing evaluation team should include members from the supply chain organization, finance or accounting, and sales. The evaluation and decision should consider cost analysis, performance gap analysis, financial opportunities, and suitability of operations for outsourcing.
4. From the analysis, it is found that none of the organizations is adequately aware about logistics and allied logistics activities. In order to improve awareness level, hire experienced logisticians or develop own professional logistics team.
5. Companies must share relationship experiences or feedback with logistics service providers. It will help the logistics service providers in designing logistics services more efficient and effective for companies.
6. Based on the findings from the analysis, it is found that there is lack of effective coordination between the companies and the logistics service providers. In order to cope with changing market needs, respondents will have to improve coordination with the logistics service providers. For this, following practices can be adopted:
   - Periodical review meetings.
   - Training and workshops.

6.4.2. For the Logistics Service Providers

7. Customer segmentation: As reflected in the empirical findings, customer segmentation can be adopted. By starting with an intimate understanding of product and service needs of every customer segment and linking them to the steps that provide breakthrough satisfaction to customers.
8. Generate greater service reliability: With information being generated in real-time, it is possible to meet different customer requests such as locating a delivery, show if there have been failures and generate mitigation actions in advance. The monitoring related to the management of available data allows to view the performance of the contracted service as well as their own fleet and delivery team
9. Making the client more dependent on the Logistics Service Provider (LSP): By investing in fleet technologies creating information relative to delivery and customer service provided, it is assumed that the LSP incorporates an apparatus of solutions that would be difficult for the client to undertake
10. Favouring the integration with the client: To provide customer information in real-time, or generate reports to inform them on the status of their deliveries and any other occurrences, is a distinguishing feature, because this integrates the services provided with that of the client's business
11. Start practising demand-driven logistics: When a company begins practicing demand-driven logistics, transportation costs will be reduced. Beyond that, demand-driven logistics moves logistics management out of the functional silo and provides strategic benefits to the entire enterprise.
12. Optimize transportation routes: Employ recognized transportation best practices to improve the efficiency of moving goods off the production line and into delivery. By applying concepts such as segregating flows into small and large lots, direct dock-to-line feeding, and combining cycles (one full against one empty), can avoid wasteful internal transportation processes and optimize available resources.
13. Jointly plan for and collaborate about potential supply chain disruptions: Include suppliers, logistics service providers, and customers in the

collaboration plans. Drive toward mutually available risk plans for each link in the supply chain.

14. Social responsibility and sustainability: environmentally sound logistical practices are becoming increasingly important factors for many organisations as consumers expect social responsibility to be included as standard. For this, following practices can be adopted.
    - Reverse Logistics
    - Green Logistics
    - Environmental certification

15. Re-thinking: logistics service providers should re-think about themselves. For most of the companies, the scope of logistics is still limited to transportation and warehousing. Modern logistics is far ahead of traditional logistics. Logistics service providers must be equipped with modern technologies and practices.
16. Fleet and delivery information management qualifies a Logistics Service Provider (LSP): Having technology does not mean the ability to respond to the needs of or improve customer services. The LSP needs to generate reliable information that complements and streamlines its management, transforming it into a distinguishing feature capable of providing operational results. This attribute perceived by the customer is what qualifies the LSP in winning or expanding its services.

6.4.3. For the Government

The logistics infrastructure and development is an essential element in the country's economic structure transformation and its migration up the value chain. While the logistics and allied technologies are still in the early stages of growth, the government should consider using promotional incentives to boost logistics development. Some of the suggestions are follows:

17. Central, state and local governing bodies should provide subsidies for critical logistics infrastructure development. Quality infrastructure is a key pillar of

logistics competitiveness. Infrastructure networks reduce the effect of distance, help integrate markets, and provide the necessary connections between distances. Quality infrastructure is trade enhancing – especially for exports – and has positive impact on economic growth.

These subsidies should not come with conditions that interfere with business operations. Investment in logistics parks should come from the private sector, and foreign investments should be encouraged in this domain.

