ANALYSIS OF FREIGHT MODE CHOICE DECISION: A CASE STUDY OF ISLAMABAD AND RAWALPINDI

Pakistan Institute of Development Economics

By

Shah Rukh Shah

PIDE2019FMPHILEC017

Supervisor

Ms. Saba Anwar

MPhil Economics

PIDE School of Economics

Pakistan Institute of Development Economics, Islamabad

2023

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Pakistan Institute of Development Economics

Pakistan Institute of Development Economics, Islamabad

PIDE School of Economics

<u>CERTIFICATE</u>

This is to certify that this thesis entitled **"Analysis of Freight Mode Choice Decision: A Case Study of Islamabad and Rawalpindi"** submitted by **Mr. Shah Rukh Shah** is accepted in its present form by the School of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Economics.

Supervisor: <u>Ms. Saba Anwar</u>   Signature: _____

External Examiner: <u>Dr. Zafar ul Hassan</u>   Signature: _____

Head,
PIDE School of Economics: <u>Dr. Shujaat Farooq</u>   Signature: _____

Author's Declaration

I, Shah Rukh Shah, hereby state that my M-Phil thesis titled "ANALYSIS OF FREIGHT MODE CHOICE DECISION: A CASE STUDY OF ISLAMABAD AND RAWALPINDI" is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics or anywhere else in the country/World.

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Dedication

To My Beloved Parents, Brothers and Sisters, Who Support Me Throughout My Life and My Carrier beyond the Limits and Parents Generous Love made me extremely successful in my journey.

ACKNOWLEDGEMENTS

Abstract

Pakistan has a very skewed modal transportation, with approx. 96% of freight moved by road. The core premise of the study is that successful policymaking involves a thorough understanding of how the policy's target(s) would respond to it. Transportation systems, especially freight, are typically complicated, heterogeneous, and poorly understood by policymakers. Implementing policies affecting such a complex system can result in ineffective attempts and frequently unanticipated consequences. The most effective strategy to avoid these results is to ensure that behavior research underpins freight policy. This study examines the factor influencing mode choice decision of the firm and identify reform areas for railways freight business. For this purpose, 30 interviews were conducted from different freight shippers based in Rawalpindi and Islamabad. The result shows that reliability, transportation cost, ease of access, probability of loss, damages, origin and destination are the factors that influence mode choice decision of the firms. By applying probit model the estimates shows that the magnitude of reliability is 1.94 and Cost is -2.23 for the mode choice of the firm. Moreover, thematic analysis shows that for railway to regain freight modal share investment, make railway a customer-oriented organization and technology were identified by the respondents. The coordination between different stakeholders, accessibility, infrastructure upgradation, digitalization and technology innovation are pivotal for a balance transport model.

Keywords: Mode choice, freight transport, shippers, forwarders, Islamabad, Rawalpindi.

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Chapter 1
INTRODUCTION

Transport has reshaped the human development since the beginning of human civilization. Freight transportation is vital to a country's economic prosperity and regional integration. It refers to goods transported from one place to another place. Transport and logistics are important part of the economy in their own right contributing to GDP and jobs. The logistics business contributes $4.3 trillion globally, accounting for 8-10% of GDP, creating thousands of new employments, and significantly enhancing export competitiveness. The top twenty LPI (Logistic Performance Indicator) countries are among the world's top ten strongest economies. It contributes more than 12% to GDP (SBP) and 5.4% of total jobs to the Pakistan economy and it also appears that contribution of railways is very less. This demonstrates the vital role of freight and logistics in the Pakistani economy. Existence of efficient freight transport enhances economic development and can boost the economic growth of a country (World Bank, 2011). There are numerous forms of freight transportation available, including road, rail, air, sea, and pipeline, although road and rail are the country's two primary means for inland freight transport.

Among all means of transportation, demand for trucking services has grown at the quickest rate. However, this expansion has a number of major negative consequences, including traffic congestion, pollution, and traffic accidents. Railways contribute less to environmental degradation as compare to road (Chapman, 2007), per ton of cargo rail freight produce 76% less CO_2 than road (Rail & Place, 2010). A well-functioning railways system facilitates business, lowers transportation costs, and helps ease road congestion; in fact, due to rail's higher capability, one freight train can generally replace 100 trucks. Rail transport is more fuel efficient and cost effective than road transport; less fuel is required to transport a tonne of goods by rail, which saves money and reduces greenhouse gas emissions; on average, a gallon of fuel can transport a tonne of goods

250 miles by rail, compared to 90 miles by road ([NFLP, 2020](#)). Also freight by rail can lead to less deterioration of roads. Thus, research on freight mode selection, particularly between truck and rail, is crucial for increasing the efficiency of the freight transportation system.

The demand for freight and passenger increases with the increase in population, economic development, industrialization, agriculture development and urbanization (Ramanathan, 2001). The European transport plan focuses on revitalizing rail transportation by creating a more competitive rail transport market through service liberalization in order to increase rail freight efficiency (Mäkitalo, 2011). Often, freight transportation is viewed as an input to the process of production. Moving goods by railways will help reducing transportation cost, given that transportation cost represent 25% of the product cost. So, this would translate in lower prices for foods and other manufacturing goods. In addition, it will reduce energy import costs, as the transportation industry consumes 35 percent of Pakistan's total energy. In this regard, it is crucial to understand the factors that is affecting freight mode choice

Understanding this choice of transport service is crucial to comprehending the transport market, building a competitive transport system, and making a shift toward multimodal transport in particular. In recent years, there has been a rise in interest in the selection of transport services, particularly in relation to the increased emphasis on intermodal transport. To understand the challenges in attracting freight to intermodal transport and to create a competitive transport system in general, it is crucial to establish which customer factors are most relevant. The study of the modal split and competition across transport modes is thus a major aspect of intermodal research. The modal choice is dependent on the combined performance of a variety of aspects, such as price and quality, with different actors having varying values, perceptions, and selection criteria for

transport options (Woxenius & Bärthel, 2008). To comprehend the modal selection, one must therefore comprehend the underlying factors.

The goal of transportation policy is to increase economic efficiency and productivity while mitigating the negative effects of transportation. To achieve these objectives, the economic agents involved in the activity must adjust their behavior. However, in order for public policy to be effective in inducing desired behavioral changes, policymakers must have a clear ex-ante understanding of how the policy measure's intended target(s) will react (Holguín-Veras et al., 2017). Lack of knowledge of target groups' behavioral responses could result in unforeseen consequences or inefficient policymaking. For sound policymaking, behavioral research is required (Marcucci et al., 2018). Due to the complexity of freight transportation and the absence of a complete understanding of the agents' behavior, these issues are crucial. This lack of knowledge is caused by a variety of factors. It is difficult to examine the interactions between the different entities involved in freight operations, including shippers, carriers, and receivers, and the system is dynamic, as it is influenced by market fluctuations. The situation is aggravated by the fact that freight behavior research has received noticeably less attention than it should.

Early mode choice models were mostly centered on shipping cost and time, but in recent decades, other important elements like as flexibility, reliability, and safety have entered behavioral models. There are considerable trade-offs between shipping costs and the benefits of lowering transit time, enhancing on-time arrival reliability, and minimizing the risk of long arrival delays found by (Brooks et al., 2012). A binomial logit was constructed market share model for mode choice decisions in a recent study, in which the effects of numerous variables were assessed, including crude oil price, commodity value, and average shipment distance for rail and truck. It was one of the most recent attempts to account for environmental implications in freight modal decisions,

such as CO2, CH4, and N2O emissions (Hwang, 2014) . In recent decades, the environmental externalities of transportation networks have received a lot of attention. According to (McKinnon, 2007), freight transport is the largest contributor to carbon dioxide emissions in the United Kingdom, accounting for 6% of total emissions.

Several studies have been conducted over the last few decades to better understand the freight shippers' mode and carrier choice behavior, building on McGinnis' work (1990). (Flodén et al., 2017) as well as (Cullinane & Toy, 2000), conducted detailed reviews and analyses of existing studies on freight mode and choice considerations. In their literature review, (Cullinane & Toy, 2000) revealed a many of critical characteristics, including cost, transit quality, and reliability. (Flodén et al., 2017) recently conducted a study of the literature and compared earlier research on freight transportation service choice, revealing critical factors that influence the decision. Qualitative characteristics such as service frequency, transport time, delivery reliability, carrier flexibility, and freight transport safety were examined by (Beuthe & Bouffioux, 2008) for their relative importance and value for freight shippers. They discovered that these qualitative characteristics had a considerable impact on mode choice using a stated preference experiment with Belgian transportation managers, however the effect varies amongst subsamples. (Danielis et al., 2005) published the findings of a study conducted in two Italian cities to analyze logistics managers' freight attribute preferences, which demonstrated a substantial preference for quality characteristics (time, reliability, and safety) over cost. However, cargo weight/size was proven to be a significant influence (Samimi et al., 2011) demonstrating that larger goods are more likely to be transported by train. (Combes, 2012) found that the size of the shipment and the mode of transport are decided at the same time in his study of 3,000 shippers in France.

To reduce energy consumption, air pollution, and traffic safety, significant effort is being undertaken to shift freight traffic from road to rail. As a result, plenty of studies on freight mode choice have looked into policy-sensitive characteristics that could be utilized to influence modal preferences. According to (Samimi et al., 2011) rail shippers in the United States are more cost aware, whereas truck drivers are more concerned with haul time. They also discovered that rising fuel prices make shippers less likely to convert from truck to rail. (Hwang, 2014) then looked into the impact of crude oil prices on mode choices. He discovered that a sevenfold increase in gasoline prices causes a 40% decrease in truck utilization and a 50% reduction in CO2 emissions.

The mechanism for choosing the mode of transportation (mode choice) for a certain mode of transportation is critical to comprehending transportation behavior and affecting modal split. Since the early 1960s, intensive study has been conducted on mode choice behavior and affecting factors, mainly for passenger transportation, that is, the choices people make in their day-to-day movements. Since changing the freight modal split became an important policy objective in the late 1990s, the mode choice mechanisms for freight transportation have been studied very lately.

1.1   Problem Statement

Road transport is the main competitor of Pakistan Railway (PR). And it's the competition at which Pakistan Railway is at the disadvantage. Pakistan Railway was the major source of transportation for both freight and passengers till 70's. However due to lack of investment in PR by the successive governments and inappropriate policies, priorities were given to road transportation (Qadir,2021). This policy of preferring roads over the railways have declined the performance of PR. Because of the lack of investment, the railways lost to compete in passengers' traffic and freight traffic (GOP G., 2013-14). Governments has been involved in incentivizing road freight transportation instead of inclining freight-oriented trains which leads to a decline in railways freight demand. The

other reason of PR inability is poor governance. PR also shifted focus to passenger side rather than providing quality freight service which is more profitable and can help PR to overcome its financial problems. Due to this firms also shifted the focus from rail to road as railways was not providing quality freight services. Now only 4% of the freight is transported through railways while the remaining is transported through roads.

