Trade Cost in the Era of Digitalization

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At any time if my statement is found to be incorrect even after my Graduation the university has the right to with draw my MPhil degree.

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Dedication

This study is wholeheartedly dedicated to the Almighty God for the Supremacy and to the Redeemer of my soul. Thank you for the guidance, strength, power of mind, protection and skills and forgiving me a healthy life. All of these I offer to you. Secondly, I dedicated this paper to my beloved parents, who have been my source of inspiration and gave me strength when I thought of giving up, who continually provide their moral, spiritual, emotional and financial support. To my sisters, mentor, friends and classmates who shared their words of advice and encouragement to finish this study.

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ABSTRACT

In world's economy, the importance of digitalization has grown through years, particularly after the advent of economic and agriculture revolution. This study is to analyze why digital trade is not promoting in Pakistan as compared to other countries and what are the barriers Pakistan facing in the era of digitalization. This study aims to look at the influence of digitalization, ICT regulations, network coverage and cybersecurity in the economy on Trade cost for 37 developed and developing countries of all continents of the world for the time period of 2010 to 2020. The reason of selection of both developed and developing countries is to analyze the cost of trade of agriculture and manufacture sectors in the era of digitalization both across countries and for Pakistan This endeavor uses Gravity model of International trade, which has the rock version of worldwide trade greater than fifty (50) years. This research has significant strategy implications in terms of the digital economy, trade costs, ICT regulations, cybersecurity and technological innovation for decision-makers. The price of trade is extraordinary therefore requirement of digital economy is essential. Because of high security risk and burdensome regulations in agriculture and manufacturing sector, trade cost will rise in both sectors. Therefore, the trade cost must be minimized for nourishing technology by way of digitalization in economy, active regulations and high cybersecurity.

KEYWORDS: *Digitalization, Digital trade, Digital transformation, Emerging technologies, Information and communication technologies (ICTs), Digital economy, trade cost, infrastructure, ICT regulation and gravity model.*

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LIST OF ABBRIVITIONS

APEC Asia–Pacific Economic Cooperation

B&R Belt and Road.

BES BlackBerry Enterprise Server

DTRI Digital Trade Restrictiveness Index

DTFM Dual tone multi Frequency

ESCAP Economic and Social Commission for Asia and the Pacific

FDI Foreign Direct Investment

FTA Free Trade Agreement

GDP Gross Domestic Product

GMM Generalized method of moment

GSMA Global system for Mobile Communications Association

GVC Global value chain

ICT Information and Communication Technology

IDI ICT Development Index

IPR Intellectual Property Rights

ITEs Information Technology Enabled Services

IT Information Technology

MFN Most -favored- nation

NERA National Economic Research Association

NEG New Economic Geography

NFU National Farmer Union

ODR Online Dispute Resolution

OECD Organization for Economic Cooperation and Development

OSHA Occupational Safety and Health Act

PTA Pakistan Telecommunication Authority

PVC Polyvinyl chloride

RIM Research in Motion

RTAs Regional Trade Agreement

SBP State Bank of Pakistan

SME's Small and Medium Size Enterprises

TBT Technical barriers to trade

TCC Trade competitiveness coefficient

TCI Trade complementarity index

WEF World Economic Forum

UNCTAD United Nations Conference on Trade and Development

CHAPTER 1

INTRODUCTION

1.1 Overview and Background

Over the period of time, development in digitalization is transforming trade globally. Digital technologies help industries to increase productivity, growth, and domestic competitiveness. Digital technologies possibly will support reducing trade costs and decrease the significance of distance. They also help examine products by verifying the quality and help to match consumer choice to products. They reduce trade costs by reducing transportation and storage costs. These costs have a major share in trade costs, and therefore their reduction has a potential impact on trade.

While new technologies create opportunities for a firm to reach their potential consumers more efficiently, in terms of mobile, fixed broadband, and internet, much improvement has been made in connecting the world digitally. While initial findings on new technologies are encouraging, more work is still required to achieve their full potential. Moreover, various technical and regulatory challenges still need to be resolved. The implementation of digital technologies is changing trade structures in different sectors. Developments within the field of robotics have opened new methods to trade services and made potential changes in international trade. The development of digitalization increases opportunities and challenges for developed and underdeveloped countries. Digital technologies open up new markets, forms of trade, and products, lower trade costs, and change trading procedures. In the last 25 years, digital technologies are merged into a number of regional trade agreements (RTAs).

Digital Trade restrictiveness plays a task in the low capability of Pakistani firms to adopt new technologies. The DTRI (Digital Trade Restrictiveness Index) is an index that deals with digital regulations for ICT goods, investments, digital facilities, and principles in the era of digitalization. Therefore in the case of transnational flow and national usage of knowledge, Pakistan is quite extra restrictive but much less restrictive than a number of its companion, i.e., Russia, India, and China. The Philippines is the only country with much less restrictiveness than Pakistan in digital trade. The said index consists of 4 different clusters fiscal restrictions, establishment restrictions, restrictions on data, and trading

restrictions. Pakistan shows a higher level of restrictiveness for fiscal regulations, limiting access to the market on digital products. The usual stage of such restrictions throughout countries is very low.

One country that is typically restrictive in the region of tariffs, taxation, and subsidizations is Pakistan. Pakistan comes in the top five list of countries most restricted for tariffs, taxation, and subsidies. Some of its companion scores are equally restrictive on the list. Pakistan applies a mean tariff of 9.7 percent on digital goods. Two more duties must be paid during the import stage: regulatory duty and customs duty. Pakistan also has regulations on importing chemicals used in making PVC for cables from countries like India, Iran, Thailand, etc. Besides, the mean tariff on imports from its neighboring county India is not applied by Pakistan. Regulations in the region of trade resistance, taxation, and subsidization matter a lot for digital products. Therefore, access to digital input supplies will positively impact sectors using digital ideas competently (González and Ferencz 2018).

IT & IT service vendors went through different challenges about the taxation systems. Their issues on taxation are tax administration, taxation policies, and government practices. Services vendors paid tax at the provincial level. Provinces charge tax at the origin of consumption/services. There are some tax similarities with the federal authorities due to which vendors face complex management systems, extraordinary taxation, and hesitation. Therefore local markets diversified amongst provinces. A priority should be eliminating hesitation and division and making a single tax policy system that competently produces vital revenues. There must be a common understanding of taxation policies to resolve the matter of double taxation among authorities, which reduces uncertainty. The private sector acknowledges that the most challenging area in their business is dealing with taxation authorities, which costs them both time and money.

Pakistan scores below the **Establishment restrictions** for digital sectors. It is less restrictive than its peers due to removing different types of FDI limitations in digital regions, i.e., computer services and telecommunications. Pakistan also structures a friendly regime when it involves Intellectual property rights restrictions but still has some restrictions on site. Some definite actions are not reflected as copyright violations under the Copyright Ordinance of 1962. The country allows some copyright exemptions for research and private study persistence. Likewise, the country identifies Intellectual property rights as an entry barrier for other firms. However, this problem is not identified within the index (DTRI) as criticisms did not originate about overseas candidates' application procedure. Pakistan's

financial and administrative issues make it less attractive to overseas IT stakeholders. Macroeconomic instability and security concerns are the main cause of low foreign investment in the area of IT. Likewise, there is also a safety risk sensitivity, making it very difficult for companies in Pakistan to invite business from out of the country (Couto and Fernandez-Stark 2019).

Pakistan is merely more restricted concerning **Data Policies;** however, restrictions on gaining access to content have. Although Pakistan doesn't have any local data conditions however still has restrictions to gain access. Moreover, data composed by sectors/institutions like hospitals, banks, etc., cannot be transferred to anybody without the permission of the related regulator. Likewise, data in some institutions cannot be given to anybody without the client's permission. Pakistan has more restrictive data procedures than its companion like India, Russia, Thailand, and Indonesia about access to content. The government of Pakistan has a procedure for checking content which creates a barrier for foreign content to enter Pakistan. The country doesn't have any heavy restrictions regarding intermediate liability obligations on online platforms.

A policy system strengthens the digital economy; therefore, it is important to have a policy system about data. Therefore data is used to widen the scope of SCM (supply chain management) structures, online payment means. Newly evolving regions like cloud storage grow from utilizing the transactional flow of digital data. Current studies show that barriers to data flow restrain online services. Also, such barriers create difficulties to achieve effective gains from management and privacy policy by firms dependent on software technologies. Such policies regarding data appear to restore the interest in overseas technologies, as a study by (Ferracane and Marel 2019) shows for a gaggle of Asian countries.

Now regulatory changes to non-public data protection are being made by Pakistan. There is a three pillars strategy to analyze legislation. Firstly, the legal policies of authorities should be reported. Secondly, emphasize the consideration of internationally recognized principles. Thirdly, global collaboration should increase to license digital technology.

Regarding the current proposal, issues are often recognized. Primary, the draft law, needs a clearer image to confirm that it is as per internationally recognized principles and that its implementations must be as per principles. Furthermore, the law needs permission to gather data and use it while it is uncertain whether such an obligation will be more difficult or not.

Permission is also required for sending data out of the country. Lastly, data centers need to be developed to implement data localization requirements. The main aim of law should be to maintain the equilibrium of different objectives. Subsequently, law purposes of understanding the valid legal policy and letting the data stream towards markets. Promising principles will achieve this aim and be recognized internationally. Healthy, globally accepted regulations are essential for productive collaboration between a country and its companion.

Pakistan is more restricted in importing digital services than many other countries, and such restrictions are linked to principles of digital trade. A provision of 100 Pc Cash margin was applied by the State bank of Pakistan on imports of mobile phones in 2017. Though such provisions importers were bound to deposit the total amount before opening LC, some biased restrictions are levied by Pakistan concerning principles of digital products in telecommunication. No terminal equipment change network unless got approval from PTA. The machines needed for testing terminal equipment and network conditions also require PTA's approval. Also, the private sector of Pakistan recognized that measure related to security and authentication of equipment is difficult. Firms must achieve internationally recognized standard certifications Accreditations in order to flourish. These figures demonstrate the potential of IT companies and their ability to provide high-quality products and services.

Pakistan has various encryption-related regulatory restrictions and practices. Pakistan officially encourages businesses to employ encoding/decoding services to obtain an ECAC certificate. In most cases, this criterion is applied inconsistently. Despite company assurance of end-to-end encryption for users' chats and data, WhatsApp is still widely used On the other side, in Pakistan, while the government interrogated RIM (Research in Motion) for the use of encryption in BlackBerry. All Telecom carriers were ordered to stop the email route from (BES) in 2015.

In Pakistan, digital standards promote the trade of products and services by allowing smaller businesses to contribute to the exports and imports of the country. High regulations are usually a monetary burden for a company that wants to export. To ensure quality and achieve legitimate policy goals, standards for goods and services are established. (Fontagné, Orefice et al. 2015)

Trade costs are expressed as the ratio of international trade over domestic trade. An increase in trade cost shows that international flows have increased in relation to domestic ones. Thus it has become easier for the two partners to trade among themselves than to trade within their own countries. Understanding trade costs is necessary for explaining policy interferences intended to decrease such costs.

Our main objective is to analyze the cost of a trade in the era of digitalization. This study explored different determinants of the trade cost for the agriculture and manufacturing sector of the economy using an ICT regulatory tracker, ICT development index indicators, cybersecurity index, and other determinates that will improve the digital trade system and reduce trade costs in Pakistan. Then in the second stage, the same analysis of trade costs in the era of digitalization will be explored across countries. However, barriers and restrictions are the major hurdles every investor faces. This study explores the digital trade economy, barriers, and regulatory gaps in Pakistan. Therefore, the objective is to remove barriers by investigating the digital technologies that promote digital trade and reduce associated costs. Further, it also examines regulatory gaps or requirements that Pakistan needs to address.

