Majors: SCM
S. No. 30

Role of Transportation in Design and Implementation of Reverse Logistic System in Pakistan

By:

Muhammad Dain Usmani **Enrollment #01-3211820-28**

MBA/SCM

Saqib Mushtaq
Supervisor

Department of Business Studies
Bahria University Islamabad

Fall-2019

FINAL PROJECT APPROVAL SHEET

Viva-Voice Examination

Date __/__/____

Topic of Research: **Role of Transportation in Design and Implementation of Reverse Logistic System in Pakistan**

Names of Student: Muhammad Dain Usmani

Enroll # 01-3211820-28

Class: MBA

Approved by:

_____

Saqib Mushtaq

Thesis Supervisor

_____

Examiner-I

_____

Examiner-II

_____

Dr. Syed Haider Ali Shah

Research Coordinator

_____

Dr. Muhammad Ali Saeed

Head of Department

Management Sciences

ABSTRACT

This research focuses on project deliveries in Pakistan construction sector through transportation. This study is important for the development of the reverse logistics performance by applying the appropriate management practices and policies in construction industry working in Rawalpindi and Islamabad (Pakistan). Employees from departments related to transport and SCM system in selected organizations are the participants of the study. A standardized questionnaire has been used for data collection which has been taken from related literature that endeavors to collect data about all the variables. 70 questionnaires have been collected which were filled properly. It was discovered that all professionals were process/project ready which indicates that the people have the capability to change and implement supply chain management, personnel are literate and have the skill and expertise to adopt supply chain management, an organisation structure that supports supply chain management, training procedure that supports supply chain management, and a strong inhibition to factors limiting the implementation of supply chain management.

Keywords: SCM, Transport, reverse Logistics and Implementation, Construction Industry

Dedication

To my Beloved & Respected

Parents & Family

Declaration Form

I, Muhammad **Dain Usmani, Enrollment No:** 01-3211820-28; **MBA** hereby declare that the thesis has been submitted by me in the partial fulfillment of the requirement for the degree of MBA and this thesis present research carried out at Bahria University Islamabad Campus and aims encouraging discussion and comments. The observation and viewpoints expressed are the sole responsibility of the author. It does not necessarily represent positions of Bahria University Islamabad Campus or its faculty. I also understand that if evidence of plagiarism is found in my thesis at any stage, even after the award of my degree, the work may be cancelled and the degree revoked.

Date 19/12/2019

Muhammad Dain Usmani

Enrollment No: 01-3211820-28

MBA/SCM

Email: m.dain78_usmani@hotmail.com

Acknowledgement

All praises for the **All Mighty ALLAH** who is most Beneficent and the Most Merciful. I would like to give my thankfulness to my supervisor **Mr. Saqib Mushtaq** who due to his kind support, motivation, experience and knowledge made me complete this research thesis. I also thank to my parents, family and children for their sincere and continuous support during my studies.

Date 19/12/2019

Muhammad Dain Usmani

Enrollment No: 01-3211820-28

MBA/SCM

Email: m.dain78_usmani@hotmail.com

TABLE OF CONTENTS

CHAPTER NO 1

INTRODUCTION

The chapter includes background, problem statement showing the previous research gap then proceeds to explain the objectives, research questions, significance and sequence of the study. Finally, an overview of the way in which the study is conducted has been provided.

1.1Background of the Study

The role of logistics increased approximately 30 years ago, when the regulation of international trading began to diminish and thereby trading between nations became easier through free market focus. All in all, the free trade helped the competitiveness of transport logistics services, as the costs of logistics diminished (Wood & Wardlow,2015: Gourdin,2017: Hickey & Cassidy,2018).

Furthermore, the founding of EU in the 1990's made transportation logistics a lot easier between the member states. Even though the world has faced significant changes in the past decades, logistics has been and still continues to be an important part of business. If compared to earlier days, logistics is nowadays seen as an integral part of the whole business model, rather than a separate function, which managers just have to deal with (Cassidy,2018).

According to the Council of Logistics Management, logistics professionals have been publishing studies since the early nineties. Reverse logistics (RL) is considered a significant part of society and business (Stock,1992) as it deals with the reverse flow of used products from the point of consumption to the point of production.

Research on barriers and drivers to implementation of reverse logistics has concentrated on developed nations rather than developing nations (Rahman,2014). RL is in its infancy stage in developing nations, particularly Pakistan. However, researchers have pointed out that the lack of research in developing countries is hardly surprising, although RL is considered a significant component of the supply chain. Pakistan is a developing country, positioned at number six in the world population with 201 million inhabitants. In 2016, it was the second-largest economy in South Asia with a GDP of $988.2 billion and growth rate of 4.7% (Zahidi,2016).

Awareness about drivers, barriers, and opportunities in Pakistan is truly limited, and there is no literature review on it. However, RL has been gaining attention in the country owing to awareness of the "Draft Hazardous Waste and Hazardous Substances Rules" (DHWHSE), 2016, in Sections 13 and 14 of Pakistan Environmental Protection Act, 2013 Hazardous Substances Rules (2017); green marketing, economic issues, implementation of a new environmental policy, recovery of valued used products, and improving social conditions. Although the policies mentioned above are significant drivers for RL in Pakistan, an effective processing system should be developed in order to achieve the objective of sustainable RLS for a variety of consumer-used products, such as lubricants, pesticide packing, batteries, lights, bulb, tires and electronics equipment, which are not properly disposed of.

There must exist a system in Pakistan that has the capacity to return these solid waste items into the original production supply chain (Mubashir,2018). However, companies' knowledge of barriers to RL is limited and poorly addressed in developing countries.

One could easily state that the globalization of business has increased the importance of logistics operations (Karhunen & Santala,2018). Logistics efficiency is estimated to build 20 percent of the competitiveness numbers for the Finnish industrial companies (Paavola & Iikanen, 2012).

Logistics serves as a value creating driver for the customers (Gourdin, 2017) and the choice of right transport mode is seen as one of the key things in the logistics management perspective (Meixell & Norbis,2014). Fortunately, many companies have understood that the quality of logistics services creates the real value (Laari & Töyli, 2012).

However, Manuj and Mentzer (2014) remind that when conducting global logistics, one faces several risks. As a matter of fact, the increased role of globalization adds the risk factors for logistics remarkably (Solakivi *et al.*,2012). Manuj and Mentzer (2014) suggest that logistics companies should be ready to encounter these risks by proper risk management strategies.

As a matter of fact, the research of Tavasszy, Ruijgork and Davydenko (2012) shows that the change process of logistics continues, as the role of information and technology increases in all industries, not only in logistics. The reverse logistic is define has "the process of implementing and controlling the efficient, cost effective flow of raw materials, in process inventory, finished goods and related information from the point of origin for the purpose of recapturing value or proper disposal(Rogers & Tibben, 2014).

Based on the industry and channel position the practices of the reverse logistic vary across the companies. The industries where returns are higher than the cost, they have a better reverse logistic system and processes. The returns are

considered to be main determinant of the profitability. The industries of Pakistan need to make major improvement regarding the return issues and understand how to manage the reverse logistic effectively. (Elmas & Erdoğmuş, 2013)

The progress in techniques of transportation plays an important role in implementation of logistic system through improved service quality, operational cost and delivery speed etc. The importance of logistic has been growing in various areas due to the increase in globalization and nationalization in recent years. (Tseng *et al.*,2013)

Transportation system play a key role in logistic by joining the separated activities. The performance of logistic is influenced by transportation system because transportation occupied one third of logistic cost. The transportation is considered has a core business in many industries because transportation is required in delivering the manufacturing products to final consumers and returns (Sreenivas & Srinivas, 2013).

Most of the companies use reverse logistic has a source of feedback from their customers because these days it is important for companies to listen to their customers to survive in this competitive environment. The response rate for reverse logistic and feedback process is different from one industry to another industry. The component and materials which are collected after consumed are transported back in supply chain for reused or recycling purposes are part of reverse logistic. Different tools of traditional logistics management required knowledge about materials, allocation of waste, manpower skills, and detailed infrastructure for efficient design and implementation of reverse logistic system (Corrêa & Xavier,2013).

Yusuf & Raouf (2013) provided the framework for reverse logistic by means of optimizing the social, stakeholder, economic and environment gain and also highlighting the variety of waste and its operational methodology in Pakistani industry. The operational framework of reverse logistic consists of different factor which are lack of awareness about reverse logistic, inadequate information system, financial, forecasting and economic constraints etc. The design of reverse logistic consists of development of social, economic and environmental aspects of different industries.

The effective reverse logistic management is enhanced has a competitive advantage because it improves the customers trust and reduce environment pollution & material cost. The products are returned or discarded because they are no need any more or they are not function correctly. The reverse logistic activities include acquisition, inspection & separation, reprocessing, disposal, direct recovery and re distribution of products. There are different operational models of reverse logistics which include self employee, pooled and outsourced models. (Khan, & Zhang, 2012)

In supply chain management, reverse logistic shows relatively new directions and gain increased attention for practitioners and researchers. The main characteristic of reverse logistic is related with different uncertainties like return time of the product, location, amount of recovered products etc. (Pinna & Carrus, 2012).

The Reverse logistic shows growing importance in supply chain. The organization need to prioritize the operations related to recycling, reusing and cost minimization to have competitive reverse logistic activities. The writer aim is to build up a basic framework for the implementation of reverse

logistic system to sustain supply chain in Brazil (Corrêa & Xavier, 2013).

The logistic process related to the recovery of products from customers to the producer includes different operations like recycling, waste disposal, repairs and remanufacturing. The business needs to improve their competitive strategies by establishing the mechanism for recovery and reuse of products. It's difficult to design and implement an efficient reverse logistic because there is so much uncertainty about the products quality, depreciation and time period. (Romero & Gutiérrez, 2012)

1.2 Research Gap

Due to the lack of infrastructure and knowledge about the concept of reverse logistics the business sector of Pakistan shows less effective practices toward implementation of reverse logistic system. When planning a transportation strategy, there are different kinds of alternatives that are driven by surrounding opportunities of transport logistics (Valtioneuvoston, 2019).

Unfortunately, RL is still unexplored in Pakistan, and environmental degradation remains an urgent global problem. Pakistan is a country with low environmental protection standards. Firms generally perceive RL as an underestimated part of RLS (Haq ,2018). The transportations are often linked to large projects, meaning that these transportations are often project deliveries and there is a clear need for understanding these types of processes. Transporting goods to international markets is not easy, as there are lots different factors that might hinder the whole business process.

1.3 Problem Statement

Supply chain management is a network of organizations or entity, that are tied through an upstream and downstream linkages via different processes and activities with a view to producing valuable goods and services to satisfy end users Tiwari *et al.*,(2018).

In order to cope with the challenges driven from global transport logistics, there has to be profound understanding of how these different transport modes differ from each other Transport logistics faces several barriers that harness the fluency of transportation processes (Aas, Halskau & Wallace 2018; Siuruainen, 2017).

This study seeks to underline the role of transportation in design and implementation of Reverse Logistic System in construction industry of Pakistan.

1.4 Research Question

What kind of role Management Readiness can play after Implementation of Reverse Logistic System?

How can Transport Readiness be beneficial for Implementation of Reverse Logistic System?

What is the role of People Readiness on Implementation of Reverse Logistic System?