1.2   Research Questions

- What are the factors that influence mode choice behavior of a firm?
- How improvements can be brought about in PR to attract more freight business – A firms' perspective.

1.3   Objectives of The Study

Following are the objectives of the study

To identify the factors influencing mode choice decision of the firms.

To identify the priority areas of reform for PR in the freight business.

Critical analysis of freight related policies.

1.4   Significance of The Study

It is evident from the literature that number of empirical studies have been done on freight business at macro level. However, there is dearth of studies that deal with the microeconomics demand side dynamics of the freight analysis in Pakistan. The firm level analysis will help in understanding the underlying efficiency issues from the demand side. The transportation cost of inputs, raw material or commodities are a major cost for any firm. The objective of the firms is to minimize this head of cost to ensure the competitiveness of its products in the market. This study will help the policy maker in formulating a more balanced split of freight flows. This study will define the areas the PR need to focus on to attract more freight business. The finding of this study has major policy

implications for vision 2025 to surge the railways freight share. According to (Vision-2025). , government of Pakistan is committed to increase railways freight share from 4 percent to 20 percent of total freight transport (Planning Commission, 2014).

1.5   Organization of the Study

This study is organized into the following six chapters. Chapter 1 is introduction, problem statement, objectives of the study and significance of the study is discussed. Chapter 2 gives an overview of the freight sector in Pakistan. In Chapter 3 the relevant literature is reviewed. Chapter 4 discusses the methodology of the research. Chapter 5 contains the results and discussion and the last chapter 6 is conclusion and policy recommendation.

Chapter 2
FREIGHT SECTOR

In the contemporary world, nations compete intensely to attract investment, increase exports and improve the livelihood of their citizens. While there are many underlying conditions and reasons for attaining success, one common denominator is the presence of a modern and efficient transport and logistics infrastructure. The ability to handle, store and transport goods to and from international markets is essential in achieving global competitiveness. Yet the capacity to move cross-border goods can be a challenging task. Efficient transport and logistics sector require reliable and modernized infrastructure; appropriate industrial capacity; business-friendly institutions to maximize contribution to trade and economy. Together they can strengthen trade and facilitate business, providing growth to the economy and people.

There are two basic modes for freight transportation in Pakistan that is Road and Railways. While road is the most dominant mode for freight transportation, almost 96% of the freight is transported via road and the remaining 4% is transported through railways. The over-reliance on road transport causes congestion and deterioration of the road network. The motorways and the national/provincial highways constitute the major road networks of Pakistan. Less than ten percent of the whole road network is comprised of national highways and motorways, yet they transport nearly all freight traffic. Karachi to Torkham via the north-south N-5 highway is the busiest route. The route is approximately 1,760 kilometers long, carries around 65% of intercity traffic, and serves 80% of Pakistan's urban population. Road transport is one of the expensive modes of transport which lead to the increase in the supply chain cost of the whole economy.

The trucking sector in Pakistan is highly fragmented, with the majority of operators being small-sized and only a handful being medium- or large-sized. The freight charges in Pakistan are the

lowest in comparison to the rest of the world. To maximize profits, truck drivers overload their vehicles, which has a substantial cost due to infrastructure damage.

The largest operators in the trucking industry, especially National Logistic Cell, are in the public sector (NLC). NLC was established in 1978 to handle crisis management duties during natural disasters and unforeseen circumstances, such as strikes, shortages, port congestion, etc. NLC maintains a capacity to undertake Strategic Tasks and to support the Armed Forces of Pakistan, especially the army, during emergency situations and conflict. NLC's fleet consists of 800 prime movers/heavy-duty vehicles. NLC is currently one of the largest transportation corporations competing with private operators. It has a 10 percent market share in freight transportation, being the nation's largest and most resourceful fleet. In the freight service sector of the market, the NLC has created a sophisticated transportation and distribution system. It offers nationwide warehousing and distribution services to its clients. Better Fleet than the competitors enable NLC to travel safely and on-time to any location in the nation.

NLC has an advantage over other operators due to the Pakistani government's preferential treatment. Afghan Transit Trade constitutes a substantial proportion of imports at the ports of Karachi. The government of Pakistan has only approved NLC to transport products from Karachi to Torkham (final point of Pak/Afghan border from KPK region) or Chaman (last point of Pak/Afghan border from Baluchistan province). Before NLC all these routes used to be operated by Pakistan Railway. The majority of private operators are dissatisfied with NLC's privileged treatment.

Pakistan's freight industry has only a small number of major players. Bashir Siddiqui Logistic (BSL) has more than 500 trucks, Agility Pakistan has 400 modern trucks with GPS tracking capability, and Sheheen Freight Service has a fleet of 250 vehicles.

In Pakistan, trucks operate for extended periods of time and transport heavy cargo at modest speeds. A travel in Pakistan takes three times as long as one in Europe. The distance between the ports and the north of Pakistan by road (about 1400-1800 km) takes three to four days, which is twice as long as what it takes in Asia and Europe (World Bank 2006).

Despite the restricted supply of refrigerated vehicles, perishable items such fruits, vegetables, meat, milk, and eggs are delivered across vast distances via road. Due to the absence of a temperature-controlled transport system, the country's capacity to trade fresh fruits is severely hampered. According to estimates 30-40% of the food is wasted due to lack of refrigerated transport, cold storages, low quality packing material.

According to research done by the Ministry of Commerce in 2007, there are numerous causes of damage to perishable goods. The majority of respondents stated that 10 percent of their shipments ended up with damage issues. Principal causes mentioned for the losses, in order of significance, were extended journey durations due to poor transport infrastructure (extremely low average speed), poor packaging, unhygienic transport conditions, and inadequate amenities (temperature control, etc.).

2.1   Pakistan Railway (PR)

Pakistan Railways (PR) is a national state-owned enterprise with headquarter based in Lahore. It was established in 1861. It is linked to the Ministry of Railways, which is responsible for the organization's planning, administration, and regulation. PR facilitates both passenger and freight transportation. Pakistan Railways has a 7791 km (4481 miles) track across the country, stretching from Karachi to Torkham. PR is one of the largest employers in the country, current employing 67,406 personnel. Long-distance and large-scale transportation of both products and passengers is a strength of railways worldwide. Until the 1970s, it was also the dominant form of transportation

in Pakistan. Since then, the share of railways has decreased due to the government's preference move towards roads. During 2005-2010, budgetary spending on railways was only 45.5 billion Pakistani rupees, while spending on national highways was 155 billion Pakistani rupees. The percentage of inland freight traffic carried by railways has declined from 73 percent in the 1970s to 4 percent now.
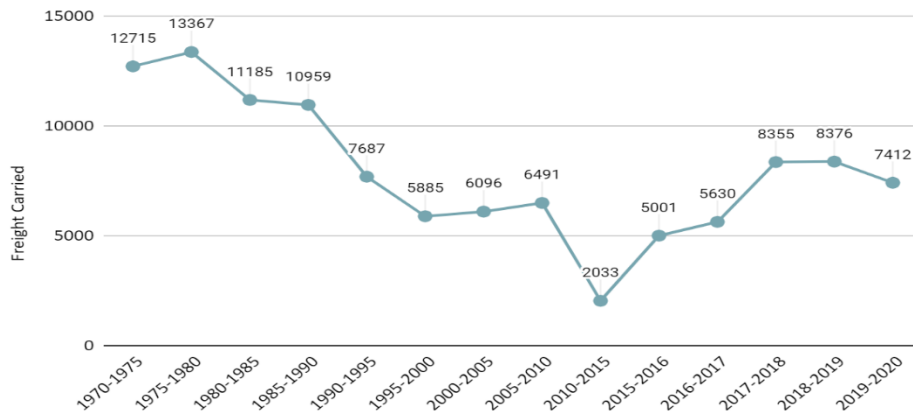
Figure 1: Freight Carried by PR (Thousand Tonnes)

Source: Year Book 2019-20

Freight has been an important source of revenue for Pakistan Railway (PR). However, the freight carried by PR has reduced over the years. Freight carried by PR largely comprise of coke and coal and PR departmental commodities. Revenue from freight stands at 40% of total revenue, it was 65% in 1970's. In 1990's oil traffic shifted to pipelines leading to a decline in traffic. PR has endured the worst crises in the period 2010-15 as the revenue from freight stands 16% the lowest ever recorded.

Table 1: Performance of Railway Freight Sector

Rail Freight	2015-16	2016-17	2017-18	2018-19	2019-20
Freight Carried (thousand tonnes)	5001.00	5630	8355	8376	7412
Freight Carried (TKM)	4733548	5031315	8080353	8303590	7369878
Average km travelled by a ton	954.44	893.65	967.06	991.25	994.22
Freight Wagons (no.)	15324	16085	16159	14327	14448
Locomotives (no.)	460	455	478	472	473

Source: Year Book 2019-20

Table 2: Commodity-Wise Freight Carried (Thousand Tonnes)

Commodities	2015-16	2016-17	2017-18	2018-19	2019-20
Cement	283	239	247	195	222
Coke and Coal for public	881	1303	3899	4133	3357
Railway material and stores	661	848	625	565	541
Chemical manures (fertilizer)	107	234	94	135	195

Source: Year Book 2019-20

2.1.1 Pakistan Railway (PR) Concerns

PR is currently suffering due to various reasons, some of them are continuous losses, depleting assets, consumer dissatisfaction, under investment, political interference, corruption institutional dichotomy and governance issues(Khaliq & Khan, 2020).

According to (Ahmed, 2021) PR has suffered Rs. 1.19 trillion losses in the last three years. In the year 2018-19 Pakistan Railway has suffered a loss of Rs. 32.7 billion, Rs. 50.15 billion in 2019-20 and 36.28 billion in the initial eight months of the fiscal year 2020-21.

Pakistan Railways' assets are deteriorating at a rapid rate, as the majority of them have outlived their useful lives, both in terms of infrastructure and rolling stock, significantly affecting their operational efficiency. Due to the age of the assets, a significant portion of revenue is spent on maintenance. On the other hand, the government invests more in road transportation. The main reason of Pakistan's current railways situation is a combination of disregard for trains and preference for roads. Instead of being a commercial organization, Pakistan Railway evolved into a bureaucratic one, where responsibilities and processes take precedence above end results. Direct intervention in strictly technical matters by bureaucrats invariably results in inefficient service delivery. Additionally, running a business enterprise with political considerations cannot result in profit. Commercial considerations should guide operational decisions and development fund allocation, not political involvement. Political appointments or transfers have a detrimental effect on efficiency. Corruption is pervasive because those apprehended have extended reaches into the halls of power.