18. Central and local governments should set up special funds for inland waterway transport infrastructure development. Bonds, fees, and special central government allocations all are possible sources of funding for such infrastructure.
19. Central government should increase the budget earmarked for the improvement of logistics infrastructure.
20. Government should take necessary steps to develop logistics hubs throughout the country. Public- private participation and BOT method can be adopted to implement such infrastructure projects.
21. Government subsidies should be used to improve energy efficiency and reduce greenhouse gas emissions of road and waterway transport by replacing obsolete vehicles and vessels.
22. All levels of government should focus on creating carrier management networks and vehicle control systems, gradually establishing emergency command systems and systems to monitor the safety and integrity of carriers.
23. Since logistics enterprises should be the main driver of logistics industry development, local governments should create incentives, such as tax relief and funding assistance, to support the logistics industry.

6.5. Conclusion

Businesses always search for ways to achieve competitive excellence that will set them apart from others in the competitive group. The competitive advantage is gained by offering a customer service of greater value, lower price or greater benefits. Businesses without a competitive advantage will have a harder time maintaining their relevance in the market.

Businesses have to be adaptive and flexible enough to stay relevant. Logistics industry is considered to be important in building competitive advantage. The industry is driven by reasons such as price, labor costs, security, trade regulations, labor stoppages, vessel capacity and technology. Having the personnel, practices and tools to proactively adapt to the changes in the globalised marketplace will give a company the competitive advantage of required kind.

Logistics activities represent a significant portion of an organization's overall budget. This is why supply-chain managers and business owners are always looking to get the most out of their logistics spending. The majority of companies outsource logistics to cut costs, access expertise, and improve the bottom line. Some companies outsource logistics functions because they believe that third party experts can better simplify supply chain management and deliver goods to customers faster and cheaper than the companies.

This study examined the role of logistics service providers in building competitive advantage and logistics excellence of firms in selected industries in Kerala. The three industries selected for the study were food processing industry, apparels and textiles industry, and rubber and agro products industry. From the study, it is found that better logistics services create higher customer value by generating efficiency, effectiveness and differentiation for the customers. On the whole, the study concluded that logistics service providers significantly impacted the companies in creating competitive advantage and building logistics excellence

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APPENDICES

Appendix A: Survey Questionnaire

Research Scholar
Rahul. K
Research Scholar
Department of Commerce and Management Studies
University of Calicut

Supervising Teacher
Dr P Mohan
Pro-Vice Chancellor
University of Calicut

Dear Sir/ Madom,

Study on "Role of Logistics Service Providers in Building Competitive Advantage and Logistics Excellence of Firms in Selected Industries in Kerala"

This survey aims to investigate the role of LSP's in making competitive advantage and logistics excellence of firms in selected industries in Kerala. Respondents are invited to answer questions based on their experience or knowledge of their firm. Responses will only be aggregated for statistical analysis in the current PhD study. The attached questionnaire will take approximately 20 minutes to complete. We appreciate the time and effort you will be taking to respond to the survey.

Thank you very much for your support.

Yours sincerely ,
Rahul. K
PhD Candidate
Department of Commerce and Management Studies
University of Calicut

Questionnaire

The questionnaire contains three sections; section A was designed for information about the reasons for logistics outsourcing and criteria for selecting a logistics service provider. Section B was designed to measure seven main constructs; it had 122 items, all were measured on a five point scale. Section C dealt with demographic details of the respondents.

Section A

1. **Reasons for outsourcing**

	Attributes	**Very strongly more important**	**strongly more important**	**Weakly more important**	**Equally important**	**Just Equal**	**Equally important**	**Weakly more important**	**trongly more important**	**Very strongly more important**	
1	TS										CL
2	TS										FA
3	TS										CSS
4	TS										CC
5	TS										LC
6	CL										FA
7	CL										CSS
8	CL										CC
9	CL										LC
10	FA										CSS
11	FA										CC
12	FA										LC
13	CSS										CC
14	CSS										LC
15	CC										LC

Explanation

TS- Time saving, CL- Order cycle length reduction, FA- Fixed asset reduction, CSS- Customer service improvement, CC- Customer service is too complicated, LC- Logistics cost reduction.