According to this study, the estimation result shows the agriculture trade cost reduction effect of the ICT development index is significantly higher than that seen in manufacturing trade costs, has been continuously increasing over the past 10 years, and has proved statistically significant. The study also shows that the reduction of agriculture and manufacturing trade costs caused by the advancement of digital technologies will not be stronger than the negative effects of digital trade regulation. Therefore, to minimize the effect of digital trade restriction, which greatly exceeds the trade cost reduction effect of the ICT development index and has statistical significance in the agriculture sector but not in the manufacturing sector. It is obligatory to create international norms for the relaxation of regulations and standardization of digital trade restriction factors, eliminate border barriers, promote free trade and regional agreements in both sectors, and unconditional easing of regulations restricting digital trade would not be a desirable approach, and appropriate regulation and efficiency improvement through institutional reform should be considered together.

1.2 Current Digital Policies in Pakistan

The government's key role in achieving the digital desires and potential of the mobile economy should be to enhance access to high-quality mobile broadband networks, reasonable services, and smartphones. Processes of licensing and taxation are helping in the

development, investments, and social advantages associated with a more connected contemporary Pakistan. Regulatory changes in isolation will not be sufficient. Government agencies need to collaborate with firms to achieve the vision of digital Pakistan by observing the change in mindset. It will also include the development of healthy policies that improve official structures, point out inequalities, increase literacy rates, allow and protect cross-border data flows. Both of them will create a trusted atmosphere in which all citizens and enterprises will be able to prosper. And starting Pakistan's transformation into a South Asia digital powerhouse and innovative internet economy.

Between 2014 and 2018, Pakistan's annual GDP growth rate (average) was greater than 5%. The government expects 5.4 percent growth from 2018 to 2023, with its main investments focused on increasing industrialization, regional investments, and trade expansion. Despite this, financial development fell to almost a decade low of 3.3% for the year ending June 2019. Therefore government can't achieve a 4% growth rate in the current fiscal year. On the one hand, the population is increasing at the rate of 2% each year; on the other hand, and Gross Domestic Product is increasing at a more passive pace. The mobile network plays an important role in GDP evolution, tax generation, job opportunities, and efficiency gains across sectors like agriculture and manufacturing. ITU says that a ten percent rise in mobile wideband perception in Asia leads to a 1.5 percent growth in GDP.

The involvement of the mobile network system in Pakistan will generate almost $24 billion, accounting for 6.6 percent of the Gross Domestic Product by 2023. This increase will be achieved by speedy acceptance of mobile network services and 4G services.

There is a lack of policies to secure data online. Suppose there are some policies/laws in Pakistan. In that case, their implementation is the biggest challenge until now. People are unaware that such laws to improve transparency and confidentiality of data following legislative measures are society's current need.

1. Develop a structure for cloud-based services to endorse the acceptance of digital storage services.

2. Making and implementing data protection laws to ensure data privacy, security, and sensitivity.

3. Collaboration with the federal commerce ministry to develop a structure by consulting stakeholders.

4. Encourage the use of electronic signatures to increase the trust of stakeholders.

5. Modify existing rules and create electronic functionality, processes, and Electronic Submissions, etc.

1.3 Motivation of the Study

Writing research papers grants me the opportunity to communicate my side of the solution to important problems in my chosen research field with the development of economic globalization and the upgrading of digital technologies, today's global trade is aggressively shifting from the stage of digitalization to the stage of intelligence with "digital trade" as the latest development form. As cross-border digital trade has developed rapidly in recent years, it has become a breakthrough in the development of digital trade. Digital trade is set to further accelerate on the back of dynamic cross-border activities, rapid shifts toward a digital lifestyle by consumers, ongoing global digitalization has been enhanced. The pandemic has accelerated the digitalization process of consumers and businesses' development of digital infrastructure and strengthened regional cooperation. So, for this reason this study area choose to examine the rapid increase in the digitalization of trade. Through this technique, we can analyze future businesses domestically and internationally.

1.4 Research Objective

The first objective of this study is to analyze the trade cost in the era of digitalization. This study will explore different determinants of the trade cost for the agriculture and manufacturing sector of the economy using an ICT regulatory tracker, ICT development index indicators, and different other determinates that will improve the digital trade system and reduce trade costs in Pakistan. Then in the second stage, the same analysis of trade costs in the era of digitalization will be explored across countries

1.5 Research Question/ Hypotheses

- What are the restrictions/barriers that impede the digital trade growth in Pakistan?
- How do innovative digital technologies affect the trade cost in different Sectors?
- What are the regulatory issues encountered by the foreign investors coming into Pakistan? And what legislative gaps exist to improve/enhance regional trade agreements?

1.6 Significance of the study

This study focuses on digital trade in Pakistan. A holistic review of the digital trade economy will provide useful insights and perspectives along with vital information through explaining the digital trade barriers, restrictions, and regulatory needs in Pakistan to the policymakers, International & National Investor, large scale and medium scale enterprises, and potential investors for more informed decision making. This study analyzes the cost of a trade in the era of digitalization and explores different determinants of the trade cost for the agriculture and manufacturing sector of the economy that will improve the digital trade system and reduce trade costs in Pakistan.

1.7 Research Gap

Globally, Digital trade has increased rapidly in the past many years. However, barriers and restrictions still exist, which does every investor faces major hurdles. This study leads to a debate on developing suitable methods/policies that help to promote digital trade and reduce trade costs in selected countries, including Pakistan.

The study's main objective is to fill this gap by examining the digital technologies that promote digital trade and reduce associated costs. Further, it also examines regulatory gaps or requirements that need to be addressed in Pakistan for trade.

CHAPTER 2

LITERATURE REVIEW

2.1 Theoretical Literature Review

Initial experimental gravity models of worldwide trade were based on a straightforward and simple connection with Newton's Law of Gravity. The force of attraction among two bodies is proportional to the sum of their mass and inversely proportional to the distance squared; according to Newton's law, these early trade gravity models proposed an identical link between bilateral trade flows, a measure of trade resistance, and economic magnitudes between two countries.

According to the gravity model of trade, a country's trade dimension is proportionate to its economic mass and a measure of its comparative trade resistance. The gravity model has been the staple global trade model for about 50 years due to its instinctive demand. Theoretical advances have shown how gravity model-like specifications are obtained from the variability of models based on different suppositions about preferences, market structure, and technology. However, the early experimental effort was based on the gravity model's absence of high standard theoretical advance and theoretical strength. Alongside accompanying the brace up of the gravity model‘s theoretical roots, the method in which it is estimated has also changed adequately since the turn of the millennium. The gravity model should be estimated through different estimation techniques depending on specific properties of regression.

Anderson and Van Wincoop (2003) propose that distance is an immense hurdle in international trade that has attained much attention. Numerous studies have indicated that with respect to distance, the value of trade elasticity has risen steadily overtime.

Olivero and Yotov (2012) studied that the consequences of distance on international trade have declined over time measure the impact of distance on international comparatively to international trade.

Novy (2013) investigated research about the bilateral elasticity of trade regarding trade cost is not constant. However, due to numerous trade complications, economists acknowledged that the gravity equation has been resolved over time as data has better quality and theoretical innovations emerge.

Caron et al (2014) recommended that the gravity model framework resolves different trade issues with various sectors and non-homothetic preferences. Though we focused on the Anderson and Van Wincoop (2003) gravity model, other conceptual grounded models come up with a range of previous work. For instance, Chaney (2008) develops gravity-like equations that support fundamental trade models. Companies' productivity varies even though they all share important harmonies at the beginning of this section. The fundamental models announced by the specific types of gravity created by these models significantly varied.

A related and equivalent Deardorff (2007)model. Alvarez and Lucas (2007) for a particular goal when constructing an estimating model applied, researchers have the freedom to select a range of theoretical gravity models. On the other hand, the theoretical-based model role an increase in today's literature.

2.2 Empirical Literature Review

In past studies, it has been estimated that the trade partners' implementation of trade facilitation measures reduces the trade cost. To promote cross-border trade by enabling the mutual and exchange recognition of trade-related data. The countries reducing the trade cost may enter into trade by bilateral and multilateral trade to operationalize cross-border trade agreements. Furthermore, governments have to collaborate and take initiatives on cross-border paperless trade facilitation to reduce trade costs. An analysis by **(**ESCAP) shows that the tariff cost accounts for 78%, and non-tariff barriers account for 76% of the non-tariff barrier for trade and tariff and 2%-3% across the country. Hence, the trade cost decreases due to trade agreements among the countries. Ferracane (2017) Likewise, ICT services have allowed businesses to access worldwide markets and positively impact trade and alter innovations. Lower trade costs provide incentives to enlarge their customer base and increase profits. Still, for Pakistan, foreign investment in digital sectors is critical to capitalize on, expand ICT goods services exports, export development, and continue ICT services. Internet access has become widely recognized with the rise of the internet and the advancement of technology. To participate in e-trade mode, many obstacles pose for developed and developing countries. In the same way, 89 million people in LDCs use the internet, and around 4 billion people are offline in underdeveloped countries, according to ICT estimates.

According to Clarke and Wallsten (2006) high internet penetration encourages trade flow from developing countries to developed countries. Still, there is no considerable effect on trade flow from developing to develop ones World Bank Group (2019). Foreign Direct Investment, on the other hand, is a crucial tool for businesses to profit from beneficial spillover effects. As a result, especially in the digital sector, these spill-over effects allow domestic firms to learn and multinationals to adopt new technology in terms of digitalization. Furthermore, technical innovation allows the company to produce and invent new products and services at a low cost. On the other hand, Pakistan has a limited amount of FDI in the digital sector.

2.2.1 Literature Review Related to Trade cost

ICT-related investments, particularly in telecommunications, total FDI received between 2003 to 2015 account for 13% and 19% just for digital enable services like finance. As a result, the modest share of a digital investment may limit progress toward more advanced digital service export and lower trade costs.

Novy (2013), in an empirical application, for a number of significant trading partners, this study calculated the relative bilateral trade costs. He found that between 1970 and 2000, the US relative trade cost metric fell by nearly 40% on average. The drop in relative trade costs in the United States has been especially strong with its neighbors, Mexico and Canada. The study also looked at the reasons behind the substantial rise in bilateral trade between the United States and other countries during that time period. The study concluded that the single most important driving force is income growth. Reductions in relative bilateral trade costs come in second, although they play a significant influence quantitatively.

Romalis (2007) looked at the 1990s when tariffs and other trade costs for an important class of goods and services fell to extremely low levels. In contrast, the global expansion of foreign direct investment during that time period significantly reduces technology and policy obstacles to international production management. The decrease in trade costs has a significant impact on tiny economies with low capital tax rates. Such economies see a significant increase in the production and export of high-capital-intensity products. The evidence for this conclusion is strong, as evidenced by extensive trade statistics. In recent years, the emergence of such contemporary, high-labor-productivity industries has been cited as a key element of the Irish economy.

Bond and Syropoulos (2008). They argued that decreased welfare and collusion would lead due to free trade, and in several markets, businesses engage frequently using a duopoly model. As this involves lower deviation incentives, an effective cartel agreement infers cross-hauling of commodities if trade cost and discount factors are not excessively high. Mutual trade liberalization invariably boosts total production, but it can also reduce total output when trade costs are within a range whose lower bound surpasses a threshold level. They also studied how outcomes might alter in the presence of price interactions. Companies suffer capacity limitations when trade costs are below the threshold level. Because there is no negativity of output restrictions in the case of differentiated products, the non-deviation constraint becomes much more complicated. Nonetheless, the lowest discount factor associated with the monopolistic outcome can be a non-monotonic function of trade costs in most cases.

According to Greenaway et al. (2009) national trade cost systematically alters trade composition using a sample of 37 industrialized and transition economies. Potentially relevant omitted variables using econometric techniques that control endogeneity. As a result, it might be considered a source of comparative advantage.

Bosker and Garretsen (2010) developed an alternate strategy approximating trade costs. They also demonstrated that the NEG variable's trade cost function concerning the nontrivial market access is fundamentally important. As a result, they argue that future empirical. NEG research should pay considerably greater attention to .trade costs.