Chapter 3
LITERATURE REVIEW

Maggi and Bolis (1998) examined a micro-analysis of freight transport demand is proposed in this work by the authors. With rare exceptions, current research focuses on the method of transport chosen by shippers and provides consistent evidence of the significance of attributes. Globalization and liberalism have led to a wide range of services, from simple transportation to full-scale logistics. So, shippers' actions are viewed here as sophisticated decisions that take into account the entire logistics plan of a company. In the absence of any data, a stated preference technique is used to estimate the marginal willingness to pay for various levels of transport and logistics quality and service. Long-term logistics plan information is used to support adaptive expressed preference studies. It's here that we give our first findings, integrating the results of decision analysis with information about each individual instance. It's important to keep in mind, however, that the relative importance of each feature is not influenced by what type of commodities are being transported or what industry they are in. In terms of both frequency and adaptability, this is accurate. It is clear from the estimates that there is a considerable degree of variability in crucial features, because each company has a unique logistical organization. The company's special requirements necessitate additional characteristics.

Blauwens et al. (2006) investigated the efficacy of various policy initiatives targeted at encouraging a switch to alternative modes of transportation for freight. The study looks at modal choice from the perspective of corporate logistics using an inventory-theoretic approach. The inventory-theoretic method is based on the notion that all expenses in the supply chain that are influenced by the choice of transportation mode are explicitly considered. The inventory-theoretic framework is used to compute the market share of several freight transport modes in a hypothetical

transport market following a brief literature survey. Secondly, various policy actions are analyzed to see how they affect transportation mode market share. The market for container transport from a seaport to its hinterland is used as an example. Intermodal transport may be significantly shifted from road travel by a combination of particular policy initiatives. However, the findings of this study may be applicable to other freight transport industry segments as well. As an example, the market for bulk products, unlike the market for shipping containers, is dominated by lower-value goods. This market is dominated by high-capacity transport modes with low average speeds, such as inland navigation or rail transport, which account for a large portion of the modal split for certain market segments/transport axes.

Holguín-Veras et al. (2017) analyzed the good policymaking necessitates an in-depth knowledge of how the policy's intended beneficiaries will respond. Policymakers have a difficult time dealing with transportation networks because of their complexity, heterogeneity, and lack of knowledge. It is easy for policies that affect such a complicated system to have both harmful and positive unintended consequences. If urban freight policy is not backed by behavioral research, these results can be avoided. The authors perform an ex-post review of qualitative and quantitative research approaches to discover which one best predicts the behavioral changes that were observed by transportation users in response to transportation policy. According to these authors, the asserted and revealed behavioral reactions of transportation users to price and incentive policies in the New York City metropolitan region are explored utilizing qualitative and quantitative research. For comparison purposes, findings from both quantitative and qualitative research are catalogued in a database. As a result of these studies, it is possible to see how both techniques may work together to improve urban freight strategies, as well as the synergies between them. A sequence of QaR and QnR procedures, starting with the most cost-effective, can help policymakers improve their

formulations. As a first step, IDIs might be used to gather data on how the industry and the policy as a whole might react to each other. As an alternative to using IDIs, focus groups can help determine how industry representatives feel about the (potentially changed) policy.

Brooks et al. (2012) investigated the relationship between a Cargo interest and their agents make mode choice allocation decisions between land-based transportation and coastal shipping in this research paper, which studies the Australian domestic freight transport market. It examines the willingness to pay (WTP) for various qualities of modal alternatives on specific transportation routes. When it comes to assessing the influence of carbon pricing or other regulatory considerations on transportation costs, this knowledge is essential. Shippers' preferences for service components given by freight transport providers across modes with varied characteristics (speed, frequency of departure, dependability (two measures), and cost) in three corridors are identified and quantified in this paper. Frequency, transit duration, freight distance, direction (head haul/backhaul), dependability as evaluated by delivery window, reliability as measured by delay, and pricing supplied by the operator are the seven factors that are examined. The paper closes by outlining the trade-offs that shippers face when deciding on a method of transportation on the specific corridors studied in the study. Additionally, it investigates what may happen if the price of carbon were to rise as a result of the policy.

Holguín-Veras et al. (2021) showed the importance of freight mode of transportation in the US. They developed an econometric model to show the impact on public policy choice and change in the market. To achieve the objective, the study used both qualitative and quantitative approaches. In the qualitative portion, the in-depth interview is conducted with shipper carriers and traders, highlighting the factors that influence the mode of choice in transportation and barriers they face and force them to shift to another mode of freight. The confidential data were utilized in the

quantitative section, which is a distinctive aspect of this research observed under the custody of the United States Census Bureau, Internal Revenue Service, and Surface Transportation Board. They have estimated a discrete-continuous model for freight mode choice for 42 different commodities choosing rail or truck. Results indicated that the form of transportation chosen for freight is greatly dependent on the recipient, who decides the mode of transportation. The interview also reflects that the receiver, as the primary customer, decides the shipment size and freight mode. They also highlighted that freight rate and reliability are the important factors.

Wang et al. (2013) examined that freight mode selection is essential in forecasting freight demand. Due to the scarcity of freight data, far less study on freight mode selection has been undertaken than passenger demand analysis. This research looks at unobserved factors influencing freight mode choices, such as trucking and rail. The revealed preference data is gathered from the Freight Analysis Methodology and pooled for use in this investigation. Binary probit and logistic regression models are created to evaluate modal performance and validate variations in mode choice decisions across Maryland's three areas. Many mode choices may be discovered for cargoes generated in these zones. For cargoes generated in these zones. Identifying these characteristics may aid cargo modelers in developing and calibrating better freight demand models for Maryland and can assist policymakers in reducing truck-caused traffic congestion and air pollution.

Winston (1981) used the disaggregate model for the freight transportation demand compared to the aggregate approach without considering the choice decision. They used a mode of choice decision experiment at the individual level for several intermodal competition issues. Two types of data sets were used for analysis: one data set contains a wide range of perishable Agri-commodities. The variable in such data set includes the quantity of commodity shipped, net value of the commodities, means of freight and transportation fee, loss and damages during shipment,

and total time taken by freight. At the same time, the second data set contains shipment data of commodities such as length of haul and origin-destination Paris. The results in terms of methodology perspective have several benefits, i.e., it shows higher econometric specification than another model for freight demand. Secondly, the elastic market demand is the precise last, but most crucial mode choice decision is more important for particles decision-market behavior and considerable substance to any policy implication.

Cullinane and Toy (2000) analyzed the stated Preference (SP) adopted approaches in freight route/mode choice research necessitates identifying the primary modal variables that impact these decisions. While it is necessary to restrict the number of qualities and attribute levels to keep the number of combinations (choice alternatives) provided to respondents reasonable, it is equally critical that these variables be precisely defined and characterized. In the bulk of empirical investigations, approaches for doing this task have centered on focus groups, interviews, unscientific synthesis of prior studies, or even the researchers' feelings or ideas. This study describes and shows the implementation of a content analysis technique to the (mainly Western) freight route/mode choice literature, therefore giving a formal way to identify and justify the features used in (Stated Preference) SP studies. The consequences for extraction of features in empirical investigations are examined, emphasizing the Eastern European setting.

Beuthe and Bouffioux (2008) analyzed the qualitative factor for freight transportation such as services, time, damage, reliability, and carrier flexibility during shipment at the UK state level. Most of the literature focus on limited freight transportation, such as the choice between truck and rail intermodal transport. In this paper, data was taken from a survey of Belgian freight transport managers. The survey contains extensive data related to the transport market and statistical literature. They also conduct preliminary in-depth with several transport managers. The results

show that analysts should consider estimated time values, reliability, and other qualitative factors in transport analysis. The distribution values should be used instead of using the average value. They found that these factors played a significant role in decision-maker behaviors.

Kim et al. (2014) investigated the factors of transportation mode choice and the limits on transferring freight in New Zealand (NZ) from road to rail and coastal shipping, as well as quantified the trade-off between factors that influence shippers' views to aid in increasing the percentage of freight transported by non-road transport modes. A stated preference survey of 183 cargo shippers in New Zealand, including small and medium-sized businesses and freight agencies, determines if freight carriers' characteristics influence their ordered preference for features linked to mode choice and modal shift. The ranking data also estimates a rank-ordered logistic (ROL) model. The findings demonstrate various unique forms of transportation mode choice behavior within the sample and how preferences for the timeliness, affordability, accessibility, damage, loss, customer service, and appropriateness differ between industry groupings and company types. Furthermore, the ROL technique enables us to discover variability in mode choice preferences and mode shift determinants for freight within New Zealand. According to the findings, NZ shippers regarded transit time as the major limitation to rail distribution, while access and freight size were the key obstacles to sea freight. The study also examines how the modal shift limitations of New Zealand shippers differ depending on the firm's personal or logistical features. By giving quantitative measurements of the degree of preference for the major mode choice criteria, this study educates freight transport policymakers about the demands of New Zealand shippers.

Moschovou and Giannopoulos (2010) explored the process and criteria for freight mode decision behavior in Greece between 2004 and 2009. The study included a large-scale survey of various rail freight players in Greece, a complete statistical analysis of the results, a presentation to establish priorities, preferences, and detailed rankings of mode choice criteria, and a modeling exercise to develop models that describe the mode choice behavior of Greek enterprises. This article examines the questionnaire survey, the characteristics of the participating businesses, the decision-making process for selecting the mode of transportation, and the criteria utilized for mode choice decision-making in Greece. The findings include conclusions and data that may be utilized to characterize mode choice behavior in freight transport in countries other than Greece. These are described as transportation dependability and quality, transportation costs, transportation chain features, and the current state policy and its accompanying legislative framework for transportation market operation. The findings of the modeling exercise and the numerous models of freight mode choice behavior that were developed will be published in a future study.

Zeybek (2019) examined that the liberalization of rail markets in the EU has been in process since 2007. This enables any licensed EU incumbent or non-incumbent railways company to apply for capacity and offer rail freight services within the EU. Few firms have successfully gained new clients, as evidenced by the vast majority of new rail freight service providers who have poached consumers from incumbents. In order to prevent major and rapid market share losses, the incumbent must first know customers' mode and carrier selection behavior before unleashing competition by extending the market. This study assesses the impacts on shippers' and forwarders' mode selection, highlighting the significant elements that drove freight mode selection before the liberalization of the rail industry. Based on the survey's outcomes performed by interviewing shippers and forwarders, the analysis was undertaken. Cost is the primary determinant of both

shippers' and forwarders' mode selection, proving their price sensitivity in the purchase of transport services, as indicated by the research findings.