1. **Criteria for selecting a logistics service provider**

	Attributes	**Very strongly more important**	**strongly more important**	**Weakly more important**	**Equally important**	**Just Equal**	**Equally important**	**Weakly more important**	**trongly more important**	**Very strongly more important**	
1	SQ										SP
2	SQ										CI
3	SQ										EEI
4	SQ										BM
5	SQ										BE
6	SQ										PS
7	SQ										CS
8	SQ										IT
9	SQ										BT
10	SQ										MS
11	SP										CI
12	SP										EEI
13	SP										BM
14	SP										BE
15	SP										PS
16	SP										CS

17	SP										IT
18	SP										BT
19	SP										MS
20	CI										EEI
21	CI										BM
22	CI										BE
23	CI										PS
24	CI										CS
25	CI										IT
26	CI										BT
27	CI										MS
28	EEI										BM
29	EEI										BE
30	EEI										PS
31	EEI										CS
32	EEI										IT
33	EEI										BT
34	EEI										MS
35	BM										BE
36	BM										PS
37	BM										CS
38	BM										IT
39	BM										BT
40	BM										MS
41	BE										PS
42	BE										CS
43	BE										IT
44	BE										BT
45	BE										MS
46	PS										CS

47	PS										IT
48	PS										BT
49	PS										MS
50	CS										IT
51	CS										BT
52	CS										MS
53	IT										BT
54	IT										MS
55	BT										MS

Explanation

SQ- Service quality, SP- Service price, CI- Continuous improvement, EEI- Experience, expertise, innovation, BM- Business scope and market, BE- Supporting business expansion, PS- Professional and staff, CS- Culture and strategy, IT- Suitable IT system, BT- Business type, MS- Multiple services.

Section B

1. Customer Service

Please use the following scale and if an element is not applicable to your firm, leave it blank.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

S.No	Customer Service	Response
1	Our LSP keep their promise at fixed time	
2	LSP always shows sincere effort in solving our problems	
3	Our LSP provides its services correctly the first time	

4	Our LSP provides its services at the time it promises to do so.	
5	LSP insists on error free documents.	
6	Our LSP tells us the time frame within which the service will be performed.	
7	LSP provide prompt services	
8	LSP is always willing to help us	
9	LSP is always willing to help us with unloading, documentation etc...	
10	LSP responds to my requests without delay	
11	LSP instils confidence	
12	LSP makes us feel safe in transactions	
13	LSP consistently courteous to us	
14	LSP understands our questions	
15	LSP gives us personal attention	
16	LSP has operating hours/ delivery times that are convenient for us.	
17	LSP frequently seeks our needs and problems	
18	LSP understands our specific needs.	

2. Customer Satisfaction

Please use the following scale and if an element is not applicable to your firm, leave it blank.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

S.No	Customer Satisfaction	Response
1	Stocks are available when needed	

2	The correct safety stock levels are held	
3	We know what the service level is today. (Service level=promised level of availability)	
4	We perceived or experienced that the service level is correct	
5	Our customers are happy with the stock lead time (From order to pick-up availability/ Despatch)	
6	Our customers expect better stock lead time (From order to pick-up availability/ Despatch)	
7	We have the ability to accommodate special situations and unusual or unexpected customer requests (Flexibility is high)	
8	Our LSP handles claims/returns very promptly	
9	Our LSPs informs customers of delays	
10	We have the ability to quickly implement contingency plans when a failure occurs in the supply chain (malfunction recovery is high)	
11	We are very prompt in measures how many shipments arrive without damaged products (Deliveries are damage free)	
12	Customers should receive shipments within the promised time.	
13	Customers are satisfied with the responses	
14	Responses to customers are correct and easy to understand	
15	Customers are satisfied with the transportation time	
16	Invoices are error free (measures what percentage of invoices contains no errors)	
17	Shipments always match orders (measures how many shipments contain the exact amount of product ordered)	
18	Shipments are always shipped to correct location (measures how many shipments are made to the customers selected location)	