What is the role of Technology Readiness on Implementation of Reverse Logistic System?

How Environmental Impacts can influence the Implementation of Reverse Logistic System?

1.5 Objective of the study

To find the impact of Management Readiness on Implementation of Reverse Logistic System

To find the impact of Transport Readiness on Implementation of Reverse Logistic System

To find the impact of People Readiness on Implementation of Reverse Logistic System

To find the impact of Technology Readiness on Implementation of Reverse Logistic System

To find the impact of Environmental Impacts on Implementation of Reverse Logistic System

1.6 Significance of the study

This study is important for the development of the reverse logistics performance by applying the appropriate management practices and policies. These policies and practices are essential because society's concern about the environment and good picture of the company is increasing.

In current era of the business, supply chain practices ar non ignorable and it is necessary to consider the interests and values of the customers. In Pakistan these practices are normally do not follow and these practices are at very early level. So this study demonstrates that these policies and practices can change the reverse logistics performance.

Reverse logistics practices are very essential in overall performance of the supply chain and organization. It is linked with the products which are already used and to reproduce them. It is highly recommended that companies must use the appropriate

procedures for the re producing the products because of the society concerns.

To optimize the supply chain in current market situation, the research shows the role of transportation in design and implementation of effective and efficient reverse logistic frame work.

1.7 Organization of the Study

This chapter One: Covered the brief introduction of basic idea of the study, its problem statement, objectives, significance and necessary terminologies used in the study.

In chapter Two: Detailed review about previous studies has been included in this chapter. Key definitions, variables as well as their specific definitions given in past literature, framework & hypothesis have been discussed.

In chapter Three: The information about population, sample and collection of data along with data analysis has been mentioned, information about adopted questionnaire, likert scale used in this study and information about the statistical tests for final empirical analysis.

In chapter Four: This chapter incorporates All statistical tests i.e. reliability test, correlation, descriptive stats and regression analysis have been used and their proper explanation has been explained.

In chapter Five: Conclusion, Recommendation, Implications and future research have been drawn after applying the statistical tools on the data. These conclusions are based on the acceptance and rejection of the hypotheses drawn for the study.

CHAPTER NO 2

LITERATURE REVIEW

This chapter provides an overview of previous research on knowledge sharing about the variables and theories. It also presents Theoretical framework and hypotheses of the study that comprises the main focus of the research described in this thesis.

2.1 The Concept of Supply Chain Management

The concept of supply chain management is believed to have stemmed from and thrived well in the production and manufacturing segment. The first obvious evidence according to Adebayo (2012) and shingo (1988) in vrijhoef and koskela (2016) were in JIT delivery (appropriate delivery time) system used by Toyota Automobile; it's a practice that was majorly to regulate the supply of Toyota Products in the appropriate small quantity in the appropriate needed time.

Deming (1982) asserts that the stimulus was born in 1950 when Deming in a statement to Japanese leaders suggested a collaborative working which incorporates suppliers in a long term relationship built on trust and loyalty would lead to improvement in quality and decrease unnecessary high production cost. Vrijhoef and Koskela (2016) and Chen (2018) stipulates that the idea of supply chain management was introduced from the management principle during the 1960s, on the conviction that a solitary activity cannot guarantee the success of a system or series of activities.

The concept can be said to have emanated from the need to improve performance by improving quality, decreasing cost and time of production. The concept of supply chain management

having worked effectively in other segments needs to be adapted to the sector of construction in spite of the difference of this sector with other sectors like the manufacturing and production in these three ways; projects are one-off in nature, production are usually onsite and organisation is temporal (Koskela, 2017 as sighted in khalfan, 2018) efforts have been made by researchers and workers in the construction industry to implement this concept Supply Chain Management like other innovations from the production and manufacturing industry was developed in the 1960s based on the conviction that a solitary activity from a party (be it client, consultant, contractor or subcontractor) cannot ensure the effectiveness of an entire system (Chen, 2018).

Amade *et al.,*(2016) asserts that paucity of understanding of supply chain management concept alongside unclear strategic benefits is the major constraints to the deployment of supply chain management. construction industry's Supply chain management is however not narrowed to quantity surveyors alone as all parties plays a crucial role it is therefore imperative to investigate the extent of awareness of other professionals in the built environment and construction practices, their level of involvement in supply chain management activities alongside the constraints to successful adoption of supply chain management practices.

Saad*et et al.,*(2016) identified and raised a fundamental issue related to the effective implementation of supply chain management practices which is the degree of preparedness of the organisation to adopt supply chain management practices. This was confirmed in Aje*et et al.,*(2015) where there was an average level of awareness of supply chain management practices among quantity surveyors however; there was low level of participation

and involvement of quantity surveyors in supply chain management practices.

2.1.2 Importance of Transportation in RL

The inbound and outbound transportation system provides the flow line for the conduct of RL operations. Jayaraman and Luo (2015) provided the insight that the delays in transporting, sorting, grading, and disposition of the returned printers only serve to reduce the value remaining in the product. Tracey (2018) stated that transportation is often ignored as a source of competitive advantage. This work examined the impact of inbound and outbound transportation performance in terms of meeting delivery schedules and providing a timely reply to inquiries on the firm's ability to achieve product variety, product quality, manufacturing cost reduction, satisfactory delivery service, and acceptable overall performance.

Trebilcock (2016) stated that the successful handling and transportation of returns is as important as filling orders for customers. Andel and Aichlmayr (2016) showed the importance of transportation by using a software system for inbound and outbound return management modules that automatically determines approval or denial of the return, status changes for tracing products in receiving, inspection, and pre-disposition, etc. US companies are spending in excess of $35 billion per year on handling, transportation, and processing of returned goods (Meyer 2015). In conclusion, the literature in this area pointed to the importance of transportation in RL.

The citations and figures are mostly macro in nature. Often, the importance of transportation in literature is highlighted by the negative consequences of having inadequate or ineffective transportation systems than outlining the advantages of having a robust and effective transportation system. This

highlights the passive and inactive nature of transportation activities undertaken by many firms.

2.1.3 Transportation costs, concepts, and models

Sahin *et al.*,(2012) stated that one of the important parameters in the determination of optimal transportation costs is the state of the economy. The authors further stated that realistic technical, economical, and operational parameters are needed for determining transportation costs. Efendigil *et al.*,. (2014) stated that transportation of returned goods have different characteristics compared to forward logistics transportation both in terms of complexity and cost of required operations.

Sahyouni *et al.*,(2015) developed three generic facility location models for the integrated distribution andcollection of products. The models quantified the value of integrated decision making in the design of forward and reverse logistics networks by focusing on facility and transportation costs throughout different stages of a product's life cycle. Karabuk (2015) developed integer-programming models and a computerized decision-support system to address the problem of scheduling the pickup and delivery of daily inventory movement between plants. These plants belonged to a textile manufacturer that owned and operated a trucking division.

Lieckens and Vandaele (2015) developed an RL network in order to minimize the investment in transportation costs (among other factors) by using a mixed integer non-linear program. Srivastava and Srivastava (2014) explored the role of transportation and modelled transportation unit cost in RL.

Considerable attention should be given to monitoring and controlling transportation costs as the additional transportation costs to return the products/parts to the

warehouse for processing are usually a part of the manufacturer's operations and the overall product costs (Aichlmayr 2016).

Stock and Lambert (2016) have suggested that return goods handling often increases both the complexity and costs of transporting, storing, and handling products. Shear (2013) stated that combining 'pallet rate' pricing from carriers and pallet tracking from store to-vendors allows for the most cost efficient hauling of returned items. Further, Cooke (1991) stated that transportation congestion is one of the two major ways in which environmental concerns influence how logistics managers perform their jobs.

Lambert and Sterling (1984) developed a model in order to identify and manage costs associated with the shipment and handling of inbound materials and component parts. The implementation of the model resulted in transportation and handling cost savings of over $1.1 million a year for a company. In short there are many concepts and models associated with forward transportation costs as opposed to the costs associated with RL transportation costs. Determining the average transportation cost per returned item could be a challenge for many companies engaged in RL.

2.1.4 Third-party Transportation Providers

Cooke (1991), Krumwiede and Sheu (2016), Muffatto and Payaro (2018), and Efendigil *et al.*,(2014) focused on the role of a third-party transportation system and provided decision-making models and concepts for the feasibility of implementing third-party transportation systems. Byrne (2014) showed the result of a study that found 86 per cent of RL decision makers believed that outsourcing gave them more control over their operations and 55 per cent of RL decision makers believed that

outsourcing assisted them to implement changes faster and more effectively.

Meade and Sarkis (2016), without focusing on transportation systems, presented a model of selecting a third-party partner for a function of the RL system. The authors stated that the factors that play an important role in selecting a third-party RL provider differ from some traditional factors for supplier selection.

Cairncross (1992) suggested that initial transportation is affected by whether the customer or waste manager is responsible for collection. In conclusion, the literature in the area of third-party transportation providers offers many choices and a framework for implementation. It is likely that the third-party transportation option will gain more acceptance and be used by many companies in the future. This is critical as companies outsource the services for which they do not have resources or expertise.

Umer & Afzal (2014) studied the reverse logistics in soft drink bottling industry of Pakistan. The conclusion suggests that reverse logistics play in important role in achieving competitive edge in soft drink industry. Also the companies need to design an appropriate framework for implementing reverse logistic system.

Mu & Ma (2014) study the issues and improvements related to the design and implementation of reverse logistics. The reverse logistic information system design and implementation face different problems due to the lack of understanding about the concept of this system. Due to the rapid improvement in science and technology, the utilization of resources and human development & productivity has been increased from recent years.

Now a day's companies pay attention to establish an effective logistic system in order to increase profits, improve customer service, control production cost and advance their competitiveness. Improvement in technology will provides a good platform for the information system of reverse logistic. With the help of newly build technology like GPS, GIS, RFID and EDI the reverse logistic play an important role in design and implementation of information system.

Ramos *et al.,*(2014) aimed to backing up the strategic and real time policies which are useful in decision making of RLS and keeping the objectives of economic and environmental and social. In this study, explained that in the past only economic factor were normally considered but now a days also environmental factor also consider while making the policies.

Lambert & Kader (2016) studied an appropriate proposal to make decisions in RLS which covers different aspects of situations which occurs in the real time working. They came up with the proposal which consists of seven points of RLS and further break down in three stages which are (strategic, tactical, and operational). These three stages were practically implemented in different industries to check the succession of analyzing and the model which were proposed consisted on three stages. The framework which was proposed in the study are really help for the managers and the decision makers in real time working to the arrangements of their reverse logistics policies and practices which they used to run the operations f reverse logistics and also gave the opportunity for the researchers for doing the better work on it and propose a well satisfying models.

Company wants to set a suitable model for reverse logistics and less costly and also which isn't harmful for the environment

model for reproduction for those products which life ends for use, suitable RLS model is required in the supply chain. They proposed a model which is good for the RLS. This model is beneficial and less costly and also less harmful to the environment for the RLS by Millet(2016).

In supply chain logistics department main aim is to satisfy the customer needs and in this study they examined on the customer satisfaction with the logistics. They examined that which is most important factors which should be on the front in RLS. It is for sure that customer is first part to play role in the RLS so this consideration increases the attention towards customer care. In this study multivariate test applied to the data of 267 Portuguese people. They identified that how much level should be there for customer satisfaction in the RLS Valle, (2014).