Fries et al. (2009) examined the environmental effect, rail and river transport are the most efficient modes of land freight transportation, particularly over extended distances; nevertheless, they are seldom employed owing to poor pricing and quality conditions. However, environmental efficiency is crucial not only from a political standpoint, but for all economic players as well. The majority of shippers and forwarders have the authority to choose which transport provider to employ for a given consignment. Today, their selection is mostly cantered on quality and price, as opposed to environmental concerns. Additional environmental information might encourage shippers to take environmental concerns into account when selecting transport services. In Switzerland, a shipper study was conducted to examine significant elements in shipper demand for land transport services, including the relevance of environmental performance in freight transport. A collection of logit models was calculated to assess shippers' willingness to pay for lowering their shipments' environmental effect. A special emphasis was placed on disparities between the sorts of shipping goods. The results corroborate the concept that the closer a shipper is to the final customer, the greater their environmental awareness. Nonetheless, a cost-benefit analysis finds that shipper sensitivity is in most cases unable to offset the price increases produced by switching a shipment from its present method of transport to one with a lower environmental effect.

García-Menéndez et al. (2004) estimated a freight transport demand function with a Conditional Logit model has highlighted the importance of cost, transit time, and shipment frequency as mode selection drivers. Interviews were performed with exporting companies, freight forwarders, and other transport companies, and data about method of transport, cost, transit time, and other characteristics were compiled. From October to December 1998, 157 exporting companies based

in the Valencian Community were questioned. The modes evaluated were highway and maritime. According to an elasticity analysis, sea transport is significantly more sensitive than road transport to changes in its own costs and transit prices. Gains in intramodality equilibrium do not, however, just need price adjustments. As evidenced by the relevance of the results and the elasticity of the variables DELAY and DAMAGE, marine transport must provide more technical and technological advancements and quality enhancements.

Shen and Wang (2012) explained the mode selection is crucial for the effective delivery of commodities. This paper develops a binary logit model and a regression model to examine the movement of cereal grains by truck and rail in the United States, utilizing the publicly accessible Freight Analysis Framework (FAF2.2) database, US highway and network data, and Trans CAD, a geographic information system with robust transportation modelling capabilities. The binary logit model and the regression model both employ the same set of generic variables, such as the chance of mode split, commodity weight, value, network transit time, and fuel cost. The results demonstrate that both the binary logit and regression models work well for cereal grain transportation in the United States, with the binary logit model providing more accurate estimates of the observed truck and rail mode splits. The two models may be applied to investigate various commodities between two modes, and more mode-specific variables may yield better findings.

Shin et al. (2019) examined that the features of shippers' and carriers' freight mode selections following the implementation of a new freight transport system. As the analytical scope, we selected an area where actual freight transport occurs and surveyed shippers and carriers who move containers to determine their stated preference (SP) towards the new freight mode. The SP survey was conducted using an experimental approach, and this study took transit time, transport cost, and service quality into account. Comparing and analyzing the models by distance using an

individual behavior model, this study the results of the model estimation indicated that the explanatory power of the distance-classified model and the individual parameters are statistically significant. In addition, the hit ratio was high, which indicates that the model was well calculated. In addition, the model's analysis of the range of elasticity and the value of trip time was deemed adequate in comparison to earlier research. The results of the elasticity study indicate that measures to reduce transportation costs are beneficial in boosting demand for the new mode of transportation. It was determined that the value of trip time for freight transport is greater than the value currently applied in Korea. Given that the existing value of trip time is based on road freight transport, more study is necessary to apply a new value of travel time in the future that matches the features of the new transport mode. Third, the transport distance was separated into less than 20 km and more than 20 km based on an assumption made while segmenting the model's market; however, more research is required to segment the transport distance by comparing the competitiveness of the two transport modes by distance. This study established a freight mode selection model based on the introduction of a new transport mode, although it has not yet been used in the real world.

Chapter 4

Policy Assessment

This study reviewed national freight and logistic policy (2020) and transport policy (2018). The national transport policy is a prerequisite for the effective development of a sustainable and cost-effective transport system. Logistic has profound impact on the implementation of the structural changes needed to achieve a sustainable and an inclusive development. Pakistan has a skewed modal transportation mix, with approx. 96% of freight moved by road. Road transport is one of the most expensive modes of transport, elevates the supply chain cost for the whole economy.

Pakistan has poorly dropped its ranking in Logistic performance index 122 out of 160 countries. The best LPI ranking of Pakistan over the last 15 years is 68. Logistic performance and economic growth are correlated so we know where we are lacking. The lack of a comprehensive vision for infrastructure, logistics, mobility and transport hampers the realization of a broad based and an inclusive economic growth. The objective of Logistic policy can be achieved through 5'C's element which is connectivity, competitiveness, cross-border transit, communication technology and capacity building which is unfortunately lacking in context of Pakistan. Establishment of linkages between road and rail can ensure efficient flow of goods and help in alleviating road congestion. Proper farm to market channels needs to be establish.

The different parts of the freight transport and the logistics value chain are currently being managed by numerous different ministries and government agencies/organizations, including the Ministry of Communications, Ministry of Maritime Affairs, Ministry of Railways, Aviation Division, Ministry of Commerce, Ministry of Planning, Development and Special Initiatives, Federal Board of Revenue (FBR), as well as the Provincial Governments. The absence of a unified ministry to lead the development of logistics is a significant barrier. This problem was also

identified by a guest speaker Mr. Babar Babat in webinar (The Logistics in Pakistan from Origin to Destination) arranged by PIDE.

For improvement of multimodal transport system, to harmonize and safeguard the interest of multiple stakeholders regulatory and legal regime need to be updated. The problem in Pakistan is implementation, there are many policies drafted but they were never implemented like in 2007 Trucking Policy was identified as change in the sector but never implemented. The Trucking industry in Pakistan is informal, and credible data is difficult to come by. There are disparities in the number of trucks registered. Most of the trucks operating on the road are single or double axle trucks. 65-70% of the fleet is single or double axle trucks According to many studies, single- or double-axle trucks do the most damage to the road since their loads are distributed mostly on the rear axle. The majority of trucks are overloaded, resulting in excessive expenses due to the deterioration of the infrastructure.

Another reason for the inefficiency of the transport system is the incomplete integration of local markets. Due to poor markets and inefficiency in transport system hampering the whole economy. In developing countries, food losses occur in the production chain and hit small farmers the hardest. FAO (Food and Agriculture Organization) estimates that 30-40 percent of agricultural food is lost due to poor farm-to-market distribution channels.

This study reviewed transport policy 2018. The foremost and the critical issue in developing the transport system in the country is the lack of ignoring freight transport as a business venture. Similar approach can also be seen in our policy making. No specific framework has been laid out to uptake freight industry in Pakistan or at the least even addressed the basic problem related to freight transport. Also, the policies talked about the affordability, efficiency, durability and all the things but there is no proper mechanism on how to achieve these objectives. One of the barriers in

developing freight sector in Pakistan is lack of coordination between the different organization. Also, the policy discussed about environmental preservation, while still our focus is on road transport, and most of the fleet is outdated, which creates more pollution and no there is no such policy action to preserve environment.

In freight transportation, there is a lack of meaningful evaluation of modal choice policy. Many policies are implemented by governments, the majority of which have never been assessed. Because the majority of existing evaluations do not include quantifications of effects, it is difficult to determine if policy actions have been beneficial. Many policy instruments contain wide, vague, and ambiguous intentions, making it difficult to determine whether or not objectives have been met. Several evaluations focus just on the achieved modal shift and ignore the impact on negative externalities. There is a continuous controversy among the professional and policy maker over the intermodal distribution of traffic in Pakistan. For the development of national transport system, the role and suitability of various modes of transport is an important factor. Every mode has its own role. The railways are designed and suited for long-distance transport. Short distance rail transportation is inefficient and uneconomical. In developing countries, we think that transport has to be regulated and the government must always interfere but these rules need to be helpful. In Pakistan, we cannot expect the public sector to meet all of the nation's transportation demands. It does not occur in developed nations and cannot be anticipated to function in developing and poor nations. The private sector plays a significant role in transporting passengers and freight in urban and rural areas and between cities. In the past, the private sector carried 80 percent of the weight while the public sector carried only 20 percent. Currently, the public sector is barely bearing any burden. Fare regulation is another issue that negatively impacts the efficiency of the private sector.

Management is another concern with the transportation system. A person who lacks the necessary transportation qualifications and expertise may be appointed to create policy or oversee projects in this sector. This is a violation of the fundamental concept of good management. It is proposed that a person working in a certain system be permitted to make it a career. Before being asked to set policy or manage a transportation project, he or she must have the required transportation qualifications and be familiar with the principles and procedures of excellent management.

In developing and emerging countries, funds to finance transportation projects have always been scarce. We require sufficient finances to fund the building of new projects as well as the maintenance of existing ones. The fund supply must be consistent and sufficient. The concept of increased private-sector cooperation inside and outside the country should be explored and used to the planning and implementation of transportation projects.

Inadequate planning and corruption are among the causes responsible for the failure of Pakistan to establish an efficient transportation infrastructure. The role of the private sector, lack of capacity among public transport organizations, negligence in the development of high-capacity public transport, and failure to utilize existing land use patterns for the development of dependable and efficient public transport have been identified as essential factors for the development of an efficient transport system for the nation. Governance, capacity-building including investment, and urban planning are crucial for the national development of Pakistan in order to offer appropriate, efficient, and effective public transportation.

The perceived demand for modal shifts will be influenced by technological advancements in transportation vehicle propulsion. Mode-choice policies are based on specific assumptions about the environmental implications of each mode of transportation and how these may alter in the future owing to propulsion breakthroughs. With technical advancements, trucking, the mode of

transportation that generates the largest external costs, could reduce them. Switching to sustainable biofuels and compressed natural gas has cut GHG emissions in trucks in a number of countries (CNG). Truck (or road) electrification is also quickly progressing. Rail transport has a low carbon footprint already. With the phase-out of diesel locomotives and the roll-out of electrification of railways in many nations, this is likely to fall much more — provided that the electricity comes from renewable sources.