Novy (2010). The author investigated the effects of international trade expenses on important macroeconomic indicators. This is accomplished by introducing asymmetric country sizes with new open economy macroeconomics based on micro-founded two countries' general equilibrium model with iceberg trade costs. The model matches actual trade shares for the OECD countryside well, and trade costs are demonstrated to produce an endogenous home bias in consumption. Furthermore, weaken cross-country output, consumption linkages, and exchange rate volatility amplifies trade expenses. Finally, the model is built to accommodate the exchange rate pass-through levels. Local currency pricing and producer contrast are less meaningful due to trade costs.

Şener et al. (2011). Studied that the Pakistan trend is stationary on a scale between 1 and 7 (no technologies adoption to high technologies adoption). According to WEF, despite the firm's ability to absorb new technologies, Pakistan has had poor performance since 2010.

Market entry difficulty arises when firms export goods and services to foreign states; they confront unique challenges in legal obligations specific to the export market as well as information technology problems. Agreement dues are the main hurdle in the export markets, and the majority of barriers are related to trade facilitation when entering the market. Entry visa requirements and work permits governing regulations; for instance, the visa application process and existing visa regimes are complicated for Pakistan's foreign investors and IT specialists.

Blyde and Iberti (2012) found the use of trade cost measures such as tariff and freight charges as a result of the reallocation process the rise in trade productivity. They found new heterogeneous firm models of global trade back up the forecasts. Trade impacts resulting from tariff reductions and lower transportation costs were the innovative findings of this research paper. Transportation costs are the most limiting factor in trade-induced reallocations given the number of channels they affect. Reduction in the reallocation impacts of lower trade costs could play a role in the decreased effects and increase in trade fractions which may be more widespread in developing countries. More effort is required to study this idea in further depth.

Bao and Qiu (2012) empirically calculated 1995 to 2008 the trade consequences of TBT in 105 WTO countries. The two-stage gravity model is used to account for both firm heterogeneity and sample selection biases. According to the studies increasing the export volumes while the country‘s TBT notification reduces the likelihood of other countries. Conclusion: Explain the TBT’s divergent effects on consumer confidence and the fixed and variable cost of export. TBT’s have no significant effects on developed countries' exports but significantly affect underdeveloped countries.

Busse et al. (2012) investigated the effect of foreign aid spent on Aid for Trade and Trade Facilitation on trading costs. They used a sample of 99 developing nations to undertake a panel data estimation from 2004 to 2009. The findings showed that trade aid has a negative relationship with the costs of trading facilitation. Importantly, the influence is not simply statistically significant.

As the study of Folsom et al. (2012) digital technologies enhance productivity much less than the previous advancement. Advantages of programming reduce based on the part of digital trade because certain human activities are unable to perform by computers. On the other hand, physical products replace digital alternatives; most digital technology

investments are motivated by a desire to maintain market share. Meanwhile, some argue that digital technologies lower product costs and boost productivity.

Inanc and Zachariadis (2012) in determining international pricing differences and segmenting international markets, demonstrated the importance of trade expenses such as distribution and transportation costs as compared to the ‘‘Law of One price’’ the physical distance from the origin has a higher and more precisely positive impact on international deviations than estimates that do not account for the origin of each product. In product market segmentation identifying trade costs and their significance, their finding suggested using relative productivity, bilateral trade flows, and relative prices from survey data. To increase our understanding of trade costs and the relative relevance of causes of international price discrepancies, combine microeconomic trade data with microeconomic relative pricing for further research aim should be on this gap.

Meanwhile, Sáez (2013), one option for addressing this limitation in Pakistan is to pursue a multi-prong approach that might involve bilateral agreements and extensive trade negotiations. As a result, procedures have been developed to make it easier for businessmen and companies to relocate temporarily.

Barua et al. (2013) claimed due to different diffusion pace, productivity rise by digital technologies only in certain sectors. In addition to rising competition, security, and data privacy issues, the digital divide and determining whether digital technologies truly enhance productivity are major issues and challenges.

Pomfret (2014) examined the supply chain and trade cost have a relationship because they have stronger data. After a quick discussion of the usual theory of supply chain evolution, they looked at the quantitative evidence RVCs are particularly strong. Still, their origins and nature vary across Europe, the Americas, and Asia. When both data and computational facilities grew more complete, they investigated the connection among trade costs and the supply chain, focusing on the years since 1990.

Miroudot and Shepherd (2014) find that in the case of services, RTA impacted bilateral trade costs and decreased the trade cost by only 6.5 percent on average. They found that RTAs are rather modest given that these agreements tend to lower trade costs for both members and non-members and the significant evidence of ‘’preferential margin’’ of services. Unlike products, they do not provide significant preferential treatment but indicate a preference for

specific partner countries. This is all the better; trade distortions contribute to preferences. The impact of services RTA is the first to use trade cost data for analyses in the literature.

Gaurav and Mathur (2016). The findings showed that India's bilateral trade with the EU has benefited significantly from trade liberalization over the last two decades. This could also be due to the European Union countries achieving greater political and economic integration during the same period. The trade growth of 109 percent across countries' drop in bilateral resistance values has propelled this bilateral trade growth. According to the gravity model framework, a rise in income significantly impacts trade growth (26 percent). Latvia and Malta have the highest decreases in their tariff equivalent for trade with India among EU nations during the study period.

Kotarba (2017) used the gravity model and control multiple resistance techniques to test the differential effects of telecommunication quantity like bandwidth data speed per subscription of fixed and mobile telephony and internet services, data subscriptions per capita, and quality of countries for bilateral goods. Moreover, this study revealed a considerable impact on export performance that the regression findings of 122 countries from 1995-to 2008. Subscription quality is more appropriate for developed countries; as a result, speed and data quality are important for emerging countries.

Besedeš and Cole (2017) found an extensive margin in two findings of their practical support for items. The first is the linear relationship between three elasticities, i.e., the sum of the trade elasticities for fixed and iceberg transportation costs equals the ad valorem tariffs. The second result showed that trade elasticities for tariffs are larger than the elasticity of trade for iceberg shipping costs. This study used a gravity model to detect variable costs based on value and different from variable costs based on quantity.

Casalini et al. (2019) according to their suggestion for the 21st century, innovative and more holistic methodologies for market openness are required. Include more international communication among a range of stakeholders, policy communities, digital networks, services, and spanning commodities challenges by a more general approach. Avoiding unnecessary trade restrictions, interoperability, non-discrimination, and transparency show how to market openness principles and help policymakers develop legislation for the digital age.

The main hindrance in trade is visa limitation identified by Pakistani exporters. However, it is problematic for businesses and companies to attract from abroad. Frederick (2019)

Persson et al. (2019) found an increase in mortality in the least productive establishments, job creations in the most productive establishments, and employment loss in the least productive enterprises linked with final good trade costs or lower input. Heterogeneous enterprises with the predictions of trade models support the evidence. The effects of final good trade costs are less than input trade costs on establishment-level employment flows.

Ye et al. (2020). They organized product bilateral trade characteristics and expressed them in the Cartesian coordinate system by using X and Y to represent imports and exports, similar to spatial visualization. As a result, geographical analysis and expression approaches can be used in bilateral trade research. They introduced a new method for visualizing bilateral trade information from a spatial perspective called the digital trade feature map (DTFM). Feature extraction, visualization, and analysis can be summed up as the DTFM implementation process. Furthermore, this strategy can provide a larger viewpoint for understanding trade aspects, i.e., taking into account the characteristics of a certain product type and its neighbors. They also developed an extendable DTFM application architecture into which various trade features, grid generation modes, and geographical analysis models could be easily combined.

On the other side, Matthess and Kunkel (2020) highlighted the interaction between digitalization and structural change among developed and developing countries. As a result, digitalization impacts the driver of structure change in various ways in the digital market. Digitalization provides opportunities for developing countries to diversify from conventional to digital trade practices of goods and services.

Habibi and Zabardast (2020) compare the OECD countries with Middle East countries to examine the influence of ICT and education on economic growth. Panel data were used for 18 years for 24 OECD countries and 10 Middle East economies using GMM and OLX fixed methods. According to the results in both countries, ICT positively impacts economic growth. The impact of mobile subscription was perceived as lower in OECD countries compared to Middle East economies and used of internet are high in OECD countries compared to Middle East economies.

The study of Yuan et al. (2021) over 37 years has assessed the influence of digitalization in the economy on technological innovation, financial risk, and income expenditures for G7

economies. The developed econometric method used in this research study's technology and determinants have a long-term stable relationship. Policy Suggestions for decision-makers in the G7 nation-state to design their strategies according to the technological innovations, bank financing, and digital economy are the study's contribution.

2.2.2 Literature Review Related to Agriculture and Manufacture Trade Cost

In line with Li et al. (2017), Franc (2019) further research should look into ICT use in product complexity in the most vulnerable industries. As each level faces unique challenges to identify key issues in regulating and controlling digital trade at various levels of governance is the major goal of this study. This paper makes a two-fold contribution to regional, national, and international levels of digital trade regulation challenges by providing a significant overview. Secondly, to acquire a better understanding of the need for new or changed trading laws to support digital trade and digital economy and investigate digital trade in several aspects.

According to their examination, Lee and Falahat (2019) collected data from 143 exporting SME manufacturers in Malaysia based on considerable indirect effects on product and service advantages and has little direct influence of digitalization on competitive advantage. In a digitalized international marketplace with a particular emphasis on service advantages, products and price, the gap was filled by observing digitalization's direct and indirect consequences on businesses. To strengthen their company’s internalization plans based on its targeted competitive strategy, policymakers and managers can use digitalization.

Kharel (2019) used a recently developed two-step solution comprising constrained ANOVA type estimation and state-of-the-art panel estimation techniques. Using a data set on manufacturing trade flows in eight sectors in 40 countries and the rest of the world aggregate for 1990 to 2002 provides evidence of large residual trade cost bias. Overestimating or understanding the partial effect of FTA by up to 110 percent with the usual one-step approach, the size and direction of bias vary per sector in the literature. The two-step method has different coefficients on trade costs variables and the standard method overall. Biases in partial effect estimations lead to .general equilibrium effects that are biased.

Rodríguez et al. (2019) examined bilateral exports from 2000-2014 a sample of 120 states to apply a structural gravity model, used PPML techniques, and investigated the impact of internet use on aggregate trade flows. Unlike earlier research, the degree of product complexity and estimated model for each section divided countries into segments. Product

complexity segmentation is more susceptible to internet use than income level segmentation. The usage of the internet boosts trade and shows that product complexity and ICT use when they have at equal levels, then countries trade more.

Hou et al. (2021) suggested that strategy measures aimed at improving institutional quality and lowering trade cost should receive more attention, given the importance of trade cost in international trade. From 1995 to 2014, investigated the impact of trade costs quality across 133 countries. According to the findings, agriculture and manufactured trade costs are reduced by high institutional quality. They demonstrated that Institutional quality and trade costs have a negative relationship from a global viewpoint. According to the results, transportation infrastructure investment and tariff reduction are not the sole trade policy measures for lowering trade costs and facilitating welfare to boost economic interaction between countries.

2.3 Literature Gap

All the previous studies mostly focused on promoting digital technologies for the digital trade economy. This leads to a debate on developing suitable methods/policies that help to promote digital trade and reduce trade costs in selected countries, including Pakistan. So, it also needs to explore regulatory gaps and restrictions in the digital trade. This study will explore the barriers to the digital trade economy and regulatory gaps in Pakistan.