As the society is being more aware about the environmental factors so the demands from the society to the firms are increasing for the utilization of no continued items of the nature and pressure is also increase on the firms to reduce the post utilization to the junkyards and therefore harming to the environment. In this study main focus is on three factors and those are reduce, reuse and recycling. In the RLS of the supply chain these factors are vital. We can see the examples when the production companies collect the waste material of used products. It is better to use the waste material back in the supply chain of logistic than to waste the used material in junkyards Corrêa (2013).

Industries are increasing their ways to use back the waste material of used products and also trying to keep the environmental factors and benefits of the society and economical factors. Strategy making for recycling the used products for any

organization is very serious point to make. This study examined that to implement the strategies for recycling the used products is vital industrial sector Mohamed, *et al.,* (2015).

2.2 A framework for Design and Implementation of Reverse Logistics

An integrated approach, rather than a piecemeal approach, to the design and implementation of RL is a necessity (Fleischmann *et al.*,. 2017). According to Stock (2012), this integrated approach should be mapped or flow-charted. This approach is also useful with the planning, designing, implementing, and controlling of all RL activities. The framework provides for the understanding of the relevant sub-factors and their interrelationships for the design and implementation of RL. Assuming that an in-house operation is selected the product may be remanufactured or recycled depending on previous RL operations. At this point, a valuable returned product/part has been salvaged.

Murphy (1986) stated that truck transportation was the preferred modal alternative in RL. The decision point B in Figure 2 also allows for the corrections of problems at hand so that the RL process can continue. If the appropriate intermodal transportation and routes cannot be developed then the process may be terminated.

2.2.1 International Transport Logistics

Traditionally, transport logistics is seen as a process of delivering product from point X to point Y Gourdin (2017). However, logistics is not just moving goods; it is something far more complex. Naim, Potter, Mason and Bateman (2014) point out, that logistics adds value to the customer relationships. Logistics is needed in varying industries. This means that every case is somewhat unique. Actually, there are lots of variations,

if comparing the logistics chains of different industries and companies.

One company could focus entirely on manufacturing, whereas the other on the whole supply chain from the factory site all the way to the end customer Gourdin (2017).

International business occurs between cross national borders, which means that logistics competence is one of the key issues, when exporting goods to different locations. One has to remember that geographical distance has always been one of the most significant elements of transport logistics processes. From managerial point of view, it would be important to get the costs of logistic chain as low as possible, which means that the evaluation of different transport modes (e.g. air, maritime, railroad or road) is always a crucial decision from the financial perspective, when planning the supply chain management strategy Bowersox & Calantone (2012).

According to Hickey and Cassidy (2018), the real challenge for managers is simultaneously to both increase the level of logistic quality and to reduce the costs. Due to the emerging globalization, the business environment itself becomes more complex. If compared to earlier decades, there are more international factors that cause problems to the business operations, including the transport logistics. Moreover, different cultures set their own challenges and the management has to be aware of these challenges the foreign market entries bring with Dornier, Ernst, Fender & Kouvelis (2012).

Bowersox, Closs and Stank (2016) argue that global logistics has to deal with various political, labor, cultural and economic environments. Moreover Large, Kramer and Hartmann (2013) note that there should be a special focus of sustainability in transport logistics. Throughout the centuries the transportation has been essential part of global economy. In

fact, many empires have been built upon superiority of transport logistics. This explains why logistics has become an integral part of national economies. The institutional role of logistics has meant that the transportation of goods has always been actively regulated with laws, which has also caused lots of bureaucracy. Unfortunately these regulations tend to barrier the trade process quite effectively. One of the main problems of this governmental bind in logistics is that, due to wide ranging regulations, the competitiveness of the branch suffers. To encounter this problem, there has been a trend of privatizing the logistics services out of governments' influence Gourdin (2017).

However, this deregulation process still continues in many countries. According to Tibben-Lembke and Rogers (2014), the deregulation of transportation has led to emergence of using third-party logistics services. By using third-parties in logistics, the companies will be able to better concentrate on their core business.

Transport logistics deals with the actual process of moving the products. Therefore, the transportation of goods is considered to be an integral part of the whole business transaction. Due to the earlier mentioned free trade, the logistics process has become easier to accomplish, and at the same time the development of more efficient logistics strategies and IT systems, has helped the logistics managers to plan the logistics chains more efficiently. Due to these developments, the cost of transport has diminished and the quality of service has improved Gourdin (2017) One of the key things in transport logistics is the element of time (Morash & Clinton 2013).

According to Murphy and Farris (1993), time is the most important dimension of logistics service, even more important than the quality or the costs. The schedules can be met with

efficient supply chain management. Therefore logistics strategies, like JIT, have become key points for the logistics companies. Being a reliable and punctual partner creates value for the customer. It is essential that transportation logistics focus is considered, when making supply chain decisions (Murphy & Farris 1993; Morash & Clinton, 2013).

According to Dobie (2013), some logistics companies have tried to build their competitive advantage through price reductions, but with light results. This type of strategy focus has led to diminished service quality, which causes lots of problems. In order to be competitive logistics operator, one has to create competitive advantage through different values (e.g. service quality) than price levels.

Gourdin (2017) has noted that, as the companies globalize, the costs of logistics operations increase. This means that companies need personnel, who can deal with this challenging international business environment. One of the most significant changes in transport logistics in the past decade has been the trend of outsourcing logistics services. This evolution might be caused by the fact that the decisions concerning supply chain management demand lots of knowledge that has been lacking in many companies. Due to growing importance of logistics, the companies cannot afford making bad transport related decisions. Therefore some companies have made a strategic decision of outsourcing their logistics services for the professionals Hickey & Cassidy (2018).

Lehmusvaara, and Korpela (2015) argued that the outsourcing of logistics has made the choice of right transport mode more important. This trend of outsourcing has actually helped some businesses to flourish. The research of van Laarhoven, Berglund and Peters (2016) shows that, the outsourcing of logistics services has worked well in many cases.

Peters, Lieb and Randall (2012) discuss that outsourcing of logistics has become natural in many companies, as the companies have understood the benefits outsourcing creates. One of the key benefits of outsourcing has obviously been the cost cutting ability and increased satisfaction amongst customers (Peters *et al.,* 2012).

However, Sanders, Locke, Moore and Autry (2015) found out in their research that the problem of outsourcing logistics services is in managing the outsourcing relationship. Dornier *et al.,*(2012) point out that technology has improved the quality of logistics by adding useful IT-tools for logistics, making the transports faster and the information more reliable.

Wong, Lai and Ngai (2012) discuss that, when information technology is applied in transportation systems, the logistics companies gain significant efficiency and most importantly cost reductions. However, it is crucial that there is a real cooperation mentality, when using information technology in transportation logistics, because the technology itself works only as enabler and the actors are the ones responsible for its effective use (Wong *et al.,*2012).

According to Gourdin (2017), IT systems have indeed helped the monitoring of the logistics chains. Many technological solutions (e.g., GPS) have made possible to follow the logistics process in real time. One could easily use this kind of information to overcome some possible problems faced during the transport, and this information can be shared between the logistics chain partners Dornier *et al.,*(2012).

When thinking about the role of supply chain management (RLS) for the transportation logistics, the global focus of managers has changed from logistics cost cutting to more flexible and specialized offerings.

This kind of new approach opens better competitiveness for new market entries. In addition, the relationship between the companies and governmental bodies has a significant impact on the international and domestic trade, which means that decisions regarding social factors, environmental issues or simply RLS costs can affect the importing and exporting Ross, Parker, Benavides-Espinosa & Droge (2012)

Actually, the real challenge for freight carriers is to make the transportation with higher quality and at the same time to stay in schedule without any cargo damages. On one hand, the emergence of efficient IT-systems has helped to meet these high requirements. On the other hand, the biggest challenge still remains in environmental issues. Regulations, such as emissions and engine standards, set new challenges for the whole industry Dobie (2013).

At the same time, the transport industry deals with lots of competition, mainly driven by price-level fluctuations (Lammgård 2012). Logistics provider has to be ready to adapt to the changing customer needs. In general, this means that the supplier-customer -relationships has to be flexible to secure maximum value for the customer. When offering these types of flexible services, the logistics companies are able to gain competitive advantages Naim *et al.*,(2014).

This means that the role of marketing activities increases in the customer relationships of logistics industry. One of the key things in logistic chain is that the supplier and customer cooperate already in the design phase of the products. All in all, cooperation in the early phases is needed to build and sustain successful logistics customer relationships (Flint & Mentzer, 2016).

2.2.2 Transport Modes & Carrier Selection

The choice of transport mode and freight carrier consists of *air transport*, *maritime transport, railroad transport* and *road transport*. When planning the mode of transport, many things must be taken into consideration. First, one has to remember that there is always a schedule which has to be met and at the same time the cost of transport should not be too high. Second, the goods must not suffer any damage during the transportation. Third, the service should be flexible and customer has to be able to trust the supplier Gourdin (2017).

The choice of transport mode and carrier has great impact on both customer satisfaction level and costs (Lehmusvaara *et al.,*. 2015). Liberatore and Miller (2015) discuss that these different transport mode choices have to be planned carefully, because the quality of logistics services can vary a lot. Murphy and Farris (1993) point out several factors that have impact on the transport mode choice (e.g. time, costs & reliability). They suggest that one should give greater importance on service quality, rather than costs approach in logistics management. However, there could be a problem of increased customer price levels due to the improvement of service quality Murphy & Farris (1993).

On the contrary, Gibson, Rutner and Keller (2016) argue that costs are still the most important determinant in carrier selection. Gibson *et al.,*(2016) add that costs can be diminished by adding cooperation between the shipper and carrier. It would be important to remember that customers' value preferences might vary and change a lot, which means that the logistics companies need to be ready to both identify those changes and to react as fast as possible Flint & Mentzer (2016). In addition, different cargo types need different kind of service (Ludvigsen, 2015).

One of the most commonly used transport cargo type is container. The containers are very handful, because they can be used in several transport modes Gourdin (2017). As discussed by Davidsson *et al.*,(2013), different transport modes hold varying pros and cons. Davidsson *et al.*,(2013) point out that maritime- and railroad transports are more commonly used, when transporting bulk materials. Both of these modes are quite cheap, if compared to air transport. When comparing these four transport modes, road- and railroad transports demand more infrastructure during the actual transportation, than air- and maritime transport, which operate in air and water surroundings Of course air transport and maritime transport need infrastructure as well (e.g. ports and airports), but the actual transport is more flexible in these settings (e.g. routing) Badger, Bugg & Whitehead (1993).

According to Liberatore and Miller (2015), logistics managers have to evaluate the transport modes through different types of measures. This means for example decisions of costs vs. service quality or delivery time vs. reliability –dimensions (Liberatore & Miller 2015). Kent, Parker and Luke (2017) list that the most important criteria for transport mode choices are*:* "quality, know-how & problem solving, prices, reaction to complaints, accurate billing, equipment availability and dependable transit times".