The aforementioned advancements will have a mixed impact on the attractiveness of various types of freight transportation. Automation in the road freight industry could eventually assist to improve safety and alleviate driver shortages, while electrification could improve the sector's environmental performance. Simultaneously, the expansion of road freight transport will not assist to reduce traffic congestion. Electrification is already well progressed in the rail sector, and more electrification will help it maintain its position as a low-emission, energy-efficient mode of freight transportation. Meanwhile, governments may encourage greater corporate innovation in rail freight transit to make it more appealing to customers, such as enterprises that need to carry cargo.

The National Freight and Logistic Policy (NFLP) must address the inability of the country's freight and logistic system to meet the demand for goods transport at a competitive price and with a sufficient level of service (both quality and reliability). This mix of inconsistent policies, regulatory shortcomings, and institutional inadequacy necessitates operators and service providers to deal with entities and administrative procedure, resulting in increased prices and poor services. There is a need for an integrated system-level strategy that signifies a shift from a supply-driven provision of trucking and warehousing services to a demand-driven provision of freight and logistics services for both domestic and international commodities flow.

Railways itself policies are not in the right direction, as they have shifted their focus to passenger from freight. As long as railways policies were freight-oriented railway was doing good, today railways are one of the top loss-making state-owned enterprises, putting burden on the economy, railways need to change its policies and shift its focus to the freight to reduce the losses as freight is more profitable than passenger. In interview with the railways official he said:

"That due to wrong policies and more focused on passenger rather than freight railways is making billions of losses annually. And the problem with passenger is most of the people travel without tickets and most of the passenger travel in the economy class".

An effective and efficient logistics system can be a significant contributor to Pakistan's robust economic growth; freight and logistics hold the potential and promise to facilitate domestic and international trade, promote global competitiveness, increase incomes, and reduce regional economic disparities. The sector is one of the country's most important trade enablers. In particular, an efficient freight transport and logistics network has the ability to multiply the revenue of farmers, which can serve as a catalyst for enhancing the economic performance of the nation as a whole. Pakistan's inclusive and quick economic growth is dependent on a logistics infrastructure for commercial commodities that is dependable, efficient, and affordable logistic infrastructure.

Chapter 5
METHODOLOGY

4.1   Introduction

This chapter aim to describe the methodology to identify the factors influencing mode choice decision of the firms and identify reforms areas for railways freight business. Previous literature finds significant studies regarding factors influencing mode choice decision but none of the study has been conducted in Pakistan context. Research methodology refers to the certain set of procedures or techniques that are employed to guide the entire process of research study. In a dissertation, the methodology section informs the reader or reviewers about the crafting of the research so that they can review the validity and reliability of the study that has been conducted or need to be conducted. Therefore, to serve aforementioned purpose current, this chapter will focus on the explanation of the whole research process that how the research will be conducted.

There are different types of methodologies, qualitative, quantitative and mixed approach. This study adopted a kind mix methodology. Both qualitative and quantitative methodologies are used.

4.2   Qualitative Methodology

This study adopted a qualitative approach, face to face interviews were conducted from different firms to identify factors influencing mode choice behavior. (Danielis et al., 2005) also conducted face to face interviews for collecting data to find freight service attributes from Logistic managers. This will provide a comprehensive understanding of the firm's background in relation to the mode selection.

The qualitative methodology employs face-to-face interviews employing an interview procedure (also known as an interview guide or script) with open-ended questions. For instance, the first question of the interview may be, "What means of transportation do you use to deliver goods?"

The example is provided because it is a good interviewing technique to put the respondent at ease by asking the question to which he or she already knows the answer (Berg & Lune, 2007). The interviewer left the questions purposefully open in order to avoid pressuring or imposing a specific viewpoint towards a particular variable. To obtain further information or to explain the answer, probe questions were posed. Because of the semi-structured nature of the interview, the interviewer is able to ask follow-up questions based on the interviewee's response (Bryman, 2016).

In qualitative research, both interviews and focus groups are often used methods (Bryman, 2016). However, conducting an interview rather than a focus group is preferred for the following reasons: Focus groups provide unique insights based on group interaction and collective expertise, but they need a high level of commitment and active participation from each participant. In addition, a focus group involves the simultaneous presence of a group of participants. In context of the research this is too burdensome to achieve as interview will consist of managers with strict agenda and time restrictions. Second motivation is the limitation inherit to organization of focus group. There is a risk of losing control of the conversation since specific and advanced moderate skills are necessary to manage a group, a difficult transcript due to numerous voices sometimes speaking at the same time, and inaudible impacts that are reflected in group behavior (Bryman, 2016)

Thematic analysis is the method used to analyze the transcribed interviews.

4.3   Thematic Analysis

Thematic analysis is a method for detecting, interpreting, and reporting patterns (themes) within data that is frequently used in qualitative research (Braun & Clarke, 2006). Literature is still divided over whether theme analysis should be regarded a method in and of itself or a tool to be used in conjunction with other methodologies (Boyatiz, 1998, Bryan, 2001, king 2004, Braun and Clarke (2006), nowel et al 2017). The viewpoint of thematic analysis as a method is followed here.

In thematic analysis, themes are the primary unit of analysis; they are thought to capture something noteworthy about the data in relation to the research question, and they indicate some level of structured response or meaning within the data set (Braun & Clarke, 2006). In inductive thematic analysis, themes are driven by the data or, to put it another way, they arise from the data (Elo & Kyngäs, 2008).). It is marked by a bottom-up strategy (Bryman, 2016). In contrast to the deductive method, thematic analysis utilizes theory as a coding lens. It is most frequently used in the context of theory testing and is characterized by a top-down methodology in which prior information determines the category structure.

Inductive thematic analysis is the method most applicable to the research context. Because it begins with the research question rather than a strong epistemological theoretical lens, inductive thematic analysis is simple to incorporate into the pragmatic paradigm followed by research design, which is why it is utilized. Second, due to the absence of such coding frameworks, it was chosen to begin coding themes from scratch as opposed to reusing thematic coding from previous investigations. Third, theme analysis is adaptive to the requirements of the investigation (Braun & Clarke, 2006).

Coding is the vital instrument for doing thematic analysis, which requires categorizing data segments with short names that simultaneously explain and account for each data point (Charmaz, 2006). In other words, it involves adding tags or labelling key areas to transcribed interview content. Two types of coding are open coding and axial coding. Open coding refers to the early step of coding in which concepts are identified and categorized. In axial coding connection between different coding is examined. There are different phases in coding. The first phase entails initial node coding for each interview. Initial coding is defined by Charmaz (2006) as "the analysis of data segments, words, lines, segments, and incidents in close relation to their analytic

significance." Each interview was classified separately, and for each interview, a summary of key insights and intriguing details was compiled. The second phase of coding involves organizing and classifying the codes. This resulted in the establishment of themes, including both interview-specific and data-wide themes. During this phase, various themes were recoded, and the interaction between codes and themes was investigated.

4.4   Location of the Study

The targeted area for the survey is I-9 Industrial Estate Islamabad near Potohar metro station and Rawat Industrial Estate Rawalpindi. It was established in 1963. About eight different types of industries dominate these areas which include Steel and re-rolling mills, marble cutting and polishing, flour mills, Pharmaceutical, galvanizing and metal working and engineering industries. Steel and re-rolling Mills are largest in size among others.

4.5   Targeted Population

The data was collected from different manufacture firms in the targeted area through interviews as the firms are the main stakeholders in freight transportation. And for efficient freight transportation and better freight and logistic policy it is importation to involve the main stakeholders.

4.6   Sampling Technique

This research thesis adopted convenient sampling technique. The convenient sampling technique is a type of nonprobability sampling in which samples/unit of data collection are approached by the researcher on the basis of convenience (Edgar & Manz, 2017). The people/sample/unit of data collection were sampled who were easily accessible. Due to resource constraints and lack of willingness of the respondents the researcher adopted convenient sampling technique.

4.7   Data Collection and Sample size

For data collection, in this study, we conducted in-depth interviews. In-depth interviews are open ended and unstructured interviews, which are conducted to unearthing respondents' feelings, emotional state, and perceptions about a specific social phenomenon or study topic. The leading benefit of in-depth interviews is that they provide an opportunity of face-to-face or direct interaction between interrogators and respondents, additionally, it reduces non-response rates as well as goes deeper in research problem.

Another important element of data collection is deciding the sample size. Professor Keith Townsend by citing various sources states that a fundamental element of "sample size is the depth of data rather than the frequencies", therefore respondents need to be well engaged to properly represent the subject matter of the study (Townsend, 2013). According to Cresswell (2007) for heterogeneous population interview-based qualitative studies need 25 to 30 sample size, while according to Sandelowski (1995), for qualitative studies that involve homogenous population, the interviews of 10 participants would be sufficient. Likewise, Lincoln and Guba (1985, p. 235) recommend 12 to 20 participants in interview-based studies. Furthermore, Marshall, Cardon, Poddar, & Fontenot (2013), recommend 15 to 30 interviews will be enough for single qualitative case studies. Hence, keeping these views into consideration this study has collected data from 30 respondents to ensure that our sample size surpasses the aforementioned thumb rule of sample size to guarantee the reliability of the research.

4.8   Unit of Data Collection

The data was collected from managers of different firms at the targeted area. As managers is responsible for controlling or administering the firm. There are a number of established ways to define firm size, such as in terms of value added, sales, or the number of employees.

Karlsson, J (2021) defined size of the firm as the total number of employees per firm. Most of the firms are in medium size category (number of employees).

4.9 Quantitative Methodology

Primary cross-sectional data was used to identify factors influencing mode choice behavior from different industrial freight shippers in Rawalpindi and Islamabad. Trucking is the main competitor of Railways in freight transportation. So, this data will only focus on railways and trucks. The dependent variable is the mode of transport, which is either rail or truck.

Table 3: Variable Description

Variable	Definition	
Mode	Mode of transportation used for freight shipping	Dependent Variable
1. Reliability	It is defined as the time delivery and quality of service provided by the transportation agencies	Independent Variable
2. Cost	The rate charged for transporting the shipment	Independent variable
3. Loss and damage	The probability of loss and damage to the shipment while transporting it.	Independent variable
4. Ease of Access	It is defined how easily the transport mode is available	Independent variable
5. Origin and destination	It means from where the shipment originated and where it is delivered	Independent variable

Mode: It is defined as the mode of transport used for freight shipping by the firms which is either rail or truck. It is dependent variable.

Reliability: It is defined as the time delivery and quality of services provided by the transporting agencies. As for firms' timely delivery is very important to be in competition.

Cost: The rate charged by different transport modes for freight shipping. As cost is one of the determinants for choosing a transport mode.

Probability of loss and Damage: It is defined as the probability of loss and damage to the shipment while transporting the shipment as security of the shipment is very important for the firms.