3. Customer Accommodation

Please use the following scale and if an element is not applicable to your firm, leave it blank.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

S.No	Customer Success	Response
1	I am overall satisfied with the services of LSP	
2	I would choose another service provider if given the choice	
3	I have increasing expectations	
4	The information on increased expectation are being communicated frequently	
5	My expectations on the service levels are the same as my actual requirements	
6	LSP always assess our requirements	
7	LSP always aware about our specific requirements	
8	LSP understand our customers' requirements and processes	
9	LSP provides value added services	
10	LSP provided customized value added services	
11	The value added services are relevant to us and provides competitive advantage	

4. Customer Accommodation

Please use the following scale and if an element is not applicable to your firm, leave it blank.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

S.No	Customer Accommodation	Response
1	LSP satisfies overall logistics deliveries with the right amount	
2	LSP satisfies overall logistics deliveries with the right product	
3	LSP satisfies overall logistics deliveries with the right time	
4	LSP satisfies overall logistics deliveries with the right place	
5	LSP satisfies overall logistics deliveries with the right condition	
6	LSP satisfies overall logistics deliveries with the right price	
7	LSP satisfies overall logistics deliveries with the right information.	

5. **Value Creation**

Please use the following scale and if an element is not applicable to your firm, leave it blank.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

S.No	Value Creation	Response
1	LSP has active meeting with us to discuss on distribution management	
2	LSP has on going meetings with us to fine tune the order handling process	
3	LSP discusses with us on appropriate stock levels.	
4	LSP actively modifies transportation options offered.	
5	LSP actively enhances the order handling processes	
6	LSP actively meet us to understand our needs and requirements	
7	There is sharing of ideas, information and other resources between us and the LSP	
8	There is a joint planning to anticipate and resolve operative problems between us and LSP	
9	There is already established team work between us the LSP	
10	LSP develops customer specific programs to cater difference in customer demands	
11	LSP maintanis and mpodifies its operations based on the channging customers expectations	
12	LSP is good at handling unique or unplanned customer requirements	
13	LSP has the flexibility for adaption to unexpected operational circumstances.	

6. Competitive Advantage

Please use the following scale and if an element is not applicable to your firm, leave it blank.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

S.No	Competitive Advantage	Response
1	LSP plays a strategic role for the sales companies	
2	LSP adds value to the company	
3	LSP enables us to be more competent in the market place	
4	LSP assists us to generate end-customer value	
5	LSP offers low priced distribution	
6	LSP offers adequate options of freight forwarder	
7	LSP links production and sales functions efficiently	
8	LSP handles orders efficiently	
9	LSP offers most suitable transportation options	
10	LSP maintains adequate stock level	
11	LSP enables us to sell more	
12	LSP improves the order handling process to make it easier for us and the end customers	
13	LSPs actively reviews the stock level of to ensure the stock availability	
14	LSP actively improves the distribution solutions	
15	LSP adopt unique and distinctive ordering process.	

7. **Logistics Excellence**

Please use the following scale and if an element is not applicable to your firm, leave it blank.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**

S.No	Logistics Excellence	Response
1	Geographical reach increased	
2	Costs of operation optimized	
3	Productivity optimized	
4	Competitive price	
5	Customer service improvement	
6	Profitability improved	
7	Quality improved	
8	Time to market optimized	
9	Delivery efficiency -effectiveness	

Section C

1. Name of the Firm :---
2. Name of Industry :--
3. District : --
4. Designation of the respondent :--
5. Date of data collection :--
6. Name of the respondent :---