Kent *et al.*,(2017) add that by giving great interest in these factors, the logistics firms should be able to overcome the difficulties of not knowing what creates value for their customers. According to Evers, Harper and Needham (2014), the selection of transport modes depends on the perceptions the logistic managers have on the modes. Thus, the decision of transport mode is made by evaluating the possible transport modes with certain criteria formed through the experiences and

knowledge that managers have. For instance, they have to evaluate "timeliness, availability, firm contact, suitability, restitution and cost of the transport mode". In particular, the timeliness and availability are seen as the most significant determinants in the decision-making process Evers *et al.*,. (2014).

Premeaux (2016) noted that the role of information in transport logistics has increased significantly. One of the reasons for this kind of shift might be the increasing role of information in the society itself. The carriers have also become more aware of the things the shippers seek in the business relationship. There is also a growing need for better service quality, customer relationships and availability. It is essential that both shipper and carrier understand, what kinds of transport factors the other party appreciates, and how those factors could be met.

No matter what the transport mode is, it is crucial that the buyer and supplier use collaboration in their relationship, when planning and managing the transportation (Esper & Williams 2017). According to Esper and Williams (2017), the collaboration in transportation management reduces both logistics cost and risk and adds service quality and capability. Esper and Williams (2017) add that this collaboration should be coordinated somehow to avoid ineffective outcomes. Cooperation is equally important in carrier-shipper relationships, to gain lower costs and better service levels (Caplice & Sheffi 2017).

For instance, IT systems can help the parties to share information and make the relationships more effective Esper & Williams (2017). One of the key issues in collaboration approach is that the parties do not act for individual purposes. The parties have to be able to trust each other to gain the maximum

value of the relationship Skjoett-Larsen, Thernoe & Andresen (2017).

Gibson *et al.*,(2016) highlight that the carrier places high value for trust, effectiveness and flexibility in the relationship. Carter and Ferrin (2015) discussed that in certain situations the buyers show no interest towards the transportation process, because they feel that their involvement is either not needed or not appreciated. Carter and Ferrin (2015) point out that it would be important that the buyer is also involved, because effective supply chain management calls for cooperation from all parties. There has to be fluent communication between the logistics chain partners. By sharing information, each party knows what is expected from them, and the increased communication helps to build customized services Flint & Mentzer (2016).

Each transport mode can be seen as competitive method, but actually they support each other (Wood *et al.*,. 2015; Gourdin 2017). The whole logistics chain is rarely constructed of one transport mode (Gourdin 2017). Especially containers are good example of these kinds of intermodal transports, because they can be transported easily with several carriers (Wood *et al.*,. 2015: 160-161). However, using several transport modes together could also face some difficulties (D'Este 2014). These problems might be encountered with coordination between different activities and cooperation of actors. In addition, technology plays a key role in building effective intermodal transport Rondinelli & Berry (2016).

According to Kelleher and Arshad (2017), the intermodal transport calls for fluent information sharing between the operating parties. The supply chain members have to be able to follow the transport data and the ongoing delivery process with help of IT-systems. By adding cooperation between the parties,

unnecessary delays and costs can be avoided Kelleher *et al.*,. (2017).

The research of Lammgård (2012) in Swedish logistics industry shows that intermodal transport cannot compete with single modal road transport in price levels, although this is mainly caused by current fuel costs and taxation. He reveals that the inadequate railroad infrastructure causes a great barrier for transport logistics branch in Sweden.

Quite interestingly Ludvigsen (2015) discusses that it is more common to use single-modal routes than intermodal routes in Nordic countries. This might be caused by the fact that the shippers usually demand high quality transports and single-modal transport might deliver better overall quality in many cases. However, the most important intermodal transport criterion for the Nordic companies is operational excellence. Although having similar cultural background, the Nordic countries differ from each other in many ways, which casts a limitation for making generalization of logistics processes. All in all, one could say that the quality measures of transport logistics are far more important for the Nordic companies than the costs Ludvigsen (2015).

One has to take into consideration that the infrastructure has impact on the use of several transport modes, because some modes might be impossible to combine due to undeveloped national infrastructure. All in all, the use of several transport modes together, as a one shipment, is more reliable, cost efficient and it ensures better safety for the cargo Gourdin (2017).

The research of Regmi and Hanaoka (2012) shows that intermodal transportation in global scale could face several barriers deriving from: "infrastructure, border crossing process, interaction of transport modes at the borders,

unavailability of wagons and frequency of freight trains". Regmi and Hanaoka (2012) discuss that the use of information systems in transport logistics could help to deal with these kinds of barriers. The cargo for instance, has to be attached very carefully, because the circumstances are often quite of harsh. One of the problems concerning the attaching is the different level of quality. This means that the foreign customer and the supplier could have differing perceptions of how the cargo must be attached.

Gourdin (2017) Especially the maritime cargo faces lots of hard weather conditions and the cargo has to be stowed carefully to prevent cargo damage. Safety is actually very important part of every logistics process. Fierce competition can drive the companies to limits, which can eventually mean reduced safety levels. The problems usually occur, when there is too small amount of workers handling the cargo.

2.2.3 External forces in Transport Logistics

Logistics has changed many ways in last decades, as longer transporting distances have become possible and at the same time the infrastructure and technology have developed (Nielsen *et al.*,2017). Dobie (2013) discusses that transportation companies are nowadays surrounded by uncertainties, because the environment, where they are operating has become so unstable. Especially the market, competition, technology and government regulations are causing changes that have great impacts on logistics decisions.

Dornier *et al.*,(2012). All of these forces act as a significant barrier sources in transport logistics. Business markets change all the time, as varying factors (e.g. customer preferences) have instant impacts on the logistics process. The fierce competition of the logistics industry drives the firms to gain competitive advantage through RLS, which causes shifts in

logistics strategies, as traditional means (e.g., price competition) are not effective anymore. This means that logistics decisions are in key role, when firms are trying to create competitive advantage Dornier *et al.*,(2012).

The problems in the environment are deriving from the urgency of the shippers, regulative restrictions and globalization. The fundamental problem is that the shippers demand higher quality of services with lower costs and faster delivery. Furthermore, the governmental bodies are making different demands for the logistics companies. This requires higher operational efficiency from logistics management. All in all, it would be crucial that freight carriers are aware of these issues and try to overcome them in their strategic transport logistics related decisions Dobie (2013).

Lindholm and Behrends (2012) argue that urban environment itself acts as significant barrier for the transport logistics. Due to urban environment the quality of effective transport logistics is harnessed in many ways (e.g. inadequate infrastructure levels). There is a need for cooperation between authorities and other actors to coordinate all solutions concerning different transport modes. Efficient logistics creates crucial competitiveness, which means that all actors need to take this fact into consideration, when planning and making decision of urban transport logistics.

2.2.4 Environmental Impacts of Transport Logistics

One of the top trends in international transport is the effect of globalization to climate. In other words, the more there is transportation, the more there are consequences on the surrounding environment as well (Rondinelli & Berry, 2016). Eventually, this means that the growing levels of international transport have direct impact on the climate.

In fact, the rising environmental regulations (e.g., carbon dioxide regulations) have driven some companies to move their operations to countries which have more flexible environmental regulations. This trend does not solve the problem, because the trend of relocation only adds traffic levels, which means more pollution and congestion (Vöhringer, Grether & Mathys, 2013).

Mollenkopf and Ueltschy (2013) argued that firms are often forced to focus on environmental issues in their supply chain management, because of the government regulation. The "green" approach in RLS might be an important value adding driver too (Mollenkopf *et al.*,2013). Environmental issues have become essential part of logistics, as the customers have started to place more value on environment in their business decisions. Environmental approach creates competitive advantage and corporate responsibility of logistics operators (Goldsby & Stank ,2016).

Although, there might be a dilemma of reducing transport levels and gaining growth in economical levels (Nielsen *et al.*,. 2017). On the contrary, the research of Large *et al.*,(2013) shows that the buyers of logistics services might not place very high value on sustainability, when compared other values. Therefore one might think how much effort is devoted towards building sustainability for creating competitiveness. It is evident that the bigger customers appreciate environmental services more than the smaller ones. The transport logistics companies could diminish their carbon dioxide -levels by adding the use of intermodal transport services. Logistics companies should try to embed the environmental thinking to logistics planning in a way that reduces carbon dioxide by using information systems as a help to gain valuable data of the potential problem sources (Lammgård, 2012).

One has to remember that regulations are not really a solution for the problem, although they do control companies, because the companies have to be ready to take responsibility already in the pre stages of logistics processes, in order to build sustainable logistics in long-term (Rondinelli & Berry ,2016).

One of the main problems in transport logistics is the growing amount of traffic. This trend causes lots of pressure to the infrastructure, which again causes problems like traffic jams and pollution (Dornier *et al.*,2012). The growing number of civil traffic has effect on the road transport business as well. The transport costs (e.g. fuel costs) have raised in all transport modes, which mean also high price levels for the customers (La Londe, 2014).

Transport logistics causes also lots of waste in many ways. First, the cargo has to be packaged, which involves using lots of packaging materials like plastics. Second, the motor carriers use fuels, oils and different kind of fluids that harness the environment (Karhunen *et al.*,2018).

Luckily, the recycling of the package materials has increased in recent decades. Due to the environmental trend, the companies have devoted lots of action to reverse logistics. This means for example, the recycling of the used packaging materials. However, there are issues, which are making the reverse logistics problematic (e.g. lacking know-how). Clearly, the governmental influence could help to make the reverse logistics process more effective (González-Torre, Álvarez, Sarkis & Adenso-Díaz 2013).

2.3 Theoretical Review

2.3.1 Resource-based theory

Resource-based theory of the firm According to resource-based theory, firm resources and capabilities determine firm performance and sustainable competitive advantage (Penrose 1959; Peteraf, 1993). Therefore, firms should develop reverse logistics capabilities in order to reduce costs and maximize their value offer (Wong and Karia 2013; Ramírez and Jesús 2016).

Reverse logistics capabilities represent the internal capabilities and processes that a firm deploys to effectively implement its reverse logistics activities. There are two categories of reverse logistics capabilities: information management capabilities and products (or services) capabilities. Information management capabilities for reverse logistics may utilise existing assets such as information systems and product/market knowledge (Chouinard, D'Amours, and Aït-Kadi 2013).

However, demand for return products is often unpredictable and requires specialised knowledge (Ramírez, Morales, and Jesús 2016). Furthermore, the integration of forward and reverse logistics at the information level can be a challenge since demand patterns and data may be codified in different standards. A company that has developed over time, often decades, forward logistics capabilities such as planning and controlling, flexibility, agility, and lean, may find it hard to transfer them into reverse logistics (Bernon, Rossi, and Cullen 2016).

2.3.2 Transaction Cost Economics

Transaction cost economics (TCE) is an established theory for analysing how an organisation economises on transactions costs by selecting governance structures that minimise costs

(Williamson 1975). The key characteristics of transactions are: uncertainty, frequency, and asset specificity (Williamson 1975).

Brandenburger and Nalebuff (2016) argue that firms rarely create value in isolation; rather, they align themselves with customers, suppliers, and other partners to co-develop and co-expand existing markets. Transaction cost economics helps to explain why a firm collaborates with other firms and how integration activities reduce transaction costs, resulting in superior performance (Lee, Yeung, and Cheng 2012; Cao and Zhang 2016; Kim 2013).