Ease of access: It means how easily the transport mode is available and the procedure of booking the mode of transport, also how often they are available (frequency of services).

Origin and Destination: It means that from where the shipment is delivered and where it is received as it determines the selection of the transport mode because of the accessibility to the area.

Models in which the response, or regressand, variable is neither quantitative nor interval-scaled are referred to be qualitative response regression models. The simplest qualitative response regression model is the binary model with a yes/no or presence/absence type regressand. The linear probability model (LPM) is the simplest possible binary regression model, in which the binary response variable is regressed on the relevant explanatory variables (Gujarati et al., 2012). Probit model is more popular than the logit model since it is often assumed that the errors are normally distributed. Since both probit and logit model rely on nonlinear parameters, Maximum likelihood Estimation (MLE) is used to estimate the models (van Oordt, 2015). Probit model will be used for the estimation of the first objective and the reason is that our dependent variable is binary variable so probit model most feasible for this type of estimation. Here our dependent variable is binary,

that it has two outcomes which are 0 and 1.Value assigned to Train 1, Truck0. For probit model

we are interested in in the response probability written

$$P(y = 1|x_1, x_2 \ldots \ldots x_k) = P(y = 1|X)\ldots \text{Eq.5.1}$$

If we take X as all independent variables. Written in functional form together with parameter this

is

$$P(y = 1|X) = G(\beta_0 + \beta_1 x_1 + \cdots \beta_k x_k) = G(\beta_0 + x\beta)\ldots \text{Eq.5.2}$$

where $P(y = 1|X)$ means the probability that an event occurs given the value(s) of the X, or

explanatory, variable(s).

Maximum likelihood Estimation (MLE) is based on the distribution of y given x and is therefore

important for the   estimation of the models (van Oordt, 2015). Maximum likelihood

estimation (MLE) is a method of estimating the parameters of an assumed probability distribution,

given some observed data. This is achieved by maximizing a likelihood function so that, under the

assumed statistical model, the observed data is most probable

The general form of the model is below:

$$Probit\ (Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots. + \beta_n X_n + \mu \ldots \text{Eq.5.3}$$

Here Y is the dependent variable which is the mode choice between truck and rail, β represent the

parameter and X represents the explanatory variables.

4.10 Conclusion

This chapter has outlined the methodology of the research. Mix methodology will be adopted. The tool for the collection of data was interviews from different manufacturing firms at I9 industrial estate and Rawat industrial estate. Looking at the nature of the data thematic analysis and probit/logit model was proposed. The next chapter discusses the result of the above-mentioned methodology.

Chapter 6

ANALYSIS AND DISCUSSION

In this chapter we perform analysis and discussion by applying qualitative techniques. Data obtained from face-to-face interviews were processed to categorize in context to the proposed themes accordance to the study questions. For analyzing the data obtained through interviews thematic analysis was used. This chapter is divided into two sections. The first section explains the first objective while the second section explains the second objective.

5.1   First Objective

The first objective of the study is: To identify factors influencing mode choice decision.

5.2   Factors Influencing Mode Choice Decision

Its shows how the freight shipper's decision is influenced by certain factors, opting for a specific transport mode for their freight shipment. Data obtained from the interview was processed according to the research questions and using thematic analysis following themes were constructed.

5.2.1   Reliability (Transit Time and Quality of Services)

Reliability is one of the most significant factors affecting mode choice behavior as many of the respondents mention the particular factor. Reliability here means delivery time and the quality of service provided by different transporting agencies. Transit time means the time it would take from shipper location to the receiver. Danielis et al. (2005) found reliability as one of the important factors in mode choice decision. They further emphasized that successful modal shift policies should focus on the quality aspects of the mode to be promoted. As in modern day business firms rely highly on delivery time to be in the competition. Many of the respondent stated that.

"Sales are highly dependent on the timelines of the shipment. If we do not deliver the product on time, we might loss competition in the market".

The reason firm more emphasized on the delivery time is that if they do not meet the sales timing, they might end up losing the product, like if the delivery got late for a 1 day or 2 days they are in trouble, because it can incur loss on the firm.

Some of the respondents stated that

"Customer satisfaction is an important thing. If our shipment did not reach on time, it can make our customer unhappy".

Due to late shipment firm also lose their customers and these customers goes to their competitor which is a loss to the firm. The shipment delay can also have significant far-reaching impact on the receiver. Also, it affects the firms' day to day operations. A respondent said that they need raw material daily for production so if their shipment (raw material) gets late, either they have to buy it locally or stop production. Some of the respondents further explained that if our raw material gets late then no production activity take place, so we have to pay the labor from our pocket which leads to abrupt increase in the cost.

The quality of service provided by the trucks is better than the railways. One of the main the feature is door to door service. Perhaps the most significant benefit associated with truck freight is the ability to ship a product directly to the consumer's front door. According to the respondents' trucks are in good state than the freight trains. If the decision has been made to transport something, it is fair to assume that one of the basic requirements of the transport is that it should deliver the goods in a proper way. It is difficult to imagine any situation in which a transport buyer would request low transport quality (Flodén et al., 2017). One other thing is the frequency of service, trucks are

available all-day night while railways do not have a proper schedule of trains running. As freight forwarders have more emphasized on the reliability, but there is no such policy direction to improve the reliability (timely delivery and quality services) to meet the demand of the country goods transport.

5.2.2 Cost

Firms' objective is to minimize the cost, while transportation cost is considered as input cost in the production process. In general, when it comes to mode selection the firm will choose the mode which is more cost effective. As we know that railways is cheaper mode of transportation than any other mode. The question is then why most of the firms are using Trucks than Railways? The response to the question was:

"If I have to bring it though railways then I will have to send trucks to railways station and then again load it on the trucks. Our material is very heavy, and for that machinery will be required and then I will have to send machinery over there to load it again, so it makes the same cost. So instead of this why don't I load trucks, there are no equipment's for loading and unloading at railways station".

Cost is the primary factor in freight shipper and forwarder mode selection demonstrates their price sensitivity in transport service procurement. Even when examining the type of commodities, pricing is the most important element in mode selection Zeybek (2019).

For time critical shipment, to ensure the timely delivery the firm will opt for expensive option. Respondents expressed that by choosing the expensive mode, if the firm have that image in the market that they deliver product to market on time and are reliable, if firms are consistent and reliable it creates a good image of the firm and they can charge extra for their product which can

help in reducing their cost. While if there is flexibility in delivery time than firm can opt for less expensive mode.

The freight rate is among the top two determinants of mode selection. It is important to note, however, that freight rate is never the sole determinant of mode selection, as it is typically connected with other variables, notably reliability. If the cheapest mode option reduces product quality or other operating criteria below the minimum required by the organization, that mode will not be chosen.

According to freight shippers the cost-effective mode will be chosen. The policy should be designed in such a way that is efficient in its operation and fair in determining prices, where gains of the efficient operations are equitably distributed among shippers and carriers.

5.2.3 Probability of loss and damage

Businesses go through risk management process to avoid loss and damages to the business. It is one of the influencing factors in mode choice behavior. As for firms' safety of shipment is their utmost priority. According to (Danielis & Marcucci, 2007)probability of loss and damage is significant in all their models and is one of the most affecting attribute in mode choice decision. According to the respondents, one of the reason many respondents opt to use trucks is that they carefully load and unload the shipment having proper loading and unloading equipment's. Firms do not compromise on the quality of their product as they charge customer for the quality of product they provide and in case of any damage to product the quality of product is sacrificed. Some of the respondents stated that

"Each time we use Railways for delivering our product, some time it gets stolen or damaged because they do not properly load and unload it. They do not care about our product".

During the delivery of shipment anything can happen like accident or shipment getting stolen etc. As firms cannot let their product get destroyed so to avoid the losses, they insure their product and sign contract with the transporting agencies. It helps in minimizing the risk to the product and then the transporting agency have to carefully deliver it to the destination. While investigating about who shall be liable in case of any damages, firm or freight company? The respondents said that

"In case of any damage to the product during delivery freight company is responsible for that as before the departure of the delivery we check everything".

It is one of the reasons why freight shippers prefer truck over railways that they are responsible for damages. The problem with the railways is that firm cannot claim for the damages, so to avoid this risk firm opt for the trucks. The freight forwarding companies I interviewed stated that they have a proper SOPs for insurance. As shippers are more concerned about the security of their shipment but in the policy such things are not even discussed that how to mitigate the risk to shipment.

5.2.4 Ease of Access to the mode

Accessibility to a particular transport mode also influence the decision of freight shippers. Transport mode which is easily accessible can influence the decision of the firm. In both the transport modes Truck and Train, Truck is easily accessible that's why most of the firms choose truck over train. It also saves some time for the firms. Respondent said that the procedure of booking the truck is easy and simple. Moschovou and Giannopoulos (2012) rated ease of access to mode (simplicity of procedure) as an influential factor. Some of the respondent stated that

"Trucks are easily available; we book trucks through call and can call them anytime while for train we have to wait for the scheduled timing and trains are never on time and also nowadays very few freight trains are running".

Ease of access not only means how easily they are available but also how often they are available. And because of this reason road transport is dominating the freight sector as the frequency of service is high. Respondent said that for them the frequency of services is important so that the flow of shipment is continues either its raw material or the final product. Respondents showed concern about the train who have proper schedule timing of freight train but are never on time, truck do not have proper schedule they are available all-day night.

For Railways to compete with Trucks in freight business and to increase their share they need to make sure they are easily accessible and also increase the frequency of their services and have a proper schedule of trains running so that firms can have a proper balance mode available.

5.2.5 Origin and Destination of the Product

One of the important things in mode choice decision of the firms is the origin (from where the product comes) and destination (where the product goes). As Railways do not have access to many places or cities so, the firms do not have other option for transporting their goods so they only have to use trucks. Most of the firms have customers within the city for that truck is the most suitable mode. Respondents stated that

"We are doing steel business, pipe and iron. These are construction base businesses and it is mostly in those areas where we don't need trains so we use truck"

Another respondent said that

"The reason is that the city from where our raw material comes and where our product is delivered is on Grand Trunk (GT) road where only trucks can go train do not have access over there"

Not every area has access to railroad tracks, so rail transport almost always requires other forms of transportation to move products. Rail transportation is often combined with truck freight for efficient delivery. Intermodal transport solutions have relatively low external costs (Hanssen & Mathisen, 2011). According to (Forkenbrock, 2001), the external cost per tonne-kilometer of an intermodal train is only 28% of that of a standard freight vehicle. Because intermodal freight transit uses less energy than road freight transport (Woodburn et al., 2007), it is consider as a significant contributor to achieving a sustainable transport sector. Therefore, officials at all levels have encouraged intermodal freight transport (Macharis et al., 2011).