2.4 Conclusion

By critically summarizing the literature, the research study found that, at a time when the modest share of the digital investment may limit progress toward more advanced digital service export and lower trade costs. The decrease in trade costs has a significant impact on tiny economies with low capital tax rates. Such economies see a significant increase in the production and export of high-capital-intensity products. Trade impacts result from tariff reductions and lower transportation costs; meanwhile, some argue that digital technologies lower product costs and boost productivity. Important critics discussed in literature about agriculture and manufactured trade costs that reduce by high institutional quality, from a global viewpoint that Institutional quality and trade costs have a negative relationship. The countries reducing the trade cost may enter into trade by bilateral and multilateral trade to operationalize cross-border trade agreements. Furthermore, governments have to collaborate and take initiatives on cross-border paperless trade facilitation to reduce trade costs.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Model specification

The sample of data used comprises the trade cost of the Agriculture Sector and Manufacturing Sector of 37 countries on all continents of the world. The reason for the selection of both developing and developed countries is that objective of the study is to analyze the cost of trade in the era of digitalization both across countries and in Pakistan. In the first stage of the analysis, bilateral trade costs are estimated. In the second stage, the study quantitatively analyzes digital technology's effect on the measured trade cost using a gravity model Following (Novy 2013).

$$TCA_{ij} = \alpha_0 + \alpha_i + \alpha_j + \beta_1(MCS)_{jt} + \beta_2(SEP)_{jt} + \beta_3(PII)_{jt} + \beta_4(FBS)_{jt} + \beta_5(RA)_{jt} + \beta_6(RM)_{jt} + \beta_7(RR)_{jt} + \beta_8(CF)_{jt} + \beta_9(CYB)_{jt} + \beta_{10}(INF)_{jt} + \gamma_1(Dist)_{ij} + \gamma_2(CL)_{ij} + \gamma_3\ (RTA)_{ij} + \gamma_4(Border)_{ij} + \gamma_5\ (FTA)_{ij} + \upsilon_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$TCM_{ij} = \alpha_0 + \alpha_i + \alpha_j + \beta_1(MCS)_{jt} + \beta_2(SEP)_{jt} + \beta_3(PII)_{jt} + \beta_4(FBS)_{jt} + \beta_5(RA)_{jt} + \beta_6(RM)_{jt} + \beta_7(RR)_{jt} + \beta_8(CF)_{jt} + \beta_9(CYB)_{jt} + \beta_{10}(INF)_{jt} + \gamma_1(Dist)_{ij} + \gamma_2(CL)_{ij} + \gamma_3\ (RTA)_{ij} + \gamma_4(Border)_{ij} + \gamma_5\ (FTA)_{ij} + \upsilon_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The above equation can be estimated using the panel data model technique. After applying the Hausman test, we applied either the Random effect model to choose between the fixed or random effect models.

- Where ‘‘T’’ is the measured trade costs of cross country
- Distance between two capital
- Border is dummy variable
- (CL)Common Language is dummy variable
- (RTA) Regional trade agreement is the dummy variable
- (FTA) Free Trade Agreement is the dummy variable
- (MCS) Mobile cellular subscription

- (FBS) Fixed broadband subscription
- (PII) Percentage of individual using internet
- (SEP) School enrollment primary
- (RA) Regulatory Authority
- (RM) Regulatory Mandate
- (RR) Regulatory Regime
- (CF) Competitive Framework
- (CYB) Cybersecurity Index
- (INF)Infrastructure

3.2 Data and Variables

The data for the last decade (2010-2020) were collected from ITU (International Telecommunication Union), WIST (World Integrated Trade Solution) and GSMA, and World Bank. The data is secondary and panel in nature.

Table 3.1 discusses the variables used in the Agriculture and Manufacturing sectors description of variables and sources. Most of the data has been taken from World Bank, WIST, GSMA, and ITU.

Table No 3.1: Data and Variables of Agriculture Sector

Trade cost of Agriculture sector			
Variables	**Notation**	**Description**	**Data source**
Trade cost of Agriculture sector	TCA	Dependent variable	The World Bank
Distance	Dist.	Independent Variable	WITS
Common Language	CL	Dummy Variable	WITS
Border	Border	Dummy Variable	WITS
Regional Trade Agreement	RTA	Dummy Variable	WITS
Free Trade Agreement	FTA	Dummy Variable	WITS
Fixed broadband subscription	FBS	Independent Variable	ITU
Mobile Cellular Subscription	MCS	Independent Variable	ITU
Percentage of Individual Using Internet	PII	Independent Variable	ITU
School Enrollment Primary	SEP	Independent Variable	ITU
Regulatory Authority	RA	Independent Variable	ITU
Regulatory Mandate	RM	Independent Variable	ITU
Regulatory Regime	RR	Independent Variable	ITU
Competitive Framework	CF	Independent Variable	ITU
Cybersecurity Index	INF	Independent Variable	GSMA
Infrastructure	CYB	Independent Variable	GSMA

Table No. 3.2: Data and Variables of Manufacture Sector

Trade Cost of Manufacturing Sector			
Variables	**Notation**	**Description**	**Data source**
Trade Cost of Manufacturing Sector	TC M	Dependent variable	The World Bank
Distance	Dist.	Independent Variable	WITS
Common Language	CL	Dummy Variable	WITS
Border	Border	Dummy Variable	WITS
Regional Trade Agreement	RTA	Dummy Variable	WITS
Free Trade Agreement	FTA	Dummy Variable	WITS
Fixed broadband subscription	FBS	Independent Variable	ITU
Mobile Cellular Subscription	MCS	Independent Variable	ITU
Percentage of Individual Using Internet	PII	Independent Variable	ITU
School Enrollment Primary	SEP	Independent Variable	ITU
Regulatory Authority	RA	Independent Variable	ITU
Regulatory Mandate	RM	Independent Variable	ITU
Regulatory Regime	RR	Independent Variable	ITU
Competitive Framework	CF	Independent Variable	ITU
Cybersecurity Index	INF	Independent Variable	GSMA
Infrastructure	CYB	Independent Variable	GSMA

Since we expect the development of digital technology to lead to a reduction in trade costs, the study used the ICT Development Index (IDI) Indicators, i.e Mobile cellular subscription, fixed broadband subscription, Percentage of Individual using Internet, and school enrollment primary (gross) in our analysis of the determinants of trade costs. The first variable represents the level of digital technology in each country which is most widely used in measuring the level of the information society. Dist. is the distance between the two countries' capital, RTA and FTA are the dummy variables, and X is other gravity model variables, including Border and Common Language. The third variable is the ICT regulatory tracker in four clusters: Regulatory Mandate, Regulator Regime, and Competitive Framework, consisting of 50 Indicators. The The ICT regulatory tracker developed by the International Telecommunication Union is an evidence-based tool that assist regulators monitor the fast evolution ICT regulation and decision-makers. Additional regulatory reform also helps find gaps in existing regulatory frameworks, making the case. The Fourth variable is the Infrastructure provides access to public organizations, individuals, and businesses' digital content and services. In rural and remote areas, infrastructure deployment enables policy and regulatory initiatives. These include the Effective use of spectrum, interconnectivity, and infrastructure sharing. The Fifth Variable is the Cybersecurity Index which helps the baseline security control, Threats, and solutions and measures the commitment of countries to cybersecurity at a global level to raise awareness of the significance and different dimensions of the issue.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter of the study comprises all the results and discussions about the findings of the study. It discusses in detail the relationship of different variables, their descriptive statistics, the correlation matrix, and all the tests that have been carried out.

4.1 Descriptive Results

Table No 4. 1: Descriptive Statistics of Agriculture sector

Descriptive Statistics of Agriculture Sector					
Variable	**Obs**	**Mean**	**Std. Dev**	**Min**	**Max**
Trade Cost of Agriculture Sector	407	381.907	245.365	145.173	1860.637
Distance	407	7421.378	4167.687	683.369	16694.83
MCS	407	119.408	21.554	60.941	191.208
ISEP	407	104.374	33.055	0	389.325
PII	407	71.430	20.395	7.5	99.971
FBS	407	24.826	12.529	0.890	48.271
RA	407	16.621	3.914	2	20
RM	407	16.584	3.371	8	22
RR	407	24.444	5.724	4	30
CF	407	24.678	4.376	6	28
CYB	407	58.374	23.337	2.268	100.866
INF	407	62.824	15.370	9.540	97.841

The basic concept of descriptive analysis is to statistically demonstrate the overall characteristics of the data used to estimate the models. The above table shows the descriptive statistics of the model that we will estimate. It reports the observations 407 mean, standard deviation, minimum and maximum value for all study variables. The table shows that the Trade cost of Agriculture sector values lies in the range of 145.173 to 1860.637 while the mean value and standard deviation of Trade cost of Agriculture is 381.907 and 245.365, respectively. The Distance lies in a range of 683.369-16694.83, whereas the mean value and standard deviation of distance are 7421.378 and 4167.687, respectively. The ICT Development indicator Mobile cellular subscription ranges between 60.94 to191.208.

Meanwhile, the average Mobile cellular connectivity Mean and standard deviation are 119.4084 and 21.55, respectively. The school enrollment primary gross is reported to lie in the range of 0 to 389.325. While the average and standard deviation of school enrollment primary gross are 104.374 and 33.055 respectively. The ICT Development Indicator Percentage of individuals using the internet lies between ‘‘7.5 to 99.871,’’ whereas the mean and standard deviation is 71.430 and 20.395, respectively. The ICT Development Indicator Fixed broadband subscription lies between ‘‘0.890 to 48.271’’ whereas the mean and standard deviation are 24.826 and 12.529, respectively. The ICT Regulatory tracker cluster Regulatory Authority in Agriculture trade cost lies between 2 to 20, whereas the mean and standard deviations are 16.62162 and 3.914, respectively. The ICT Regulatory tracker cluster Regulatory Mandate in Agriculture trade cost lies between ‘‘8 to 22’’, whereas the mean and standard deviation are 16.584 and 3.37, respectively. The ICT Regulatory tracker cluster Regulatory regime in Agriculture trade cost lies between 4 to 30, whereas the mean and standard deviation are 24.44 and 5.724, respectively. The ICT Regulatory tracker cluster competitive Framework in Agriculture trade cost lies between 6 to 28 whereas the mean and standard deviations are 24.678 and 4.376, respectively. The cybersecurity index in Agriculture trade cost lies between 2.268 to 100.866, whereas the mean and standard deviation are 58.374 and 23.337, respectively. The infrastructure index in Agriculture trade cost lies between 9.540 to 97.841, whereas the mean and standard deviation are 62.824 and 15.370, respectively.

Table No 4. 2: Descriptive Statistics of manufacture sector

Table 4.2 Descriptive Statistics of Manufacture Sector					
Variable	**Obs**	**Mean**	**Std. Dev**	**Min**	**Max**
Trade Cost of Manufacturing Sector	407	168.77	49.90	73.08	478.42
Dist.	407	7421.37	4167.68	683.36	16694.83
MCS	407	119.40	21.55	60.94	191.20
SEP	407	104.37	33.05	0	389.32
PII	407	71.43	20.39	7.5	99.97
FBS	407	24.82	12.52	0.89	48.27
RA	407	16.62	3.91	2	20
RM	407	16.58	3.37	8	22
RR	407	24.44	5.72	4	30
CF	407	24.67	4.37	6	28
CYB	407	58.37	23.33	2.26	100.86
INF	407	62.82	15.37	9.54	97.84

The basic concept of descriptive analysis is to statistically demonstrate the overall characteristics of the data used to estimate the models. The above table shows the descriptive statistics of the model that we are going to estimate. It reports the observations 407 mean, standard deviation, minimum and maximum value for all study variables. The table shows that the Trade cost of manufacturing sector values lies in 73.087 to 478.429 while the mean value and standard deviation are 168.770 and 49.907, respectively. The Distance in the manufacturing sector lies in a range of 683.369 to 16694.83, whereas the mean value and standard deviation of distance are 7421.378 and 4167.687, respectively. The ICT Development indicator Mobile cellular subscription in the manufacturing sector ranges between 60.941 and 191.208.

Meanwhile, the average Mobile cellular connectivity Mean and standard deviation are 119.408 and 21.554, respectively. The school enrollment primary gross is reported to lie in the range of 0 to 389.325. While the average and standard deviation of school enrollment primary gross are 104.374 and 33.055 respectively. The ICT Development Indicator Percentage of individuals using the internet lies between 7.5 to 99.871, whereas the mean and standard deviation is 71.430 and 20.395, respectively. The ICT Development Indicator Fixed broadband subscription lies between ‘‘0.890 to 48.271’’ whereas the mean and standard deviations are 24.826 and 12.529, respectively. The ICT Regulatory tracker cluster Regulatory Authority in Agriculture trade cost lies between 2 to 20 whereas the mean and standard deviations are 16.621 and 3.914, respectively. The ICT Regulatory tracker cluster Regulatory Mandate in Agriculture trade cost lies between ‘‘8 to 22’’ whereas the mean and standard deviation are 16.584 and 3.371, respectively. The ICT Regulatory tracker cluster Regulatory regime in Agriculture trade cost lies between ‘‘4 to 30’’, whereas the mean and standard deviation are 24.444 and 5.724, respectively. The ICT Regulatory tracker cluster competitive Framework in Agriculture trade cost lies between ‘‘6 to 28’’ whereas the mean and standard deviations are 24.678 and 4.376, respectively. The cybersecurity index in Agriculture trade cost lies between 2.268 to 100.866, whereas the mean and standard deviation are 58.374 and 23.337, respectively. The infrastructure index in Agriculture trade cost lies between 9.540 to 97.841, whereas the mean and standard deviation are 62.824 and 15.370, respectively.