Supply chain integration is defined as the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organisation processes (Flynn, Huo, and Zhao 2013). With respect to supply chain integration, transaction cost economics predicts that firms strategically choose integration governance mechanisms that minimise transaction costs and increase asset specificity (Williamson 1975).

Kim (2013) argued that supply chain integration represents the exchange mechanism of resources and knowledge in a supply chain. Bagchi et al. (2013) conducted an EU survey and found that the degree of supply chain integration influences transaction costs and firm efficiency. Caridi *et al.*, (2013) carried out a multi-case study on the relationship between context variables (such as virtuality and complexity) and conclude that the context has an influence on both supply chain integration and performance as well as on the relationship between these concepts.

Gimenez, van der Vaart, and van Donk (2012) found that high levels of supply chain integration are only necessary in environments characterized by high supply complexity. Leuschner, Rogers, and Charvet (2013), in a meta-analysis of 86 peer-

reviewed journal articles, found that there is a positive and significant correlation between supply chain integration and firm performance.

Frohlich and Westbrook (2017) note growing consensus concerning the strategic importance of integrating suppliers, manufacturers, and customers. Huo et al. (2014) examined the moderating role of competitive strategy in the relation of supply chain integration on firm performance and found that competitive strategies significantly influence the effectiveness of internal process and product integration but have no significant moderating effect on the relationship between supply chain integration and operational performance. Supply chain integration can be considered as a dynamic capability that firms assimilate over time.

2.3.3 Institutional theory

According to institutional theory, organisations must conform to the rules and belief systems prevailing in their institutional environment in order to survive and prosper (DiMaggio and Powell 1983). Recent studies reveal that organisations that possess the ability to recognize and react to signals in the external environment have a competitive advantage over organisations that are less flexible and agile (Reeves and Deimler, 2016).

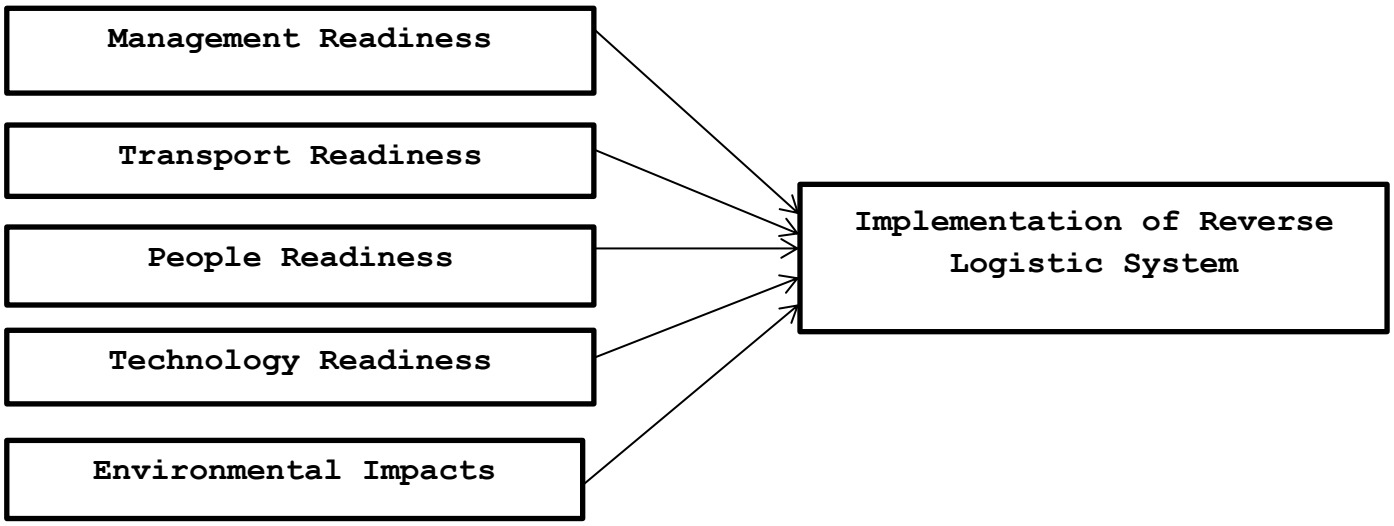
The capability to recognize and react to societal drivers towards ecological sustainability requires effective reverse logistics. Growing concerns about climate changes, local and regional impacts of air, ground and water pollution from industrial activities have significantly expanded the interaction between environmental management and operations (Bourlakis *et al.*, 2014).

Franke *et al.*, (2014) argue that reverse logistics itself is an environmental-protection and green operation activity.

Countries like the USA, EU, Japan, and China actively support the sustainable disposition of mobile phones, giving incentives for companies willing to recognise and react to environmental concerns (Kasper *et al.*, 2016).

Institutional theory also implies that a strong motivating force behind firm behaviour is socially based and proposes that an organisation is bound to satisfy its social stakeholders (Meyer and Rowan 1977; Scott 1987; Burns and Wholey 1993).

2.4 Theoretical Framework



2.5 Hypotheses

H_1: There is a positive impact of Management Readiness on Implementation of Reverse Logistic System

H_2: There is a positive impact of Transport Readiness on Implementation of Reverse Logistic System

H_3: There is a positive impact of People Readiness on Implementation of Reverse Logistic System

H_4: There is a positive impact of Technology Readiness on Implementation of Reverse Logistic System

H_5: There is a positive impact of Environmental Impacts on Implementation of Reverse Logistic System

CHAPTER NO 3

RESEARCH METHODOLOGY

In this chapter, researcher has discussed the methods used for conducting the study is discussed. It explains the population, research sample, sampling methods and collection of data.It makes clear the reason behind using of a questionnaire survey as a method for data collection. Techniques of data gathering, sample selecting and tools for gathering the data and technique of reliability of the variables is also clarified and justified.

3.1 Quantitative Approach

The research is based on quantitative approach. Through quantitative research, the researcher tries to investigate the connection between the dependent variable and independent variables. This approach has enabled researcher apply the statistical technique and study the result.

3.2 Research Purpose

The researcher used explanatory research to examine the relationship between dependent and independent variable. It will also help to identify cause of certain actions and to present theories and predictions.

3.3 Research Population/Sample

The study adopted purposive sampling method to elicit information that is quantitative in nature. Questionnaires were administered to professionals on a sample comprised of duly registered construction firms of various sizes who have updated transport logistic system operating. This is due to the fact that only companies who have remitted their tax are legally qualified to operate in Pakistan.

3.4 Sampling Techniques

Due to time constraint and main purpose of study being academic in nature, non-probability sample design with convenience sampling technique has been applied. This will be quick, convenient, and less expensive as well as the fact that most easily accessible members are being chosen as subjects. 14 organizations have been taken on board. 5 participants have been taken from each organization.

3.5 Participants

Employees from departments related to transport, logistics and RLS system in selected construction firms are the participants of the study. Questionnaires were circulated among these respondents to take accurate response about the research. It is anticipated that all respondents has given the response openly and correctly up to their perceptive and understanding of the questionnaire.

3.6 Research Design

Research design explains about the data collection from the respondents. Design makes sure a connection among data and the questions of the study. It assists determining the data into an understandable form in order to find answers of the research question. The design consists of sample, data and strategies. It explains as well the techniques for data collection and evaluating it. The study is consisted on primary data that was gathered by standardized questionnaires.

3.7 Research Strategies

For discovering the response of the research questions of the current study the approach of using a questionnaire survey is selected. The rationale behind using this approach is clarified in the subsequent section.

3.8 Tools and Measurement

3.8.1 Questionnaire Survey

A standardized questionnaire has been used for data collection which has been taken from related literature that endeavors to collect data about all the variables. Questionnaire has been adopted from the published literature i.e. By Emmanuel Abah and Anita Dzikiwi Adamu (2017).

3.9 Data Collection

Primary data has been obtained through structured questionnaires consisting of One dependent variable and Six independent variables. Questionnaire was consisted of 5 point Likert scale, 5 for Strongly Agree and 1 for Strongly Disagree.

CHAPTER NO 4

RESULTS & DISCUSSION

Quantitative data analysis was used. Raw data was set & inputted to generate descriptive statistics, which include mean, standard deviation & correlation coefficient. To test the relationship between independent variables & dependent variable, statistical analysis was done using SPSS 20.

4.1 Reliability

Reliability measures the internal consistency of items used to measure the latent constructs. The reliability analysis procedure calculates a number of commonly used measures of scale reliability & also provides information about the relationships between individual items in the scale. However, the question of reliability rises as the function of scales is stretched to encompass the realm of prediction. One of the most popular reliability statistics in use today is Cranach's alpha (Cranach, 1951). Cranach's alpha determines the internal consistency or average correlation of items in a survey instrument to gauge its reliability.

Reliability Statistics –Overall

Cronbach's Alpha	N of Items
.692	41

Table 4.1

Table 4.1 showed the reliability statistics of all questions asked in questionnaire. All items (41) had Cranach's alpha values greater than"0.6" which is 0.811 which revealed that all questions have good internal consistency & responses were reliable.

Reliability Statistics – Management Readiness

Cronbach's Alpha	N of Items
0.728	5

Table 4.2

Table 4.2 showed the reliability statistics of all questions asked in questionnaire. All items (5) had Cranach's alpha values greater than"0.6" which is 0.728 which revealed that all questions have good internal consistency & responses were reliable.

Reliability Statistics – Transport Readiness

Cronbach's Alpha	N of Items
0.691	6

Table 4.3

Table 4.3 showed the reliability statistics of all questions asked in questionnaire. All items (6) had Cranach's alpha values greater than"0.6" which is 0.691 which revealed that all questions have good internal consistency & responses were reliable.

Reliability Statistics – People Readiness

Cronbach's Alpha	N of Items
0.601	6

Table 4.4

Table 4.4 showed the reliability statistics of all questions asked in questionnaire. All items (6) had Cranach's alpha values greater than"0.6" which is 0.601 which revealed that all questions have good internal consistency & responses were reliable.

Reliability Statistics – Technology Readiness

Cronbach's Alpha	N of Items
0.722	4

Table 4.5

Table 4.5 showed the reliability statistics of all questions asked in questionnaire. All items (4) had Cranach's alpha values greater than"0.6" which is 0.722 which revealed that all questions have good internal consistency & responses were reliable.

Reliability Statistics – Environmental Factor

Cronbach's Alpha	N of Items
0.669	5

Table 4.6

Table 4.6 showed the reliability statistics of all questions asked in questionnaire. All items (5) had Cranach's alpha values greater than"0.6" which is 0.669 which revealed that all questions have good internal consistency & responses were reliable.

Reliability Statistics – Implementation of Reverse Logistics System (DV)

Cronbach's Alpha	N of Items
0.625	15

Table 4.7

Table 4.7 showed the reliability statistics of all questions asked in questionnaire. All items (15) had Cranach's alpha values greater than"0.6" which is 0.625 which revealed that all questions have good internal consistency & responses were reliable.