5.2.6 Quantitative Analysis

The estimates of the Probit model are shown in table 4. The reason using probit model was that the dependent variable is qualitative which is Mode, used by the firm which is either truck or train. Independent variables are cost, ease of access, loss and damage, reliability, origin and destination.

Table 4: Factors influencing Mode Choice Decision

Dependent Variable: Mode

Variable	Coefficient	dy/dx	Std.Error	X
Cost	-2.231215**	-.5993	0.26698	0.533
Ease_of_Accees	2.11925**	.63360	0.63360	0.566
Loss_and_Damage	-0.391318	-.12048	0..33182	0.5
Origin_and_Dis	-1.471577**	-.42177	0.26858	0.54
Reliability	1.948013**	.60734	0.22355	0.6
R-Squared	0.678545		Total obs	30
LR chi2	27.40013		Prob (Chi2)	0.0000418

*** 1% level of significance

** 5% level of significance

*10% level of significance

The results in the above table are obtained by applying probit model. The results shows that ease of access and reliability are positive correlated with the mode choice. The variable Cost is negatively correlated with the use of train any increase in the cost leads to decrease in the demand for the train. The results in tables shows that Cost has a marginal effect value of -.599 which is negative and significant. If cost is increased by 1 unit, then respondents(firms) choosing train diminishes by 59% from the base line (.533). This is because increase in the price or cost of anything would lead to decrease in the demand of that particular commodity or mode. This figure is in range with other studies, (Fridstrom & Madslien, 2001) they report and estimate -2.21, whereas (Patterson et al., 2007) report coefficient -4.140.

Ease of access is positively correlated with mode choice and has a marginal effect of .633. It means that if ease of access increase by 1 unit, then the probability to choose train will increase by 63% from the base line (.566). Any mode which is easily accessible and have easy and simple procedure will be chosen. Reliability is positively related with the mode choice and has a marginal effect of .607, it shows that of reliability is increased by 1 unit then the respondent choosing train will be increased by 60% from the base line (.6). The reason firms want on time delivery to be in the competition, timely delivery is most important for businesses. This result is also similar to the study of (Patterson et al., 2007)

The loss and damage is negatively related with the mode choice and has a marginal effect of -.12, which shows that if it increases by 1 unit, the probability to choose train diminishes by 12% from the base line (.5). This reason is businesses want to reduce the risk of loss, and they don't compromise on the quality of their product, if the risk of loss and damages increase to their product by a particular mode so they will not opt for that mode. The result are in range with other study by (Patterson et al., 2007) report coefficient (-0.396).

Origin and destination variable is negatively related with the mode choice. Origin and destination mean from where the product originates (sender) and where it ends (receiver). It has a marginal effect of -.42 which means that if it increases by 1 unit, the probability to choose trains diminishes by 42% from the base line (.54).

The value of LR(Chi2) 27.40 and its prob value shows that the model is statistically significant.

5.3   Second Objective

The second objective of the study is: To identify the priority areas of reform for PR in the freight business.

5.4   Area of Reforms for Pakistan Railway in Freight business

Railways reform is any significant change in government policy, investment strategy, or management structure that seeks to improve railways performance.

Beginning in the 20th century, the majority of surface freight was transported via rail. In the majority of nations, only a small percentage of freight is transported by rail; road transport is the mode of choice for most freight shippers. Policymakers in emerging economies are pondering how to reverse the decline of rail freight's market share.

Pakistan Railway is state owned enterprise. Pakistan railway offer services in the form of passenger and freight. While our topic of study is freight, so the discussion will only be related to freight. As Pakistan Railway is suffering huge losses for few decades, the reason is government neglect the PR and also PR have shifted focus from freight to passenger, which is more profitable than passenger.

Following are the area of reform that were mostly identified by the respondents.

5.4.1 Investment

Pakistan has inherited the railways after independence. After that no proper investment was done in Pakistan Railway which led to the deterioration of the railways and failed to improve and extend railways network. Due to lack of investment and pro road policies changes the fortune of railways. Aritua (2019) the fortunes of railways changed drastically with the emergence of road transportation in the middle of the 20th century, when postcolonial independent countries made substantial investments in road infrastructure and created enormous highway networks. The capabilities of road vehicles and the quality of the infrastructure rapidly increased, while rail struggled to keep up. PR is suffering heavy losses due to inadequate locomotives, obsolete infrastructure, managerial incapability and low speed train and it's the reason why railways cannot compete with other mode such as road transportation. However, owning to the congestion on roads because of freight containers and the heavy investment required in the wear and tear of the road infrastructure, the government are resorting to railways. To reverse the falling share of rail freight, the first and foremost thing is investment. Several countries are making substantial investments to revitalize their railways sector or to develop master plans that priorities rail freight infrastructure. The reason countries are reviving railways is that it is one of the greener mode of transportation, Railways contribute less to environmental degradation as compare to road (Chapman, 2007), per ton of cargo rail freight produce 76% less CO_2 than road (Rail & Place, 2010). Railways help in lowering congestion, fuel consumption, and emissions by reducing the number of private vehicle trips. A rail-based transportation system generates more jobs than a road-based system and ensures the availability of human resources for business centers(Haque, 2020).

India has also made significant investments in freight rail infrastructure, including 3,400 kilometers of exclusive freight-only lines (the Eastern and Western Dedicated Freight Corridors),

which will eventually form a core Golden Quadrilateral of freight-only railways connecting the major cities of New Delhi, Kolkata, Chennai, and Mumbai.

Pakistan also needs heavy investment for reviving railways infrastructure, bring high speed trains, proper standard gauge needs to be built if they want to compete with other mode of transportation.

According to an employee of PR "The reason people do not conduct business with railways is because our train speed is very low and in business timely delivery is very important, infrastructure is obsolete due to which some of the tracks are closed"

Proper freight corridors need to be constructed. Railways needs to prioritize freight over passenger as freight is more profitable. Per unit revenue of freight is higher than passenger.

5.4.2 Make Railway a Customer-Oriented Organization

Railways were developed to move bulk cargo mostly minerals from mine to ports. In Pakistan till 1970's most of the freight was moved by Pakistan Railway. After that, the proportion of freight transported by rail began to decline for a variety of reasons, one of which is that the railways failed to meet the needs of its customers. As a result, many of the traditional customers shifted to road transportation, and new customers did not choose rail even for bulky freight transported over long distances. Many of the respondent showed concerns about the quality of services provided by the Pakistan Railway, they expressed that they have used railways in the past but due to low-quality services provided to them, they are not using railways anymore for their freight transportation. Due to this decreasing freight share, railways became inefficient, overstaffed, and underfunded governmental organization that no longer had a captive market and faced intense competition from road transport.

Due to a lack of funding, the rail infrastructure deteriorated with little to no maintenance or repair, resulting in an organization that was not customer-focused. In addition, passenger rail was prioritized above freight train, which exacerbated the downturn.

To reverse this trend of falling share railways have to bring institutional and regulatory reform to enable service and tariff flexibility to meet customer demands. Successful railways have taken diverse approaches to the challenge, but their focus has been on customer orientation, with decisions influenced by variables such as customer willingness to pay, commodity type, and logistics characteristics. For any railway to regain modal share customer orientation should be the priority.

"Railway need to be a customer-oriented organization if they want to expand their business because for any business if customer is satisfied the business will thrive, they need to provide quality services to the customer".

According to (Aritua, 2019) research, it also emphasized that if railway want to increase their share in freight their first priority should be customer and provision of t quality services to them. Many examples of the successful reforms in railways can be seen in countries like Germany and United States. The prime reason behind the successful revitalization of railways was the customer centric approach.

5.4.3 Technology

Pakistan Railway is one of the largest institutions in Pakistan and it was the most important source of passenger and industrial goods movement. But despite its importance it is far behind as far as latest technologies are concerned. Adopting new technologies would not only help in stopping accidents but would also bring local and foreign investment. Some respondents said the they need

to trace their shipment to inform their customer about it, forwarding companies were more concerned about it.

Respondents stated that:

"They need to have a proper online system. For example, if we have to track our shipment, like where is our shipment, security of the shipment is very important. They need to develop a software for tracking and tracing. The problem with railways is you don't know where your shipment is and if you want to know about so you have no idea whom to call".

Encourage and facilitate Track and Trace technologies by all parties involved in the logistics industry, this includes the public and the private sector. Promote Electronic and Mobile Payments, to reduce the risk and inefficiency of using cash for the transactions. Automation is expected to address the leakages which have been the major reason behind the decline in the volume of PR freight in 2020-21 (Anwar, 2022).

The respondents were then asked if railways bring these reforms will they opt for railways, then? Most of reaction to the question was Yes, if railways can provide us quality service and become reliable, we will definitely opt for railway.

At the end of the interview respondent were asked about their preferences by categorizing distance into different categories.

5.5   Distance

Respondent were asked what mode the choose for their day-to-day operation in relation to distance criteria. Freight shippers were asked about their preferences by categorizing distance into four different categories: less than 200 km, 200-600 km, 600-1000 km, more than 1000 km. This categorization of the distance was adopted from (Moschovou & Giannopoulos, 2010)

5.5. Less than 200 km

For distance less than 200 km as expected almost all the respondents (100%) use trucks as such type of distance favor the truck mode. One of the best things about the particular mode is their door-to-door service. As all the firm interviewed were manufacturer firm so the goods transported were mainly raw material or final product.

5.5.2 200-600 km

For distance 200-600 km the percentage of respondents uses trucks is lower than the previous case but the percentage is still quite high (94%) while the remaining 6% used other mode that is train. Majority of the transported good were industrial product. One of the reasons using this mode by many respondents is they can easily load and unload the product.

5.5.3 600-1000 km

For distance 600-1000 km the percentage of respondents using the trucks is surprisingly high (85%) as such type of distance suits train but due to the weakness of the transport system in Pakistan train is the most least used form of transport in the range of 600 km or greater, although it's this type of distance has greater potential for the rail transport.

5.5.4 More than 1000 km

For distance more than 1000 km some of the respondents had no transport to report. Those who reported most of them used trucks as according to most of the respondents the use of trucks is mainly due to the timely delivery.