4.2 Preliminary Analysis Results

The preliminary analysis graphically analyzes the measured trade cost of different economies is covered the discussions about the trends of trade cost of the agriculture sector and manufacturing sector in this study.

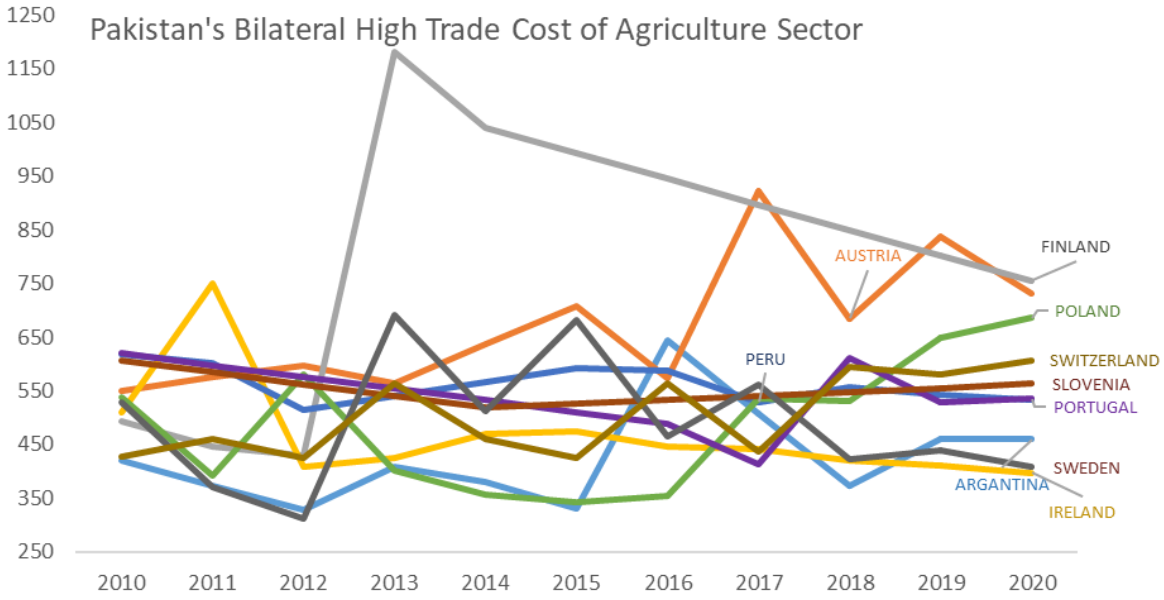

Figure No 4.1: Pakistan's Bilateral High Trade Cost of Agriculture sector

Figure 1 shows the trend of high trade costs in the agriculture sector with the top 10 countries over eleven years from 2010 to 2020. The figure shows that the highest trend in Finland in the year 2012 was due to the water scarcity that raised the Agriculture trade cost, and after that, it dramatically went down[1]. The trade cost of Austria depicted the 2nd highest trend in 2016-2017; as the total number of farms declined, which resulted in the loss of grassland following reduced agricultural area, and after that, it swiftly went down[2]. The third highest trend in Poland goes up to 2017-2020 due to an increased frequency of extreme events, such as prolonged droughts, floods, storms, and heavy showers, which resulted in reduced agricultural production and water shortage[3] .

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[1] https://www.frontiersin.org/articles/10.3389/fsufs.2018.00067/full
[2] https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/by_country/documents/analytical_factsheet_at.pdf
[3] https://www.climatechangepost.com/poland/agriculture-and-horticulture/

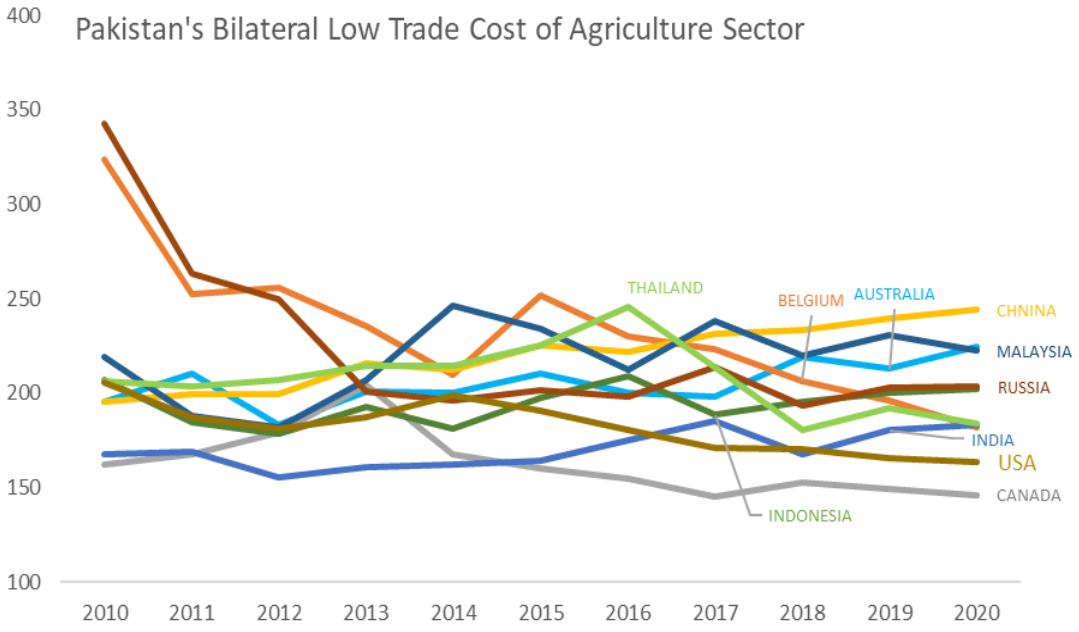

Figure No 4.2: Pakistan's Bilateral Low Trade Cost of Agriculture Trade sector

Figure 2 shows the trend of low trade costs in the agriculture sector with top 10 countries over eleven years from 2010 to 2020. The figure shows that Canada's lowest trend started going down in 2014 due to ocean freight from Canada's west and east coasts providing relatively affordable access to many importing nations. After that, it further declines slowly and then stays constant for the rest of the year.[4] The second-lowest trend in the USA is considerably reduced in the year 2017. The United States is a high production, low-cost source of agricultural products, and the removal of trade barriers, such as tariffs. After that, the line maintains the same level.[5] The third lowest trend of India declined in 2013 has singed the SAPTA which both India and Pakistan has signed will gradually phase out all tariffs on traded goods with zero tariffs after that the line minimal fluctuate.[6] Trade costs decrease as per capita income increases. Trade costs are lowest in high-income countries and highest in low-income countries.

[4] https://www.fcc-fac.ca/en/knowledge/economics/understanding-trade-overview.html
[5] https://www.card.iastate.edu/ag_policy_review/article/?a=66
[6] https://ishrathusain.iba.edu.pk/speeches/New/India-Pakistan_TRD_FPPR.docx

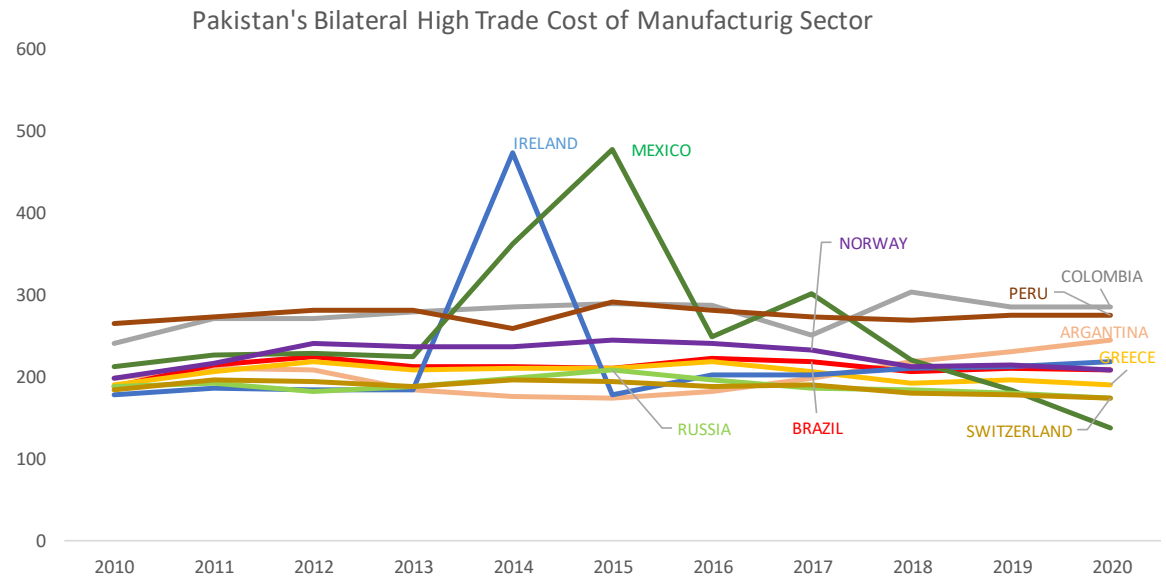

Figure No.4.3: Pakistan's Bilateral High Trade cost of manufacturing sector

Figure 3 shows the trend of high trade costs in the manufacturing sector with top 10 countries over eleven years from 2010 to 2020. The figure shows the highest trend of Mexico raised in the year 2015 due to more restrictive rules-of-origin requirements will increase production costs that, in turn, will imply higher prices, reduced output, and a decrease in consumer surplus in the region after that, the line sharp decline, the line minimal fluctuate and rapid go down in 2020.[7] The second highest trend in Ireland was considerably high in 2014 because manufacturing firms faced Costs of employment, utilities, transport, regulatory burdens, and property costs; after that, the line dramatically declined in 2015 and maintained the same level. [8]The third highest trend of Colombia rose in 2018 because the nation's high corporate taxes and labor costs have diminished the country's competitiveness after that the line stayed constant.[9] There are many reasons that trade costs may be high, including own trade policies, nontariff measures at home and abroad, weaknesses in transport and logistics, restrictive services trade and investment policies, etc.