4.2 Demographics

Respondents's Profile

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Female	8	11.4	11.4	11.4
Male	62	88.6	88.6	100.0
Total	70	100.0	100.0	

Table 4.8

Age in years

	Frequency	Percent	Valid Percent	Cumulative Percent
18-30	36	51.4	51.4	51.4
30-50	24	34.3	34.3	85.7
51-65	10	14.3	14.3	100.0
Total	70	100.0	100.0	

Table 4.9

Marital Status

	Frequency	Percent	Valid Percent	Cumulative Percent
Married	42	60.0	60.0	60.0
Single	28	40.0	40.0	100.0
Total	70	100.0	100.0	

Table 4.10

Experience

	Frequency	Percent	Valid Percent	Cumulative Percent
1.0	16	22.9	22.9	22.9
2.0	9	12.9	12.9	35.7
3.0	7	10.0	10.0	45.7
4.0	38	54.3	54.3	100.0
Total	70	100.0	100.0	

Table 4.10

Education

	Frequency	Percent	Valid Percent	Cumulative Percent
BS	7	10.0	10.0	10.0
BS/BSc	13	18.6	18.6	28.6
Certification	10	14.3	14.3	42.9
MA	3	4.3	4.3	47.1
Masters	18	25.7	25.7	72.9
MS/M. Phil	19	27.1	27.1	100.0
Total	70	100.0	100.0	

Table 4.11

4.3 Descriptive Statistics

Descriptive statistics deal with the concepts and methods concerned with summarization and explanation of the important aspects of the statistical data. This area of the study consists of the summarizing of data, their graphical displays and the calculation of a few statistical quantities that provide information about the center of the data i.e. mean and indicate the spread of the observed data i.e. dispersion. (Lodico *et al.*,, 2013).

Descriptive Statistics

Variables	N	Mean	Std. Dev.
Management Readiness	70	3.7554	0.32699
Transport Readiness	70	3.7239	0.30827
People Readiness	70	3.7422	0.30954
Technology Readiness	70	3.6793	0.31154
Environmental Impact	70	3.5321	0.32212
Valid N List wise	70		.

Table 4.12

Bogler & Somech (2018) used descriptive statistics in his study. They calculated Std. Deviation and Mean of the variables.

4.4 Correlation Matrix

Correlation analysis is a method of statistical evaluation used to study the strength of a relationship between two, numerically measured, continuous variables. This particular type of analysis is useful when a researcher wants to establish if there are possible connections between variables.

This table shows correlation between the independent and dependent variables.

		Management Readiness	Transport Readiness	People Readiness	Technology Readiness	Environmental Impact
Management Readiness	Pearson Correlation	1				
Transport Readiness	Pearson Correlation	.439**	1			
People Readiness	Pearson Correlation	.500**	.443**	1		
Technology Readiness	Pearson Correlation	.311**	.293**	.076	1	
Environmental Impact	Pearson Correlation	.614**	.485**	.521**	.308**	1

Table 4.13 The value varies from -1 to 0 and from 0 to +1.-1 shows perfect negative correlation and 1 shows perfect positive correlation. Correlation (r= 0.439) is for Transport Readiness, Correlation (r= 0.500) is for People Readiness , Correlation (r= 0.311) is for Technology Readiness ,Correlation (r= 0.614) is for Environmental Impact

4.5 Regression Analysis

Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables – that is, the average value of the dependent variable when the independent variables are fixed. Less commonly, the focus is on a quintile, or other location parameter of the conditional distribution of the dependent variable given the independent variables (Sauser *et al.*,2012).

In all cases, the estimation target is a function of the independent variables called the **regression function**. In regression analysis, it is also of interest to characterize the variation of the dependent variable around the regression function which can be described by a probability distribution (Armstrong, 2016).All 5 hypotheses have been statistically proved as per their given status.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.612[a]	.507	.435	.39528

a. Predictors: (Constant),

b. R .612 as 61.2% , R^2 .507 as 50.7% and adj. R .435 as 43.5% All independent variables having impact of 50.7% on dependent variable.

Table 4.14

ANOVA[b] (Analysis of Variance)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.614	3	1.205	11.709	.000[a]
	Residual	18.125	66	.156		
	Total	21.739	69			

Table 4.14 a. Predictors: (Constant), All independent Variables

b. Dep Variable:

Residual sum of square is 18.125 which shows the deviation of dependent variable. The F-statistics is 11.709 at .000 sig level which is less than the cutoff of 0.05.This shows significant relationship between the independent variables and dependent variable for all extracted data having 70 sample size.

Table 4.15

Coefficients Table (N=70)

	Un Coefficients		**Std. Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
Management Readiness	13.079	1.340	.520	9.761	.000
Transport Readiness	2.286	.101	.518	2.732	.000
People Readiness	2.403	4.300	.378	5.210	.000
Technology Readiness	2.083	2.689	.244	2.262	.000
Environmental Impact	2.0031	2.987	.211	2.333	.000

Management Readiness beta=.520 and t=9.761, Transport Readiness beta= .518 and t = 2.732 , People Readiness beta= .378 and 5.210, Technology Readiness beta= .244 and t= 2.262 and Environmental Impact showing beta=211 and t=2.333 respectively.

Table 4.16 : Hypotheses Results

Hypotheses	Beta Values	t-Values	Status
H1:	.520	9.761	Accepted/Approved
H2:	.518	2.732	Accepted/Approved
H3:	.378	5.210	Accepted/Approved
H4:	.244	2.262	Accepted/Approved
H5:	.211	2.333	Accepted /Approved

4.7 Summary

This chapter gives a clear picture of the outcomes of this research. Statistical tools have been applied on the primary data collected, to find out the reliability of the data and impacts of the independent variables on the dependent variables. Correlation and Regression analysis were performed on the set of data to test strength of relationship between dependent and independent variables.

CHAPTER NO 5

CONCLUSION & RECOMMENDATION

This chapter highlights discussion on results of the current study. The results and findings of this research study are compared in contrast with previous studies. Finally, the study gives recommendations and future research directions.

5.1 Conclusion

The Pakistan construction industry however is yet to achieve full readiness in the other categories or aspect as discussed below:

Management and People Aspect/category requires the following to achieve full readiness; a supply chain mind approach, a well communicated supply chain management strategy by the management, it also requires financial resources to facilitate supply chain management practice as well as a policy for training and capacity building for supply chain management.

In conclusion the readiness assessment result shows that the Pakistani RLS industry has project/process readiness. Management readiness, people readiness as well as technology readiness however needs to be given urgent attention. The construction industry is therefore not yet be prepared to adopt supply chain management which reveals that certain aspects within require consideration and attention to attain readiness.

In light of the findings of this study, It was discovered that all professionals were process/project ready which indicates that the people have the capability to change and implement supply chain management, personnel are literate and have the skill and expertise to adopt supply chain management, an organisation structure that supports supply chain management, training procedure that supports supply chain management, and a

strong inhibition to factors limiting the implementation of supply chain management.

5.2 Recommendations

This study recommends that urgent attention should be given to the aspects (Management aspect, People aspect and Technology aspect) within a category that requires attentions to achieve full preparedness so that the transport industry will be fully prepared to adopt and reap the benefits of supply chain management. Where necessary tools and equipment needs to be provided, provision should be made and where training is required, adequate training should be provided to meet readiness.

Collection is the first and an important stage in the recovery process. First, the returned items are identified and then they are located, collected, and, if required, transported to the manufacturer for remanufacturing operations. Returned products can originate from multiple sources.

The classification is based on whether the initial transport is performed by the consumer or by a waste manager. The interconnection between transportation and collection can be explored as a future research direction.

The focus of a transportation system in this study has been on costs, routes, etc. A transportation system could be researched from the standpoint of time. The ability of any transportation system to return and deliver items on a timely basis is equally important and ties into a company's overall strategy of time-based competition. This issue becomes more important if the returned items have shelf lives.

The use of a joint transportation system between two or more companies, their viability, and their cost savings could be explored in another research study. This research could also include freight consolidation and shipping in bulk.

Returns, because of their unpredictability, lead to higher transportation costs through non-contract rates, an increased risk of damage, and poor routing and tracking. The unpredictable nature of returns and its effect on transportation systems can present a good area of research.

5.3 Practical Implications

The most important extension to this research is the inclusion of other operational factors in this study. Dowlatshahi (2016) cited other operational factors as cost/benefits analysis, warehousing, remanufacturing/recycling operations, supply management, and packaging. The interaction effect of each or a combination of these operational factors on transportation could be explored and analyzed. This is a fertile and major future direction for this study.

Change in the scope of the research. Further, the relaxation or change in any of the limitations noted in the scope of the study provides a new research direction for this study. These future research opportunities could address the inclusion of retailers, services, or third-party RL providers instead of construction companies. The future research opportunities could also focus on remanufacturing companies whose sole business purpose is to engage in RL activities.

It could be explored as to whether the inherent difficulties encountered in transportation operations for forward logistics are duplicated with the same or even more intensity for transportation operations in construction industry.

REFERENCES

Aas B, Halskau Ø & Wallace SW (2012) The role of supply vessels in offshore logistics. Maritime Economics & Logistics 11(3): 302–325.

Adebayo I.T (2012) Supply Chain Management (RLS) Practices in Nigeria Today: Impact on RLS Performance. *European Journal of Business and Social Sciences,* 1(6) 107-112

Aje, O. Aderibole, B. and Ogunsina O. (2015). Supply Chain Management Practices in Construction Procurement: Perceptions of Professional Quantity Surveyors in Ondo State, Nigeria. *PM World Journal* 4(6) 1-12

Akintoye A., McIntosh G., Fitzgerald E, (2016) A survey of supply chain collaboration and management in the UK construction industry.*European Journal of Purchasing & Supply Management* 6. 158-162

Albaloushi, H and Skitmore, M (2014) Supply chain management in the UAE construction industry.*International Journal of Construction Management*, 8(1).53-71.

Bowersox DJ, Closs DJ & Stank TP (2016) Ten mega-trends that will revolutionize supply chain logistics. Journal of Business Logistics 21(2): 1-16.

Branch AE (2012) Global Supply Chain Management and International Logistics. New York, Routledge.

Button K, Costa A & Cruz C (2015) Ability to Recover Full Costs through Price Discrimination in Deregulated Scheduled Air Transport Markets. Transport Reviews, 27(2): 213–230.

Canadian Sailings (2016) Project Cargo Gets Bigger, Heavier. Transportation infrastructure, opposition to certain projects among other chalienges facing sector. Canadian Sailings, April 18: 7-16.

Cantarelli C.C, FlyvbjergB,and Buhl S.L, (2012): Geographical Variation in Project Cost Performance: The Netherlands versus Worldwide*: Journal of Transport Geography*, 24, 324-331,

Caplice C & Sheffi Y (2017) Optimization-based procurement for transportation services. Journal of Business Logistics 24(2): 109-128.

Carter JR & Ferrin BG (2015) The impact of transportation costs on supply chain management. Journal of Business Logistics 16(1): 189-212.

Chen, I.J. &Paulraj, A. (2018). Towards a theory of supply chain management: The constructs and measurements. *Journal of Operations Management, 22,* 119-150.

Construction Management, 2, 897-904.

Corrêa, H. L., & Xavier, L. H. (2013). Concepts, design and implementation of Reverse Logistics Systems for sustainable supply chains in Brazil.*Journal of Operations and Supply Chain Management*, *6*(1), 1-25.

CSPP, 'Readiness Guide for Living in the Networked World', Computer systems Policy project, 2012.

