IMPACT OF SANITARY AND PHYTO-SANITARY MEASURES ON TRADE OF PAKISTAN WITH EUROPEAN AND NORTH AMERICAN COUNTRIES.

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Impact of Sanitary and Phyto-sanitary Measures on Trade of Pakistan with European and North American countries.

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ABSTRACT

SPS measures have a very important role in bilateral exports. Non-tariff barriers are playing a major role in Pakistan's bilateral trade with both developed and developing countries, but they both have a promoting and a restricting impact. Other macroeconomic factors, such as trade partners' GDP and tariffs, have a substantial but negative impact on Pakistan's exports.

Yet this study highlights the impact of SPS in addition to tariff and other macroeconomic variables on Pakistan agriculture exports to European Union and North American countries from 2003 to 2018. This study makes use of macroeconomic variables such as exports, Pakistan's GDP, and trade partners' GDP and these variables are used to carry out estimations of model. SPS, tariffs and exchange rates are used as variables and were calculated using panel data at the HS 2 digit code level. The descriptive analysis between SPS and other macroeconomic variables on Pakistan agriculture exports to European Union and North American countries shows that Pakistan agriculture exports have trade restrictive effects. Panel data is used in this study by using some famous techniques, such as Sarjan j test and Panel unit root test. Thereafter, Housman test is used to seek favorable results. According to Housman test, random effect model is better than fixed effect model by rejecting the alternative hypothesis. There is some issue of endogeniety, therefore we used generalized method of moment which is developed by Arellano and bound in 1991. It shows the negative and statistically significant impact of SPS and tariff on Pakistan agriculture exports to European Union and North American countries. The proximate reason behind negative and significant impact is that partner countries have imposed cumulative sanitary and phytosanitary measures on Pakistan's export because the country fails to fulfill the SPS requirements. In order to increase exports, Pakistan's relevant ministries and institutions may improve trade policies and programs across all sectors.

Keywords: Sanitary and Phytosanitary, World Trade Organization, Tariff, Pakistan, European Union, North America.

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CHAPTER 1
INTRODUCTION

1.1 Background History

International trade allows countries to get access to markets for commodities and services that they would otherwise be unable to access markets if international trade not exist. Markets are becoming more competitive as a result of international trade, and pull down the prices as well in the reporting countries. But such trade pattern doesn't recognize in presence of tariff and non-tariff barriers. Diversified tariff rates have been levied severely across the world, until WTO asked its member states to either decrease or maintain the rates.

Non-tariff barriers are barriers to international trade; they might be protectionist harming importers, or non-protectionist, but nonetheless hamper international trade (Bao and Qui, 2010). Other than tariff, non-tariff measures (NTMs) are techniques which can affect international goods trade. They are increasingly limiting trade, posing a significant threat in terms of trade trends, volumes, and barriers. The WTO, for example, has a comprehensive list of NTMs, including TBT (technical barriers to trade), SPS (sanitary and phytosanitary), quota, and subsidy, among others.

Sanitary and phytosanitary agreements are commonly used by the World Trade Organization members to protect environment and interests of local producers and consumers. Precautions in term of sanitary and phytosanitary (SPS) are taken to protect humans, animals, and plants from sickness, pests, and toxins. One of the final papers approved at the end of the Uruguay Round of the Multilateral WTO Trade Negotiations in 1994[1] was an agreement on the use of sanitary and phytosanitary measures. The WTO administers the implementation of sanitary and phytosanitary agreement. These (SPS) restrictions have had a significant impact on the global trade. The members of WTO must maintain quality and standards of trade to ensure that goods are long-lasting and hygienic for customers, and that they are protected from the spread of insects or illnesses (WTO,

[1] GATT Agreement (1994)

Pakistan's export performance peaked in 2014 at 28.3 billion US dollars, according to the Pakistan Federal Bureau of Statistics, before dropping to 20.5 billion US dollars in 2016. Pakistan exports various goods including pharmaceuticals, textiles apparel, cotton, leather and garments, chemicals, rice and sporting goods. Pakistan's export destinations, therefore, are limited to a few major trading partners, mainly the United States of America (USA) and the European Union (EU). Currently, these countries account for more than 80% of exports. There are numerous other problems facing Pakistani exports, including currency instability against the US dollar, high tariff rates, and persistent increase of the Gross Domestic Product (GDP), as well as transportation and other associated costs with trade partners, all of which have a direct or indirect impact on exports. As a member of the World Trading Organization, Pakistani goods are constantly being notified by trade partners based on non-tariff barriers, which primarily focus on sanitary and phytosanitary (SPS) related product quality requirements. Hence, Pakistan needs concentrate on improving the quality and grade of exported items in order to increase exports.