[7] https://www.wita.org/nextgentrade/mexicos-higher-costs-under-usmca-may-potentially-offset-gains-from-china-related-trade-spurt-with-u-s/
[8] https://enterprise.gov.ie/en/Publications/Publication-files/Forf%C3%A1s/Making-it-in-Ireland-Manufacturing-2020.pdf
[9] https://www.worldatlas.com/articles/what-are-the-biggest-industries-in-colombia.html

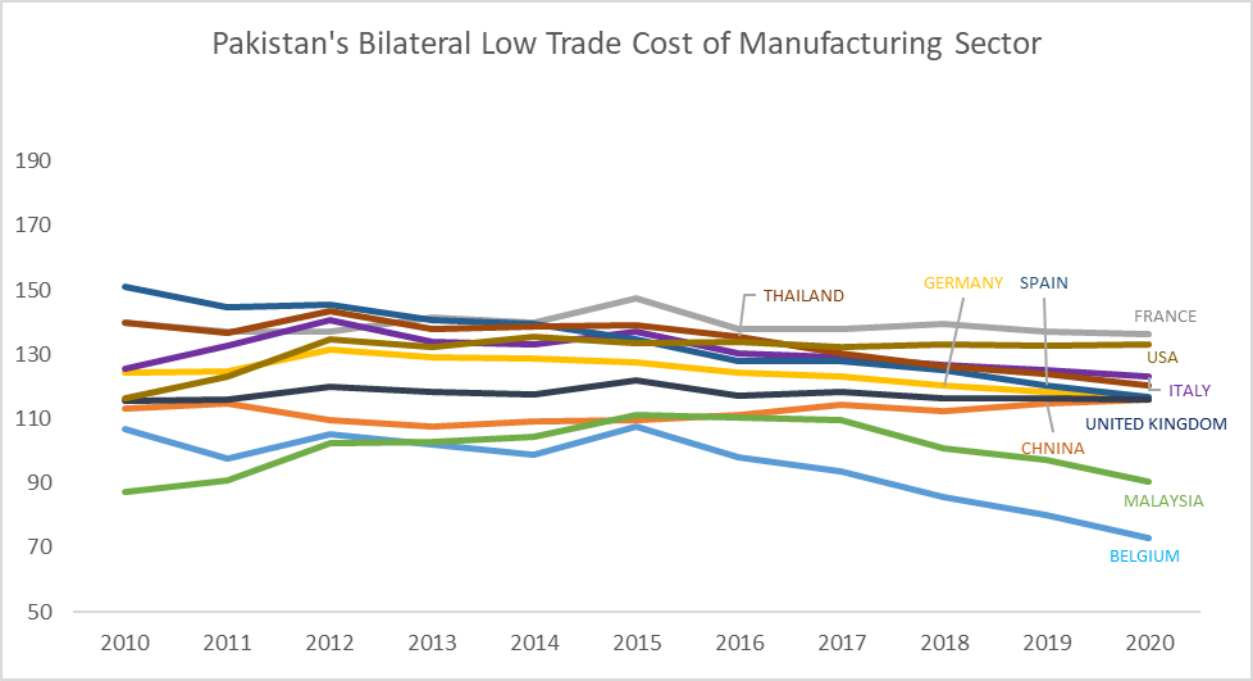

Figure No.4.4: Pakistan's Bilateral Low Trade cost of manufacturing sector

Figure 4 shows the trend of low trade costs in the manufacturing sector with top 10 countries over eleven years from 2010 to 2020. The figure shows the lowest trend in Belgium went down in 2015; after that, the line sharp decline has been held back in the last three decades due to regional insecurity, fueled by terrorist groups active in the region of Pakistan. However, authorities have clamped down on them in the last few years and managed to "reduce their activities by 95%".[10] The second-lowest trend in Malaysia was considerably high in 2015; after that, the line gradually declined due to trade balance has not achieved significant changes even after 9 years of implementation of the agreement. With this backdrop, the current FTA between Pakistan and Malaysia suggested changes that could be made to improve the outcome for Pakistan. [11]The third lowest trend of China rose and down throughout the period; the increase in Chinese aggregate trade costs significantly reduced the export share of manufacturing.[12] The trade cost graph suggests that low-income countries remain marginalized from the world trading system because the transaction costs of moving goods in and out of those economies are high. Suppose they are to gain fully from the rules-based multilateral system. In that case, it is important for low-income countries to radically lower their trade costs and become more integrated into global exports and imports.[13]

[10] https://www.brusselstimes.com/news/eu-affairs/48274/belgium-and-pakistan-looking-to-increase-bilateral-trade
[11] https://www.researchgate.net/publication/323994356_A_Household_Level_Analysis_of_the_Pakistan-Malaysia_Free_Trade_Agreement
[12] https://chinafinanceandeconomicreview.springeropen.com/articles/10.1186/s40589-017-0049-z
[13] https://www.wto.org/english/res_e/booksp_e/aid4trade15_chap2_e.pdf

4.3 Regression Analysis Results

The regression analysis quantitatively analyzes the measured trade cost of different economies through different variables is covered the discussions about the impact of trade cost on the agriculture sector and manufacturing sector.

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Table No 4. 3: Estimation result of Agriculture Sector

Trade Cost Agriculture	Model 1	Model 2	Model 3	Model 4	Model 5
Dist.	0.017 (0.099)*	0.018 (0.072)*	0.019 (0.033)**	0.090 (0.046)**	0.018 (0.053)**
CL	-345.731 (0.058)**	-342.897 (0.053)**	-348.005 (0.044)**	-327.951 (0.062)*	-332.770 (0.060)*
RTA	-99.275 (0.658)	-68.634 (0.711)	_	_	_
Border	47.806 (0.847)	_	_	_	_
FTA	-90.245 (0.679)	_	_	_	_
MCS	-0.743 (0.045)**	0.369 (0.045)**	-0.740 (0.045)**	-0.761 (0.038)**	-0.748 (0.042)**
SEP	-0.882 (0.002)***	0.284 (0.002)***	-0.889 (0.002)***	-0.881 (0.002)***	-0.795 (0.004)***
PII	2.289 (0.004)***	0.795 (0.004)***	2.195 (0.003)***	2.133 (0.004)***	2.612 (0.000)***
FBS	-0.711 (0.659)	1.602 (0.635)	_	_	
RA	18.483 (0.000)***	4.565 (0.000)***	18.253 (0.000)***	17.754 (0.000)***	18.424 (0.000)***
RM	5.995 (0.169)	4.343 (0.174)	5.923 (0.171)	_	_
RR	-9.030 (0.000)***	2.455 (0.174)	-8.897 (0.000)***	-9.040 (0.031)**	-8.429 (0.000)***
CF	-2.687 (0.275)	2.459 (0.291)	-2.537 (0.302)	_	_
CYB	-0.542 (0.118)	0.345 (0.115)	-0.612 (0.057)**	-0.682 (0.186)	-0.506 (0.000)***
INF	0.728 (0.324)	0.735 (0.317)	0.678 (0.348)	0.933 (0.060)*	_
_cons	177.860 (0.169)	121.515 (0.162)	148.544 (0.186)	195.990 (0.060)	198.337 (0.04)
R square			0.1295		

P*** significance level at 1%, p** significance level at 5%, p* significance level at 10%.

4.3.1 Results and Discussion of Agriculture sector

The table-4.3 and table-4.4 results presented General to specific modeling. Model 1 is a general model in which we encompass all possible explanatory variables of Trade cost in the agricultural sector. Then, using the General to specific modeling approach, our final model is model 5. To estimate these models, the study applied either Random effect model after applying the Hausman test to choose between the fixed and random effect models. Model 1 Distance, Border, Common language, RTA, FTA, MCS, FBS, PII, SEP, Regulatory Authority, Regulatory Mandate, Regulatory Regime, Competitive Framework, Cybersecurity, and Infrastructure are explanatory variables.

The ‘‘*Distance’’* indicates a positive and statistically significant relationship with agriculture trade cost at a significance level of 10%. Here distance means the distance between the capitals of two countries; if the distance is increased by 1%, then trade cost will be increased by 1.77%. In our last model, distance is a statistically significant relationship with agriculture trade cost at a significance level of 5%.

This study is according to our result. The findings of (Mehl, Schmitz et al. 2019) found that International transactions declined more between more distant nations and the various metrics during the Great Trade Collapse of 2007-09. Researchers have discovered that the various distance measures exacerbate each other's respective impacts. Then they concentrated on a larger panel analysis of goods trade, demonstrating that trade between more distant nations is more volatile, with an amplification pattern across distance metrics. Distance has a very negative impact on trade, and this fact is one of the most well-known and well-supported results among international economists.(Bernard, Jensen et al. 2007) explain how this can be split into a number of product effects and average exports per product effect. They find out that average sales of every individual item increase along with distance. They explore how this can be decomposed into many product effects and an average exports per product effect. They expose that relation between distance and number of products exported is negative using US firm-level data. The concept that distance is a tool for increasing the agricultural sector's trade costs indicates that distance and trade costs are positively related.

In our first model ‘‘*Common language’’* indicates a negative and statistically significant relationship with agriculture trade cost at a significance level of 5%. In bilateral trading, communication convenience is quite important and plays a crucial role.

This (Melitz and Toubal 2014) study is according to our results, representing that the collective effect of common languages is twice that of a mutual official language. Furthermore, it shows that mutually understandable languages are very important for the easiness of communication and play quite an important role in bilateral trade.

Our last model indicates that Common language has a negative and statistically significant relationship with agriculture trade cost at a significance level of 10%. It shows its impact on trade is negative, so that comes as a surprise given that convergence in commonly spoken languages lowers average bilateral trade costs. However, we must remember that the parallel impact on bilateral trade flows and variations in common language worldwide affects the prices of consumers and producers in all countries.

In our first model, the ‘‘*Regional Trade Agreement’’* indicates a negative and statistically insignificant relationship with Agriculture Trade costs. This often means the agricultural sector is treated differently in RTAs than other goods, and pure economic efficiency arguments don't provide sole basis for the government’s national trading policy stance in negotiating these agreements. Indeed the agricultural trade component of RTAs often reflects more broad-based policy objectives additionally to the classic market access issue. OECD (2015) Agriculture has long been measured as a sensitive sector with respect to national trading policy disciplines and liberalization related to manufacture goods that have undergone numerous rounds of liberalization. Agriculture is usually treated as a sensitive sector, often resisting trade liberalization has this trade stance reformed through its inclusion in RTAs, or have the RTAs simply accommodated the agricultural sector. Because agricultural tariffs are higher than non-agricultural goods, lowering tariffs might help stimulate trade, especially if tariff reductions could be made in the most heavily protected sectors. However, it is possible that those countries without privileged access may lose competitiveness, which has to be investigated more for further analysis. Thus, the concept that RTA is an instrument to extend the Trade cost of the Agriculture sector reflects a balance among numerous economic objectives and is not necessarily focused on achieving better market access.

‘‘Border’’ of across countries also indicates a positive and statistically insignificant relationship with Trade cost of Agriculture sector.(Carballo, Handley et al. 2018) Tariffs, quotas, and other border impacts impose costs on trade flows. In recent years, the processing of shipments has become more complex. Processing tariffs are

distributed among products, and new trade relationships, in particular, are burdened by high border costs. Because they mix real processing times with appropriately designed storage periods, aggregate metrics of border processing are difficult to interpret as cost ranking. Even processing times vary systematically depending on the firm and the product characteristics. Second moments regarding the processing distribution would be relevant to interpreting elasticities. This indicates that Borders are more socially liable for increasing trade costs in the Agriculture sector. The larger the non-border trade barriers, the less the impact of border obstacles on trade and welfare. Therefore Non-border trade barriers cause investors to invest domestically in trade. Due to prohibitive transportation costs, non-order barriers are very high. Even in the absence of border expenses, there would be a modest amount of international trade. Obviously, the gain is minimal by reducing border obstacles in international trade.

In our first model, the ‘‘*Free Trade Agreement’’* indicates a negative and statistically insignificant relationship with Agriculture Trade costs. Our results show that if there is no trade agreement across countries, then trade costs in the agriculture sector will increase.

According to (Murphy 2009) the Agreement on Agriculture had a number of severe flaws. To begin with, among expression and authenticity, there was a gap. Today, almost every analyst recognizes that limiting the spending of developed countries on agricultural programs rules accomplished nothing. These policies, directly and indirectly, subsidies many farmers and agribusinesses, distorting markets globally. Further rules did not have any impact on existing tariffs on agricultural products. Non-tariff restrictions were converted into tariffs, resulting in new taxes, such as importing dairy to several advanced countries.

In our first and last model, ‘‘*Mobile Cellular Subscriptions’’* shows a negative and statistically significant relationship with agriculture trade cost at a significance level of 5%. Here negative signs show that the usage of mobile cellular subscriptions increases the trade cost of the agriculture sector is going to decline.(Abraham 2007) argues that the advancement of communications services is critical in minimizing price disparities between marketplaces for similar products. As a result, the usage of immediate telecommunication services would improve market information access on pricing, quantities, and various market uncertainties (Klonner and Nolen 2010) examined the

impact of mobile technology on rural labor markets, finding that once network service is introduced to a neighborhood, employment increases significantly.