D'Este G (2014) An event-based approach to modeling intermodal freight systems. In: McKinnon A, Button K & Nijkamp P (eds.) Transport Logistics. Cheltenham, Edward Elgar: 253-264.

Dada, D. (2014). —E-readiness for developing countries: moving the focus from the environment to meet the user Elect. J. Info. Syst. Dev. Countries. 27(6): 1-14.

Davidsson P, Henesey L, Ramstedt L, Törnquist J & Wernstedt F (2013) An analysis of agent-based approaches to transport logistics. Transportation Research Part C 13(4): 255–271.

Dobie K (2013) The Core Shipper Concept: A Proactive Strategy for Motor Freight Carriers. Transportation Journal 44(2): 37-53.

Flint DJ & Mentzer JT (2016) Logiticians as marketers: Their role when customers' desired value changes. Journal of Business Logistics 21(2): 19-45.

Gibson BJ, Rutner SM & Keller SB (2016) Shipper-carrier partnership issues, rankings and satisfaction. International Journal of Physical Distribution & Logistics Management 32(8): 669-681.

Goldsby TJ & Stank TP (2016) World class logistics performance and environmentally responsible logistics practices. Journal of Business Logistics 21(2): 187-208.

González-Torre P, Álvarez M, Sarkis J & Adenso-Díaz B (2013) Barriers to the Implementation of Environmentally Oriented Reverse Logistics: Evidence from the Automotive Industry Sector. British Journal of Management 21(4): 889–904.

Gourdin KN (2017) Global logistics management: a competitive advantage for the new millennium. Oxford, Blackwell

Guzman F & Norgaard J (2016) Project cargo comes of age. World Trade 13(10): 72; 74.

Halman JIM & Braks BFM (2015) Project alliancing in the offshore industry. International Journal of Project Management 17(2): 71-76.

Heidemann A & Gehbauer F (2016) The way towards cooperative project delivery. Journal of Financial Management of Property and Construction 16(1): 19-30.

Henttu V & Hilmola O-P (2016) Financial and environmental impacts of hypothetical Finnish dry port structure. Research in Transportation Economics 33(1): 35-41.

Hickey K & Cassidy WB (2018) Logistics’ Identity Crisis. TrafficWORLD August 30.

Hirsjärvi S & Hurme H (2013) Tutkimushaastattelu: teemahaastattelun teoria ja käytäntö. Helsinki, Gaudeamus Helsinki University Press.

Hirsjärvi S, Remes P & Sajavaara P (2014) Tutki ja kirjoita (12.painos). Helsinki, Tammi.

Hummels D, Lugovskyy V & Skiba A (2012) The trade reducing effects of market power in international shipping. Journal of Development Economics 89(1): 84–97.

Inbound Logistics (2016) How to Ensure Successful Transportation of Your Project Cargo. http://www.inboundlogistics.com/cms/article/how-to-ensure-successful-transportation-of-your-project-cargo/. Cited 23.11.2013.

Kaleva (2013) Sanomalehti Kaleva. Kansanedustajat: Rata Norjan Kirkkoniemeen välttämätön. http://www.kaleva.fi/uutiset/pohjois-suomi/kansanedustajat-rata-norjan-kirkkoniemeen-valttamaton/642509/. Cited 05.11.2013.

Karhunen J & Hokkanen S (eds.) (2015) Kansainväliset tavarakuljetukset. Jyväskylä, Sho Business Development.

Karhunen J, Pouri R & Santala J (2018) Kuljetukset ja varastointi: - järjestelmät, kalusto ja toimintaperiaatteet. Helsinki, Suomen logistiikkayhdistys.

Kelleher G, El-Rhalibi A & Arshad F (2017) Scheduling for intermodal transport. Logistics Information Management 16(5): 363-372.

Kent JL, Parker RS & Luke RH (2017) An Empirical Examination of Shipper Perceptions of Service-Selection Attributes in Five Truckload Industry Segments. Transportation Journal 41(1): 27-36.

Khalfan, M, McDermott, P and Cooper, R (2018) Integrating the supply chain within construction industry.*In:* Khosrowshahi, F (Ed.), *20th Annual ARCOM Conference*, 1-3 September 2018, Heriot Watt University. Association of Researchers in

Khalfan, M. M. A. &Anumba, C. J. (2016). ―Readiness Assessment for Concurrent Engineering in Construction‖ Bizarre Fruit 2016 Conference, University of Salford, 9-10 March 2016, 42-54.

Khalfan, M. M.A, Anumba, C. J. & Carrillo P. M. (2017).―Development of a readiness assessment model for concurrent engineering in construction‖ Benchmark. Int. J., 8(3): 223 – 239

Khan, S., Khan, F., & Zhang, B. (2012). Reverse e-Logistics for SMEs in Pakistan. In *Software Engineering and Knowledge Engineering: Theory and Practice* (pp. 229-237). Springer Berlin Heidelberg.

Khutale, S.D and Kulkarni S.S (2013) Improvement in Supply of Construction Material for Construction Industry in Satara City - By Applying Supply Chain Management Tool. *IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)* 7(6) 47-53

Koskinen I, Alasuutari P & Peltonen T (2013) Laadulliset menetelmät kauppatieteissä. Tampere, Vastapaino.

La Londe BJ (2018) A Crisis in Transportation. Supply Chain Management Review 8(8): 7-8.

Lambert, S., Riopel, D., & Abdul-Kader, W. (2016). A reverse logistics decisions conceptual framework. *Computers & Industrial Engineering*, *61*(3), 561-581.

Lammgård C (2012) Intermodal train services: A business challenge and a measure for decarbonisation for logistics

service providers. Research in Transportation Business & Management 5: 48–56.

Large RO, Kramer N & Hartmann RK (2013) Procurement of logistics services and sustainable development in Europe: Fields of activity and empirical results. Journal of Purchasing & Supply Management 19(3): 122–133.

Lehmusvaara A, Tuominen M & Korpela J (2015) An Integrated Approach for Truck Carrier Selection. In: McKinnon A, Button K & Nijkamp P (eds.) Transport Logistics. Cheltenham, Edward Elgar: 199-214.

Lehtiniemi K (2013) MTV. Norjalaiset: Suomalaiset pian myöhässä Barentsin alueelta. http://www.mtv.fi/uutiset/ulkomaat/artikkeli/norjalaiset--suomalaiset-pian-myohassa-barentsin-alueelta-/2339166. Cited 04.11.2013.

Li S, Ragu-Nathan B, Ragu-Nathan T.S, Subba Rao S. (2014) the impact of supply chain management practices on competitive advantage and organizational performance. *International Journal of Management Science* 34.107-124

Liberatore MJ & Miller T (2015) A Decision Support Approach for Transport Carrier and Mode Selection. *Journal of Business Logistics* 16(2): 85-115.

Liikenne- ja viestintäministeriö (2012) Suomen lentoliikennestrategia. http://www.lvm.fi/c/document_library/get_file?folderId=440554&name=DLFE-9764.pdf&title=Ohjelmia%20ja%20strategioita%203-2012. Cited 28.10.2013.

Liikennevirasto (2013) Kaivostoiminnan liikenteelliset tarpeet pohjoisessa – esiselvitys: työryhmän taustaraportti.

http://www2.liikennevirasto.fi/julkaisut/pdf3/lts_2013-11_kaivostoiminnan_liikenteelliset_web.pdf.

Lindholm M & Behrends S (2012) Challenges in urban freight transport planning – a review in the Baltic Sea Region. *Journal of Transport Geography* 22: 129–136.

Lorentz H (2014) Collaboration in Finnish-Russian supply chains, Effects on performance and the role of experience *Baltic Journal of Management* 3(3): 246-265.

Ludvigsen J (2015) Freight transport supply and demand conditions in the Nordic countries: Recent evidence. *Transportation Journal* 39(2): 31-54.

Manuj I & Mentzer JT (2014) Global supply chain risk management strategies. *International Journal of Physical Distribution & Logistics Management* 38(3): 192-223.

Mao, Z., & Jin, Y. (2014). Reverse Logistics in Automotive Indusrty: A multiple case study in automotive industry.

Martinsuo M & Ahola T (2013) Supplier integration in complex delivery projects: Comparison between different buyer–supplier relationships. International Journal of Project Management 28(2): 107–116.

Meixell MJ & Norbis M (2014) A review of the transportation mode choice and carrier selection literature. The International Journal of Logistics Management 19(2): 183–211.

Metsämuuronen J (2014) Laadullisen tutkimuksen perusteet. Helsinki, International Methelp.

Millet, D. (2016). Designing a sustainable reverse logistics channel: the 18 generic structures framework. *Journal of Cleaner Production*, *19*(6), 588-597.

Mohamed, A. G., Fathi, A. A., Marouf, M. A., Hassan, M. S., & El Barky, S. S. (2015). Impact of Reverse Logistics Applications on

Customer Satisfaction. In *International Conference on Operations Excellence and Service Engineering*.

Mollenkopf D, Stolze H, Tate WL & Ueltschy M (2013) Green, lean, and global supply chains. International Journal of Physical Distribution & Logistics Management 40(1/2): 14-41.

Morash EA & Clinton SR (2013) The Role of Transportation Capabilities in International Supply Chain Management. In: McKinnon A, Button K & Nijkamp P (eds.) Transport Logistics. Cheltenham, Edward Elgar: 3-15.

Naim MM, Potter AT, Mason RJ & Bateman N (2014) The role of transport flexibility in logistics provision. The International Journal of Logistics Management 17(3): 297-311.

Nielsen LD, Jespersen PH, Petersen T & Hansen LG (2017) Freight transport growth--a theoretical and methodological framework. European Journal of Operational Research 144(2): 295–305.

Nodar J (2014) Securing big, big cargo. One carrier becomes an educator. Gulfshipper, July 3: 10-14.

Norbury K (2012) Project cargo specialists expect the unexpected. Canadian Sailings May 7: 14-17.

Olsen BE, Haugland SA, Karlsen E & Husøy GJ (2013) Governance of complex procurements in the oil and gas industry. Journal of Purchasing & Supply Management 11: 1–13.

Paavola J, Vehviläinen A, Ojala L, Antikainen T & Iikanen P (2012) Liikenne- ja viestintäministeriö. Suomen ulkomaankaupan logistinen kilpailukyky ja kehittämistarpeet. Selvitysmiesryhmän loppuraportti. http://www.lvm.fi/c/document_library/get_file?folderId=1986562&name=DLFE-14202.pdf&title=Julkaisuja%206-2012.

Pardomo-Rivera J.L (2018) A Framework For Decision Support Model For Supply Chain Management In The Construction Company. Unpublished Ph.D Thesis

Peters MJ, Lieb RC & Randall HL (2012) The use of third-party logistics services by European industry. In: McKinnon A, Button K & Nijkamp P (eds.) Transport Logistics. Cheltenham, Edward Elgar: 135-147.

Pinna, R., & Carrus, P. P. (2012). *Reverse logistics and the role of fourth party logistics provider*. INTECH Open Access Publisher.

Premeaux SR (2016) Motor carrier selection criteria: Perceptual differences between shippers and motor carriers. Transportation Journal 42(2): 28-38.

Ramos, T. R. P., Gomes, M. I., & Barbosa-Póvoa, A. P. (2014). Planning a sustainable RLS: Balancing costs with environmental and social concerns. *Omega*, *48*, 60-74.