Freight Shipper mode choice preferences for same Shipping Cost and Haul Time

Freight shipper were asked about their preferences of mode choice if both truck and train have same cost and haul time.
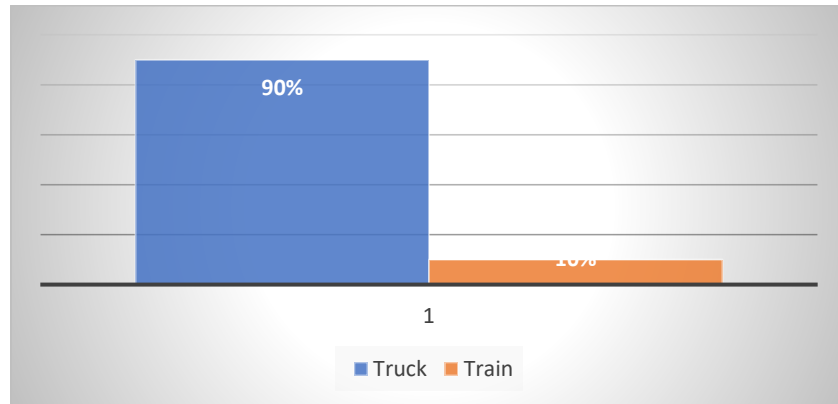
Figure 2: Freight Shipper mode choice preferences for same Shipping Cost and Haul Time

About 90% of the respondents choose to use truck and the remaining 10% choose train if there is no difference in shipping cost and haul time between truck and train. The result proved that truck is the preferred mode of freight transportation as it is very convenient as easy for loading and unloading goods and their door-to-door service.

Freight Shipper's Mode Choice Preference for the Different Shipping Cost and Haul Time.

In the industrial area freight shipper were investigated of mode choice by changing (higher and lower) shipping cost and haul time

Figure 3: Freight Shipper mode choice preferences for different Shipping Cost and Haul Time

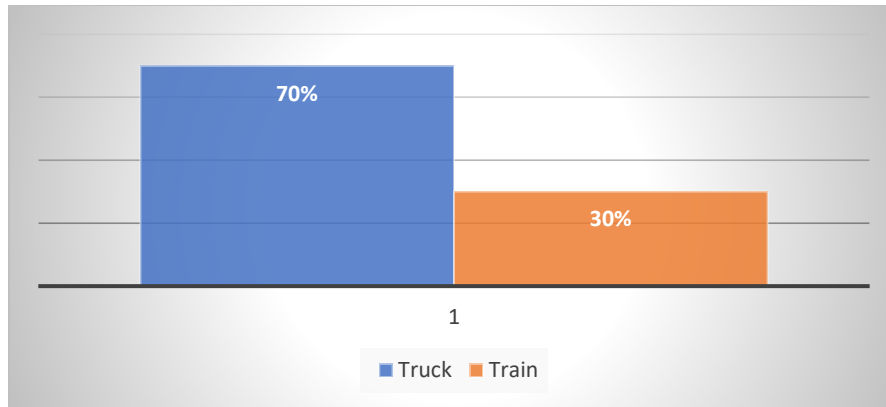In the industrial area freight shipper were investigated of mode choice by changing (higher and lower) shipping cost and haul time. If the shipping cost of trucks is higher and the haul time is one day longer than the train 70% choose, they might use the truck while the remaining 30% opted for the train. The reason people choosing truck over train is if the cheapest mode will decrease the quality of the product or other standards, they will not choose that mode.

Reviewing significant freight policies such as the "National Freight and Logistic Policy," as noted in the Policy Assessment chapter, the objectives are imprecise and there is no clear guidance on how to attain them. According to the freight forwarder, reliability is the most influential factor in their decision. The government lacks a clear strategy for improving the country's logistic performance. In addition, freight shippers argue that the policy does not address the likelihood of loss and damage to the shipment, as well as the procedures necessary to limit the risk to the shipment. Train scheduling is an additional concern that must be addressed. Additionally, technology must be implemented since freight forwarders desire shipment tracking. Before establishing policy, policymakers must engage with all major stakeholders and evaluate these issues, as behavioral research is essential for sound policymaking. According to the Logistic Performance Index (LPI), Pakistan is ranked 122 out of 160 countries, indicating that we need to improve our logistic performance, which requires the development of appropriate policies and the

participation of all relevant stakeholders, as logistic performance and economic performance are correlated.

In this chapter I have discussed the result that were obtain from the transcribed interviews through thematic analysis and probit logit model. For the first objective: Reliability, cost, ease of access, probability of loss and damage and origin and destination these themes are constructed, while for second objective the themes are investment, make railways a customer-oriented organization and technology are the themes constructed through thematic analysis. Then for first objective probit model was also used for estimation. The result of the model suggest that all the variables are statistically significant at 5% level of significance. Overall, the model is a good fit. Both the qualitative and quantitative results aligned with each other. The next chapter discusses conclusion and policy recommendation.

Chapter 7
CONCLUSION AND RECOMMENDATION

The aim of the study is to identify the factor influencing freight mode choice behavior of the firm and identify priority reform areas for Railways freight through a firm perspective. For that face-to-face interview were conducted from different freight shippers (Firms) in the industrial estate in Rawalpindi and Islamabad. For analysis the interviews were transcribed and thematic analysis was done. Also, for the first objective Probit model was used for quantitative analysis.

The mechanism for choosing the mode of transportation (mode choice) for a certain mode of transportation is critical to comprehending transportation behavior and affecting modal split. Several studies have been conducted over the last few decades to better understand the freight shippers' mode and carrier choice behavior, (Cullinane & Toy, 2000) revealed many of critical characteristics, including cost, transit quality, and reliability.

The themes constructed from the interviews for the first objective are Reliability, Cost, Ease of Access, Probability of Loss and Damage and Origin and Destination.

Reliability is one the significant factor influencing mode choice behavior identified by the respondents. Reliability here means delivery time and the quality of service provided by different transporting agencies. The reason is firms' sales are highly dependent on the timeliness of the shipment, if they do not deliver on time, they lose competition in the market. (Danielis et al., 2005) report the same result.

The cost is one of the top two influencers of mode choice. It is important to note, however, that freight rate is never the sole determinant of mode selection, as it is typically connected with other variables, notably reliability. If the cheapest mode option reduces product quality or other operating criteria below the minimum set by the organization, that mode will not be chosen.

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Ease of access, the more easily the transportation mode is available the more chances it has to be chosen. The frequency of their services also matters. Probability of loss and damage, the firm wants to minimize the risk for that if there is probability of loss and damage in any mode to their product the firm will not choose that mode. While for choosing a mode they keep that in mind, so it's one of the influencing factors in mode choice decision.

Origin and destination is identified by the respondents as influencing factor. Because the decision depends from where the product originates and where it ends. If a transportation mode has access over there it will be chosen.

Both the qualitative and quantitative results are aligned with each other. As all these variables are statistically significant. The quantitative analysis shows the magnitude of these factors, like the coefficient of reliability (1.94) shows a strong effect on train mode. Also Cost coefficient (-2.22) shows that if cost increase by 1 unit the chances of that train to be chosen decrease by 2.2 times.

For Railways to regain rail freight modal share, Investment, make railways a customer-oriented organization and technology were identified by the respondents. Due to lack of investment in railways, it is poor state. Inadequate locomotives, poor infrastructure and outdated technology for revival railways need investment. Looking at the current state of Pakistan Railways Open Access Policy (OAP) can help the railways to manage it wear and tear requirements. The freight market analysis reveals that PR has the potential of 58 daily freight trains, which it is not managing. It is equivalent to the loss of PKR 5 million per day. Reverting to OAP and unleashing the economic activity can have a ripple effect on the PR and economy(Anwar, 2021).

Also providing quality services to the customers can help expand the business. As for every organization customer needs to be their priority. Updating technology can help railways revival in freight business as identified by the respondents. Like tracking and tracing technology so that

customer can locate their shipment. Also updating signaling system can help in reducing the accidents.

Distance greater than 600 km, surprisingly high number of firms using trucks for such distance although it is such type of distance that has greater potential for rail transport. Also, there is strong bias against the use of railways, even if the carrier has same cost and time delivery the odds of choosing it is very less.

Policy Recommendation

This study has profound policy implication. The model is an attempt to develop carrier choice model for the freight transportation. As such, it is a useful tool of understanding the importance of factor affecting mode choice. For a balance transport model for freight transportation government intervention on freight mode choice can be classified in different ways. In this study government intervention or policy intervention are classified according to the factors that are important to the freight shippers when deciding on mode choice: cost, reliability, ease of access, probability of loss and damage origin and destination.

- To reduce the transit time or time loss in congestion the government need to develop infrastructure and build dedicated freight corridors.
- For better reliability to be achieved there need to be coordination between the modes. For that the policy instrument should be information exchange and digitalization.
- For the security of the shipment and avoiding loss and damage to the shipment, the policy instrument should be having proper equipment's for loading and unloading shipment, also technology needs to be updated so that customer can track their shipments.

- Transportation modes need to be easily accessible for that policy should be interconnectivity between the modes, simple procedure for booking and make sure they have high frequency of their services.

- For Railways to be in the business they need to offer quality services to the customer, railways should be a customer-oriented organization. Railways need to develop its infrastructure and bring high speed trains.

- There is an enormous freight potential that can help the PR to turn the balance sheets in its favor and exit from the list of top ten lossmaking State-Owned Enterprises through open-access policy and unleash the economic activity via the private sector.

The bias against railways reflects the perception of shippers suggest that for Railways to increase the share in freight transportation will require more than just improvement in the carrier attribute. The railways need to change its reputation.

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Appendix

Interview Guide

ANALYSIS OF FREIGHT MODE CHOICE DECISION: A CASE STUDY OF ISLAMABAD AND RAWALPINDI

All the information collected through interviews highly confidential and purely for academic purpose. The results of this study will suggest possible recommendations for improving Freight Business in Pakistan. Respondents' comments, suggestions and personal information will not be used beyond academic use. So kindly do not hesitate to express your opinion.

Respondent Consent

Turning on Tape Recorder

Firm Name: ……………………………… Date: ………………………………… Area: ………………………………………………… Region…………………

General Information

Type of firm: (owner (sender or receiver), Logistic firm)	
Size of Firm (number of employees)	
Area of activity: (Domestic, International or Both)	

Transport Mode

1)What Mode of transport you use for freight Transportation.

2)Why?

3)What mode you prefer

 If distance

    a) Less than 200 km

    b) 200-600km

    c) 600-1000 km

    d) more than 1000 km

    3.2)
    a) If both truck and train have same shipping cost and haul time

    b) If truck shipping cost is higher and haul time is longer than train

4)Does destination of the product affect your decision in mode choice?

5) In case of any damages, who shall be liable the firm or freight company?

6) Do you have any experience with the Railway? How was their experience?

7) What reforms can railway bring in so that they (Firms) opt for railway for the transportation of their goods?