Our first model, *''School Enrollment Primary (gross)*'' shows a negative and statistically significant relationship with agriculture trade cost at a significance level of 1%. In our last model, School Enrollment Primary (gross) shows a negative and statistically significant relationship with agriculture trade cost at a significance level of 5%.

E-learning is revolutionizing agriculture education. It enables more students and farmers to gain access to better information more effectively. The evaluation results of the first international e-learning projects in agriculture suggest that if developed countries help poor countries apply e-learning methodologies, that much good can be done to ensure global food security.

To improve incomes, living standards and working conditions (Khan, Hussain et al. 2021) find a meaningful way to design and commercialize an e-learning product in agriculture to restore the inequality between agriculture and other areas by generating a reasonable employment balance between agriculture and other areas.

In our first model, *''Percentage of Individual using internet''* show a positive and statistically significant relationship with agriculture trade cost at a significance level of 5%, and in our last model percentage of individual using the internet also show a positive and statistically significant relationship with agriculture trade cost at a significance level of 5%.

This enhanced accessibility will benefit both individuals and business, and many industrial sectors have already begun to gain from the Internet's "information revolution." In most cases, the decision to use the Internet in the agricultural business mostly meets pre-determined expectations. Higher levels of household income and farm sales dramatically enhance the likelihood of using the Internet for farm business. The expected quadratic effect of age is evident, with the number of older farm operators decreasing their likelihood of using the Internet.

According to (Briggeman, Whitacre et al. 2010) Several potential benefits of the Internet have been realized by the farming industry. The Internet, for example, gives immediate information (such as weather forecasts or market prices). Farms can also save money by ordering the bulk of goods online or purchasing inputs that aren't readily

available in their area. Farmers can access new markets by visiting their respective farm websites. In addition, some farmers are selling their products online.

In our results, *''Fixed Broadband Subscription''* has an insignificant and negative relationship with trade cost 1 unit decrease in fixed broadband subscription increases the trade cost of the agriculture sector by 71%. The economic impact is minimal where fixed broadband penetration is low and has a very large impact on the economy where fixed broadband structure reaches a high level of development.

This study is consistent with our results (Whitacre 2021) The study shows that enhanced connectivity at higher speed thresholds is a key element in improving farmer outcomes in the United States. According to restricted signals, low-speed thresholds may potentially be adequate to facilitate the realization of some cost reductions for US farmers. Further investigation is required for farming activities such as precision agriculture that may imply a higher speed threshold. The findings clearly show that Internet access meaningfully contributes to rural infrastructure development.

Our first and last model, *''Regulatory Authority''* shows a positive and statistically significant relationship with Agriculture Trade Cost at a significance level of 1%.

Positive relations show that as a part of a new strategy for inspection and enforcement of legislation, membership of farm assurance programmers could include the recognition of tremendous practices on the farm. Such recognition uses third-party membership to assess the state's and its agencies' risk. Good regulation promotes an economic activity's underlying value by establishing enabling rules and enforcing suitable limits on that activity to reduce the possibility of economic or other harm. Where rules are usually working well and should be kept, and a minor or substantial review that results in a better approach would be advantageous to the sector.

Our first model, *''Regulatory Mandate''* shows a positive and statistically insignificant relationship with agriculture trade costs. It demonstrates that, while a lack of regulation may result in a failure to prevent insecure behavior, poorly conceived or implemented regulation can impose costs on businesses out of proportion to the benefit received. Such regulations may prevent firms from engaging in activities that are beneficial to society, have unintended consequences, or fail to offer the protections intended.

According to the NFU's 2016 confidence survey, 53% of farmers believe regulation and legislation would have a negative impact on their operations - the second largest area of concern. Approaches that have not engaged in advance with businesses to explore how regulation is best targeted or implemented are regarded as poor regulation.

In our first and last model, ‘‘*Regulatory Regime’’* shows a negative and statistically strongly significant relationship with agriculture trade cost at a significance level of 1%. Our findings suggest that the regulatory framework is appropriate for supporting productive agriculture and agri-food trading with international markets while also safeguarding the environment, enterprises, and the general public. The benefits of good regulations include achieving desired results, avoiding unexpected consequences, public confidence in the regulation, and the certainty of working, enabling norms to follow, providing the confidence to invest.

According to NFU (2017), the success and workability of regulatory regimes post-Brexit will rely as much on their enforcement, implementation, and interpretation as the content of the legislation itself. Even if existing EU law is transferred entirely into UK law, there will be a number of cases where the ensuing legislation can be implemented to benefit UK farmers. For instance, under the current Plant Protection Products approvals regime, the United Kingdom could take a firm stance on how draught guidance documents are used in evaluating pesticide approvals before making any changes to the regime itself, which could help farmers and growers get more important products. We urge the government to begin exploring methods to improve the functioning of existing regimes as soon as we leave the EU, in collaboration with industry.

Our first model, *‘‘Competitive Framework’’* shows a negative and statistically insignificant relationship with Agriculture Trade costs. Our findings reveal that farm enterprises face production constraints, unproductive promotion techniques, marketing deregulation, cyclical swings in prices of input and output, and constant risks like floods, bushfires, etc.

According to the Productivity Commission (2014), a globally productive agricultural sector need policies and structure which facilitate revolution, low production cost, risk management, allocation of resources, and investment with high profits.

Generally speaking, open and competitive markets will be provided with suitable incentives. This is applicable to agricultural and other inputs subject to worldwide competition. This proposal focuses on structuring policies that support and develop a competitive and flexible agriculture region.

Our first model *''Cybersecurity Index''* shows a negative and statistically insignificant relationship with agriculture trade costs. (Taylor, Dargahi et al. 2020) Digital agriculture/farming stakeholders are generally disappointed with existing cybersecurity solutions, with just a rating of 4.5/10 in terms of satisfaction.

According to a recent whitepaper by the **"Jahn"** Research Group at the University of Wisconsin-Madison, frequent changes in America are causing new and often unappreciated cyber-attack with unappreciated economic and security implications. Highly digital food systems rely on digital networks and digital information systems that may be exposed to denial of service attacks. Due to the food systems are exposed to hybrid warfare strategies used by mutually state and non-state regions. The difficulty of these networked systems amplifies fears and exposition. As a result, there are unknown risks that affect food safety in other industries.

Forecasts from an IT analyst cannot keep up with the enormous increase in cybercrime and cyber-attack transfer from personal computers to smartphones and mobile devices; placing more unprotected devices causes an increase in complexed and cultured cyber-attacks on business and government institutions.

There are some scale features in already existing food systems that have possible increase cyber risk are:

1) Increasing dependence of farms on technology.

2) Addition in food supply chains through which producers directly process dairy supplies.

3) There is widespread non-compliance with food safety, tractability, and insurance.

4) Rapidly progressing technology all over the supply chains

5) In a defensive mode, there is a lack of regular market scrutiny to detect market and digital technology issues.

Our last model *''Cybersecurity Index''* shows a negative and statistically significant relationship with agriculture trade cost at a significance level of 1%.

The Department of Homeland Security defines precision agriculture uses a range of technologies to produce information, information analytics, and machine learning. These technologies are subject to GPS, sensors, and other communication networks, and they're empowered for the accurate application of agriculture, resulting in low costs and greater returns.

Our first model, *''Infrastructure''* shows a negative and statistically insignificant relationship with Agriculture Trade costs. Unformed Internet usage negatively impacts the value addition of agriculture, and formed internet usage has a positive impact. Internet and mobile devices play an important role in agricultural growth, as agricultural development also plays a significant role in the extension of mobile phones and the internet. Entry barriers in smart farming probably cost less standardization and broadband structure. Therefore, smart farming remains way behind other sectors, i.e., banking, finance, healthcare, etc.

Table No 4. 4: Estimation result of Manufacturing Sector

Trade Cost Manufacture	Model 1	Model 2	Model 3	Model 4	Model 5
Dist.	0.006 (0.000)***	0.006 (0.000)***	0.006 (0.000)***	0.006 (0.000)***	0.005 (0.000)***
CL	-21.749 (0.421)	-21.633 (0.407)	-19.585 (0.455)	-19.585 (0.455)	_
RTA	5.393 (0.872)	_	_	_	_
Border	22.074 (0.547)	24.050 (0.440)	_	_	22.652 (0.451)
FTA	-50.279 (0.114)	-51.800 (0.074)*	-42.405 (0.105)	-42.405 (0.105)	-49.407 (0.088)*
MCS	0.008 (0.939)	_	_	_	_
SEP	-0.034 (0.676)	-0.033 (0.680)	-0.026 (0.741)	0-.026 (0.741)	_
PII	-0.245 (0.310)	-0.241 (0.314)	-0.275 (0.237)	-0.275 (0.237)	_
FBS	0.305 (0.495)	0.274 (0.529)	0.220 (0.603)	0.220 (0.603)	_
RA	0.333 (0.793)	0.336 (0.788)	_	_	_
RM	0.126 (0.918)	0.051 (0.966)	_	_	_
RR	0.662 (0.370)	0.666 (0.365)	0.703 (0.258)	0.703 (0.258)	0.892 (0.084)*
CF	-0.156 (0.833)	-0.140 (0.849)	_	_	_
CYB	-0.419 (0.000)***	-0.414 (0.000)***	-0.410 (0.000)***	-0.410 (0.000)***	-0.351 (0.000)***
INF	0.292 (0.187)	0.293 (0.184)	0.320 (0.134)	0.320 (0.134)	_
_cons	121.228 (0.000)	124.153 (0.000)	130.659 (0.000)	130.659 (0.000)	125.482 (0.000)
R square 0.3296					

p*** significance level at 1%, p** significance level at 5%, p* significance level at 10%.

4.3.1 Results and Discussion of Manufacture Sector

In our first and last model ‘‘*Distance*’’ coefficient is a positive and statistically strongly significant relationship with the Manufacturing Trade Cost at a significance level of 1%.

Our findings reveal that trade costs in manufacturing sectors have dropped as tariff and non-tariff expenses have decreased. Distance is attributed biggest proportion of trade costs. Transportation costs increase because of distance; therefore, adjacent countries want to trade more than far-flung countries. The results show that a reduction in trade costs in this sector is due to the fall in tariff and non-tariff costs. Distance contributed the very best proposition of trade costs.

This (Wongpit 2013) study is connected to our results, which report that trade cost among Thailand and European Union (EU) is comparatively high in the manufacturing sector due to distance. They break down the trade cost in the manufacturing sector into different components, and results show that distance contribution to trade cost has a major portion.

In our first model, ‘‘*Common language’’* indicates a negative and statistically insignificant relationship with manufacturing Trade costs. This shows that language must be used carefully, and further, it does not clarify that language harmony affects the trade, including trust, bond, and communication ability. Common language is the trade-enhancing feature that compensates for transportation costs.

In our first model, the ‘‘*Regional Trade Agreement’’* coefficient indicates a Positive and statistically insignificant relationship with Manufacturing Trade costs. Two major steps would increase the trade and related benefits by allowing fresh countries to join RTA and reducing the outer RTA tariffs on imports from non-members. Here a positive coefficient indicates that member’s countries are exporting more than non-member countries.

In our first and last model, the *‘‘Border’’* Coefficient has a positive and statistically insignificant relationship with manufacturing Trade costs, revealing that border restrictions only impact international trade, lowering the relative barrier to domestic trade. When border trade is used to evade taxes, it becomes part of both countries' underground economies.

This research is relevant to our findings (Anderson and Van Wincoop 2001) International trade is affected by border barriers, which lowers the barriers to local trade. Because developing countries are more dependent on exports, therefore their border barrier is greater while the barrier to a local market is lower. Border barriers adjust size lower among big countries while more among small countries; then again, they have a greater impact on small countries' welfare due to a greater increase in domestic trade.

In our first model, the ‘‘*Free Trade Agreement’’* Coefficient shows a negative and statistically insignificant relationship with manufacturing Trade costs. Our first model results show that if imports reach near-record levels, manufacturing enterprises will be under pressure, resulting in unemployment and increased imported products, making prices drop dramatically.

A study (McNamara and Health 2015) says that we support free and fair trade as free trade is not necessarily fair trade. But in our last model, the ‘‘Free Trade Agreement’’ Coefficient also shows a negative and statistically significant relationship with manufacturing Trade costs at a significant level of 10%.