Rautavirta M & Jääskeläinen S (2013) Liikenne- ja viestintäministeriö. Future transport power sources. Executive summary. http://www.lvm.fi/c/document_library/get_file?folderId=2497123&name=DLFE-21539.pdf&title=Julkaisuja%2024-2013. Cited 23.10.2013.

Regmi MB & Hanaoka S (2012) Assessment of intermodal transport corridors: Cases from North-East and Central Asia. Research in Transportation Business & Management 5: 27–37.

Riazi, M. R. S. (2014) The Use Of Supply Chain Management To Reduce Delays As Result Of Pre-Construction Deficiencies In Malaysian Public Sector Construction Projects. Unpublished M.Sc Thesis

Rogers D.S and Tibben-Lembke R.S (2012) Going Backwards: Reverse Logistics Trends and Practices, Reverse Logistics Executive Council, USA

Rogers, D.S. and R.S.Tibben-Lembke (2015), Going Backwards: reverse logistics trends and practices,Reverse Logistics Executive Council, Pittsburgh, PA.

Romero, J. A. V., & Gutiérrez, J. G. Reverse Logistics in Transportation.

Rondinelli D & Berry M (2016) Multimodal Transportation, Logistics, and the Environment: Managing Interactions in a Global Economy. European Management Journal 18(4): 398–410.

Ross AD, Parker H, Benavides-Espinosa MDM & Droge C (2012) Sustainability and supply chain infrastructure development. Management Decision 50(10): 1891–1910.

Ruihui Mu1 & Yulei Ma. (2014), The design and ımplementation of reverse logistics management information system

Ruikar, K., Anumba, C. J. and Carrillo, P. M. (2014). ―VERDICT--An e-readiness assessment application for construction companies‖ Auto. Const., 15(1): 98-110.

Saeed N (2013) Cooperation among freight forwarders: Mode choice and intermodal freight transport. Research in Transportation Economics 42(1): 77-86.

Saka, N. and Mudi, A. (2015) *Practices And Challenges Of Supply Chain Management By Building Contracting Firms In The Lagos Metropolitan Area* In D. Boyd, (Ed) Procs 23rd Annual ARCOM Conference, 3-5 Sept, 2015, (777-786) Belfast, U.K. Association of Researchers in Construction Management.

Salami E, Aydinli S, Laptali Oral E. (2013) Barriers to the Implementation of Supply Chain Management- Case of Small to

Medium Sized Contractors in Turkey.*International Journal of Science and Research (IJSR)* 5(9) 516-521

Salman R. M. R. (2014). *The Use Of Supply Chain Management To Reduce Delays As Result Of Pre-Construction Deficiencies In Malaysian Public Sector Construction Projects.* (A Ph.D thesis submitted to Civil Engineering and Built Environment Faculty of Science and Engineering Queensland University of Technology).

Sanders NR, Locke A, Moore CB & Autry CW (2015) A Multidimensional Framework for Understanding Outsourcing Arrangements. Journal of Supply Chain Management 43(4): 3-15.

Sarhan, S and Fox, A (2013) 'Performance measurement in the UK construction industry and its role in supporting the of lean construction concepts', *Australasian Journal of Construction Economics and Building,* **13** (1) 23-35

Satamaliitto (2013) Satamaliiton tilastoja 2012. http://www.finnports.com/fin/tilastot/?stats=yearly&T=8&year=2012&sort=7&dir=desc. Cited 04.11.2013.

Shaik, M. N., & Abdul-Kader, W. (2013). Transportation in reverse logistics enterprise: a comprehensive performance measurement methodology.*Production Planning & Control*, *24*(6), 495-510.

Siuruainen E (2013) Työ- ja elinkeinoministeriö. Barentsin alueen uusiutuvat rakenteet. Suomalaisten yritysten toimintamahdollisuuksista Luoteis-Venäjällä. http://www.tem.fi/files/29016/Barents_web012016.pdf. Cited 3.11.2013.

Skjoett-Larsen T, Thernoe C & Andresen C (2017) Supply chain collaboration: Theoretical perspectives and empirical

evidence. International Journal of Physical Distribution & Logistics Management 33(6): 531-549.

Solakivi T, Ojala L, Lorentz H. Laari S & Töyli J (2012) Liikenne- ja viestintäministeriö. Logistiikkaselvitys 2012. http://www.lvm.fi/c/document_library/get_file?folderId=1986562&name=DLFE-15768.pdf&title=Julkaisuja%2016-2012. Liikenne- ja viestintäministeriö julkaisuja 11/2012. Cited 28.10.2013.

Takim, R, Akintoye, A and Kelly, J (2017) Performance measurement systems in construction.*In:* Greenwood, D J (Ed.), *19th Annual ARCOM Conference*, 3-5 September 2017, University of Brighton.Association of Researchers in Construction Management 1, 423-32

Tavasszy LA, Ruijgrok K & Davydenko I (2012) Incorporating Logistics in Freight Transport Demand Models: State-of-the-Art and Research Opportunities. Transport Reviews, 32(2): 203–219.

Tibben-Lembke RS & Rogers DS (2014) Real options: applications to logistics and transportation. International Journal of Physical Distribution & Logistics Management 36(4): 252-270.

Tiwari, R., Shepherd, H., Pandey, R.K (2014) Supply Chain Management In Construction: A Literature Survey. *International Journal of Management Research and Business Strategy.* 3(1)

Tongzon JL (2012) Port choice and freight forwarders. Transportation Research Part E 45(1): 186–195.

Tseng, Y. Y., Yue, W. L., & Taylor, M. A. (2013). The role of transportation in logistics chain. Eastern Asia Society for Transportation Studies.

Vöhringer F, Grether J-M & Mathys NA (2013) Trade and Climate Policies: Do Emissions from International Transport Matter? The World Economy 36(3): 280-302.

vrijhoef, R and koskela L (2016) The four roles of supply chain management in construction. *European Journal of Purchasing & Supply Management 6 169-178*

Wilmsmeier G, Hoffman J & Sanchez R (2014) The Impact of Port Characteristics on International Maritime Transport Costs. Port Economics; Research in Transportation Economics 16: 117–140.

Wong CWY, Lai K-H & Ngai EWT (2012) The role of supplier operational adaptation on the performance of IT-enabled transport logistics under environmental uncertainty. *International Journal of Production Economics* 122(1): 47-55.

Wood DF, Barone A, Murphy P & Wardlow DL (2015) International Logistics (6th edition). New York, Chapman & Hall.

World Bank (2013) International Logistics Performance Index Global Ranking in 2012. http://lpisurvey.worldbank.org/international/global. Cited 14.11.2013

Yuan X-M, Low JMW & Tang LC (2013) Roles of the airport and logistics services on the economic outcomes of an air cargo supply chain. International Journal of Production Economics 127(2): 215-225.

Yusuf, I., & Raouf, A. (2013). Reverse logistics: an empirical study for operational framework. *Proceedings of the Pakistan Academy of Sciences*,*50*(3), 201-210.

APPENDIX

QUESTIONNAIRE

Dear Participant:

I, **Dain Usmani**; student of MBA at **Department of Business Studies, BAHRIA UNIVERSITY, Islamabad Campus.** I am conducting a research on research topic "**Role of Transportation in Design and Implementation of Reverse Logistic System in Pakistan**" You can help me by completing the attached questionnaire; You will find it quite interesting. I appreciate your participation in my study and I assure that ***your responses will be held confidential*** and will only be used for education purposes.

Demographics

Gender: ☐ Male Female

Age : 18- 30 years, 31-50 years, 51-65 years

Marital Status: ☐ Single Married

Qualification: Bachelors Masters MS/M. Phil PhD Certification

Experience: 1- less than 3 years, 2- 3-5 years, 3- 5-10 years 4- 10+ years

S.No	**Questions/Items** **Management Readiness**	5 SDA	4 DA	3 N	2 A	1 SA
1	Our management is aware of RLS and recognized the benefits of RLS	5	4	3	2	1
2	All levels of management in our organization have a RLS mind approach	5	4	3	2	1
3	RLS strategy is well communicated to all levels within the organisation	5	4	3	2	1
4	We have provided adequate financial resources to facilitate RLS in our practices	5	4	3	2	1
5	We have a policy for training and capacity building to keep our staff up to date with RLS tools	5	4	3	2	1

	Transport Readiness					
1	Our transport system have people capable to implement change and move quickly to adopt use of RLS	5	4	3	2	1
2	Our staff have the functional levels of IT literacy, functional skill and expertise to use RLS	5	4	3	2	1
3	The structure of our transport system is such that provides conditions that is well suited to implement RLS practices	5	4	3	2	1
4	Transportation staff members fully appreciate the importance of training needed for using RLS tools	5	4	3	2	1
5	Training procedures have been developed that will enable our staff to proficiently apply RLS tools	5	4	3	2	1
6	The transportation system and staff is committed to address any question/problem that any staff may have about using RLS principles	5	4	3	2	1
	People Readiness					
1	The Organization have people capable of implementing change and move swiftly to adopt the use of RLS	5	4	3	2	1
2	Staff members have the necessary levels of IT proficiency, efficient skills and expertise to use RLS	5	4	3	2	1
3	Organizational structure is such that provides an environment suitable to use RLS principles	5	4	3	2	1
4	Staff members fully understand the importance of training needed for using RLS tools	5	4	3	2	1
5	Training methods and procedures have been formulated that will enable our staff to efficiently use RLS tools	5	4	3	2	1
6	Organization is committed to addressing any question/problems that any staff may have about using RLS principles	5	4	3	2	1
	Technology Readiness					
1	Organizations ICT facilities are flexible to accommodate swift change and accessibility	5	4	3	2	1
2	We have functional extranet and intranet facilities to enhance information dissemination and interoperability.	5	4	3	2	1
3	Our organization have well defined IT policy	5	4	3	2	1

4	Our organization is familiar with the use special software's related to our expertise.	5	4	3	2	1

Environmental impact

1	Organizations do care and want to avoid environmental impact during transportation	5	4	3	2	1
2	We are equipped with finest environmental facilities to enhance transportation smoothly.	5	4	3	2	1
3	Our organization have well defined environmental impact schedule	5	4	3	2	1
4	Our organization is familiar with the environmental impact related to scenarios in Pakistan.	5	4	3	2	1
5	Our organization is following International Standards as for as environmental safety laws are concerned	5	4	3	2	1

Implementation of Reverse Logistics

1	Improve customer satisfaction	5	4	3	2	1
2	Reduce logistics costs	5	4	3	2	1
3	Legal requirements	5	4	3	2	1
4	Recapturing value of returned products	5	4	3	2	1
5	Increasing competitiveness	5	4	3	2	1
6	Reduce stocks	5	4	3	2	1
7	Lifecycles of Product	5	4	3	2	1
8	Uneven returned product	5	4	3	2	1
9	Difficulty in predicting returns	5	4	3	2	1
10	Visibility/Viability of costs	5	4	3	2	1
11	Transportation from many places to one/few places	5	4	3	2	1
12	Poor inventory management	5	4	3	2	1
13	Product lifecycle issues	5	4	3	2	1
14	Lack of clarity in relation to the disposal options	5	4	3	2	1
15	Difficulties in marketing used products	5	4	3	2	1