Our findings reveal that FTAs have proven to be one of the most effective strategies for country exporters to access other markets. “Free trade agreements” (FTAs) lower trade barriers for exports and therefore protect country interests and strengthen the law in the FTA partner country. This facilitates and reduces the cost of exporting commodities to trading partners essentially.

Our first model, *‘‘Mobile cellular subscription’’* Coefficient, shows a negative and statistically insignificant relationship with manufacturing Trade costs. The impact of digital technologies like information and communication technologies have seen everywhere, except in production figures. Over two decades later, economists are examining the influence of technologies on production and growth. Another argument is that giving mobile phones to your employee is costly; therefore, you can enable features in your handset and SIM cards that limit their use for business purposes only. Many tariffs are available; you may select a tariff that meets your business requirement.

In our first model, ‘‘*School Enrollment Primary (gross)’’* Coefficient shows a negative and statistically insignificant relationship with manufacturing Trade Cost

Often, educational institutions do not effectively provide the essential training and education to promote communication skills across cultural divides. Furthermore, there is increasing demand for interdisciplinary thinking, reflecting the The growing integration of different fields of knowledge in manufacturing. The creation of such competencies and the provision of new life-long learning programs to help people keep up with the pace of change will become a challenge for today's educational systems. Manufacturing training is expected to be a key factor in achieving this objective. Manufacturing education should use a replacement approach to arrange industry for next-generation innovation and promote its growth to respond to the current role.

This study is related to our results (Mavrikios, Georgoulias et al. 2019) Innovation is highly crucial since it is The main driving force for continuously Providing added value to the customer and as a result, keeping The manufacturing industry Product is competitive. Some world regions today are characterized by a risk-averse approach to

Manufacturing business (e.g., Europe).This is especially for SMEs that have to operate under superior technological, financial and social conditions. To oppose this approach embedding entrepreneurship as well as developing creativity and inventive spirit within educational systems will be a major issue for manufacturing education in the years to come.

Our first model, the *''Percentage of Individual using the internet''* Coefficient, shows a negative and statistically insignificant relationship with manufacturing Trade costs. The negative coefficient sign shows that if there are no internet facilities to an individual, trade costs will increase. The increase in Internet users improves information on manufacturing trade availability, boosts manufacturing exports, raises competition, and lowers trade costs.

The increase in the number of Internet users has also mitigated the effect of distance on manufacturing exports, but according to our results, the internet users are less due to which the trade cost will not be reduced and there competition is not enhanced and discourage the manufacturing exports.

Our first model *''Fixed Broadband Subscription''* Coefficient, shows a positive and statistically insignificant relationship with manufacturing Trade costs. The fixed broadband subscription has begun to be abandoned, especially in developed countries, because it's less flexible and therefore, the positive sign shows that in high economic

countries, security is extremely important in adopting ICT within the production process of the manufacturing sector.

Our first model *''Regulatory Authority''* Coefficient, shows a positive and statistically insignificant relationship with manufacturing Trade costs, which shows that the most comprehensive impact of a regulation measures the total burden it will impose on the economy due to net change in social cost and social welfare of new regulation.

The impact of regulations on resource allocation decisions now and in the future the societal worth of all commodities and services that are no longer produced or consumed it's the total of all the opportunity costs incurred as a result of the rule.

(Koprowicz 1986) They identify ''isolated partial equilibrium'' impacts on single firms in their assessment of the US (OSHA) and Administration consequences, such as rise in cost of manufacturing, which reduce the burden of regulations, profits, and wages, and improvement in worker safety, which includes compliance, familiarization and administrative with sanctions and enforcement.

In our first model, the *''Regulatory Mandate''* Coefficient shows a positive and statistically insignificant relationship with manufacturing Trade Costs; our results generally show the same environmental controls as larger polluting utilities but hit more severely with costs due to size and manufacturers carry a disproportionate burden of regulatory costs.

This research related to our findings (Batkins and Brannon 2013) the manufacturing business is scarcely under-regulated, with regulatory burdens totaling more than $350 billion and a dozen rulemakings ongoing. Even some certainty in the regulatory future could provide a desirable boost for manufacturers with stationary economic growth. To establish a regulatory framework, one option would be to simply classify the key elements of the President's executive order.

The *''Regulatory Regime''* Coefficient indicates a positive and statistically insignificant relationship with manufacturing Trade costs in our first model. In our last model, the regulatory regime coefficient shows a positive and statistically significant relationship with manufacturing Trade costs at a significant level of 10%. Our first model result shows that laws' complexity frequently leads to duplicative, poorly planned, and

consequently ineffective restrictions, which unnecessarily burden manufacturing operations.

Since the Great Recession, financial policies enacted by Congress to avoid another downturn has increased the regulatory burden on manufacturers. These regulations have made it more difficult for small manufacturers, who account for 90 percent of the country's quarter-million manufacturing firms, to borrow money.

Our last model results show that effective regulation is strategically created and implemented to have a favorable impact. Regulations are required, transparent, and cost-efficient. Current rules could be examined regularly to eliminate outdated and ineffective policies before new legislation is proposed. Manufacturers managing their roles with existing and forthcoming regulations might devote more resources to job creation, product development, and market expansion, resulting in increased innovation and productivity.

Our first model, *''Competitive Framework''* Coefficient, shows a negative and statistically insignificant relationship with manufacturing Trade Cost negative sign of the coefficient shows that no regulations have been removed. Manufacturers cannot focus on competitiveness and growth possibilities, which are factors that contribute to a thriving economy the sheer volume of new rules and policies. On the other hand, indirect "general equilibrium" effects were competitive advantages resulting from unequal regulatory influences among different companies and workers.

In our first and last model, the ''*Cybersecurity Index*'' Coefficient shows a negative and statistically significant relationship with manufacturing Trade costs at a substantial level of 1%. Our findings demonstrate that cyber security has a strong potential to become a crucial competitive and differentiating factor in the manufacturing markets. This can help cooperation when the leading company does not worry about losing its advantage.

Our first model, ''*Infrastructure''* Coefficient, shows a positive and statistically insignificant relationship with manufacturing Trade costs and shows that poor mobile coverage, lower network quality, and sluggish network rollouts are linked to high pricing according to the 'Impact of Spectrum Prices on Consumers' report. As a result of higher data pricing, the 'Effective Spectrum Pricing 'report estimates that,

Consumers across selected regions lost out on economic gains worth $250 billion. According to the report, consumers in these world regions are particularly hard hit by high costs Finally, who remains unconnected better spectrum pricing regulations in developing countries are required to enhance the lives of the billions of people.

CHAPTER 5

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Conclusion

The advancement in digitalization increases opportunities and challenges for developed and developing countries. Digital technologies expose new markets, forms of trade, and products, as well as lowering trade costs and changing trading procedures and also helps industries to increase productivity, evolution, and domestic competitiveness. They also help match consumer choice to products, verify the quality of products, and reduce trade costs by reducing transportation and storage costs. These costs have a major share in trade costs, and therefore their reduction has a potential impact on trade. The Digital Trade restrictiveness index plays an essential role in the low competence of Pakistani firms to adopt new technologies and deals with digital regulations for ICT goods, investments, digital facilities, and principles in the era of digitalization.

Moreover, in Pakistan, smaller businesses can contribute to exports and imports of the country, but exports and high regulations are usually a monetary burden. To ensure quality and achieve legitimate policy goals, standards for goods and services are established. Another barrier is increased trade costs, which shows that international flows have increased in relation to domestic ones. Thus it has become easier for the two partners to trade among themselves than to trade within their own countries' policy interferences intended to decrease such costs. This study examined Pakistan's digital trade economy barriers and regulatory gaps. Therefore, the objective is to remove barriers by investigating the digital technologies that promote digital trade and reduce associated costs. Further, it also examines regulatory gaps or requirements that Pakistan needs to address.

The main aim of this study is to analyze the cost of trade in the era of digitalization and explored different determinants of the trade cost for the agriculture and manufacturing sector of the economy using the ICT regulatory tracker, ICT development index indicators, cybersecurity index, infrastructure, and different other determinates, that will improve the digital trade system and reduce trade cost in Pakistan. Then in the second stage, the same analysis of trade costs is explored across countries. However, barriers and restrictions are the major hurdles every investor faces. So, for this purpose, the data sample used to comprise the trade cost of the Agriculture Sector and Manufacturing Sector of Pakistan and

37 countries lies on seven continents of the world except for Antarctica. Quantitatively analyze the effect of digital technology on the measured trade cost using a gravity model Following Novy (2013).

The objective of including both developing and developed countries is to examine the cost of trade in the digital era, both across countries and in Pakistan. Distance, border, FTA, RTA, ICT development index indicators, cybersecurity index, and infrastructure services are all used to determine trade costs. Agriculture trade cost has a more substantial impact than the manufacturing sector on digital trade cost. Trade policy and regulatory variations are the important components of trade costs in the agriculture and manufacturing sectors. Significantly, this factor describes. The significant share of trade costs between developing and developed economies.

Furthermore, the findings of this study also propose that trade policy has run-over effects across sectors. The study concluded that trade policies and trade regulations in the manufacturing and agriculture sectors are stricter. This is consistent with earlier research suggesting that regulatory measures like regional trade agreements, free trade agreements, and burdensome rules may directly affect trade costs. Similarly, tariffs and non-tariff trade barriers also affect trade in distribution and transportation services.

Lastly, we concluded that access to information and communication technology is essential for trade costs in the agriculture and manufacturing sectors, where its significance has also increased over time, emphasizing the role that digital delivers in these sectors.

5.2 Policy Recommendation

A reliable estimation of costs of international trade is necessary for policy evaluation. The Trade Cost explains how total trade costs have changed over time and their evaluation among countries and sectors. It is also important to understand which point policy actionable factors push these costs and how their composition differs among countries and sectors.

Based on this research study, here are some recommendations:

- Develop a digital trade strategy to guide trade negotiations and wider trade policy, setting out policy objectives and how it intends to achieve them. This will provide

coherence between domestic and international policy and provide clarity and predictability to businesses, workers, and citizens.

- Facilitating and promoting digital trade is important for the economies of all these countries; attention also needs to be paid to the protection and promotion of citizens' digital rights(including personal data protection and accountability of digital technologies), consumer protection (including promotion of safe and secure internet, and consumer redress for cross border digital transactions) promotion of a competitive and innovative digital economy, fair and effective taxation of digital economy and cybersecurity.

- The Pakistan Government should ensure its commitments in trade agreements are sufficiently robust to safeguard its ability to regulate new technologies and strike an appropriate balance between protecting companies' intellectual property and promoting other relevant public policy objectives, including access technology, market competition, and open-source software.

- Internet regulation ensures that commitments in an international trade agreement on the liability of online platforms are fully aligned with domestic laws and policies, particularly when it comes to moderation of online content and online harms. Pakistan should have a robust domestic regime that considers the relevant trade-offs before signing any commitments in future trade agreements that could restrict regulatory options.

- Specific regulation on consumer protection in the digital economy would foster digital trade by ensuring consumers can have legal certainty and ways to pursue redress, improving consumer trust in digital trade.

- A central requirement of the digital economy is skilled manpower for developing new digital platforms and industries and enabling workers and users to meet their technical requirements. Facilitating these activities requires significant investment in traditional education and government programs to oversee new educational programs and organizations.

- There is also a need for free trade and regional trade agreements with other countries to reduce trade costs and special attention is needed in the strategic approaches to introduce and apply digital technologies for smallholder and family farmers.

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Appendix

Countries Name	
Argentina	Japan
Australia	Latvia
Austria	Malaysia
Brazil	Mexico
Belgium	New Zealand
Canada	Norway
China	Pakistan
Colombia	Peru
Chile	Poland
Denmark	Portugal
Finland	Russia Federation
France	Slovenia
Germany	Spain South Africa
Greece	Spain
India	Sweden
Indonesia	Switzerland
Ireland	Turkey Thailand
Italy	Turkey
Japan	United Kingdom
Latvia	USA