World Trade Organizations' Article 205 deals with the SPS covenant that allows nations to define their standards. In such case, those laws are supposed to be based on scientific discoveries as well as enforced to this level that they are necessary for protection and health of human, herbivores or carnivores; they should not classify arbitrarily across nations with same situations (WTO, 2016). In order to protect health of humans and animals, the sanitary measures are often used, whereas the phytosanitary measures are seldom utilized to protect health of plant. In other words, such measures are meant to protect living organisms.

The SPS agreement covers a variety of issues, including protection against risks posed by supplements, pollutants, poison, or illness in food, which could endanger people's lives. The SPS methods are also employed to protect life of human being against animals or plants-transmitted ailments; and to protect fish and wildlife, as well as forests and vegetation, from insects and illnesses (UNCTAD, 2012).

Under the SPS Agreements, countries are entitled to impose restrictions to protection human health, animals, plants, the climate, biodiversity, and public safety, in accordance with WTO laws. In international scenario, non-tariff barriers will be crucial. (Disdier, Fontagn and Mimouni, 2008).

In sanitary and phytosanitary agreements, awareness has been raised to restrict trade in agriculture and food items. This might substantially hamper Pakistan's capacity to export agricultural and food products, particularly if it is unable to meet advanced countries' SPS requirements. Although it is argued that existing initiatives fail to solve many of Pakistan's fundamental challenges, efforts have been made to abate the distortive impacts of trade from SPS agreement (Mustafa and Ahmed, 2003).

Non-tariff measures (NTMs) which are obstacles to international trade, are referred to as non-tariff barriers (NTBs). These NTBs might be protective for foreign exporters at the expense of domestic exporters, or they can be non-protective but limit trade capacity. Non-tariff barriers are protectionist method that increase the expenses of exporting nations and makes trade development much arduous than tariff obstacles. Sanitary and phytosanitary agreements are technical non-tariff trade barriers negotiated by the World Trade Organization (WTO).

Tariffs and non-tariff measures have been widely implemented to protect home nations' failing production industries. Non-tariff barriers are non-monetary barriers implemented by importing countries. Unlike NTBs, tariffs are of monetary nature. These non-tariff barriers can be removed and are frequently discussed in accordance with international, multilateral, or free trade agreements. NTBs raise the cost of trade and are more difficult to eliminate than traditional tariffs.

Food safety issues in international trading are getting increasingly serious (WHO, 1998). In comparison to bulk grains, trade in regulated and fresh foodstuff is expanding. A considerable number of these goods require more care in order to avoid food safety hazards. The GATT 1994 (agreement) has reduced traditional trade barriers, implying that SPS measures will play a larger part in the determination of market access. The buyers in countries having higher incomes are less aware of risks with regard to food security and seek big assurances about handling of products. Similarly, a number of developed countries (DCs) alter their food safety regulations to place a greater emphasis on process control and risk prevention all over the process of manufacturing. Food product exporters will find it difficult to comply with food safety regulations as a result of these movements (Unnevehr, 2000).

Regional and global trade has become increasingly hampered as a result of these issues. The members uphold quality and standards of trade seeking safe supply of food for

the consumers and free of pests and diseases. To safeguard the benefits of domestic producers or maintain a competitive advantage, unnecessarily tight health and safety rules are used. However, bilateral and preferential trade liberalization policies were established and implemented, notably after WTO membership.

Pakistan Strategies Trade Policy Framework (STPT) 2015-18 examines Pakistan's present export performance and identifies concerns with items and regions where Pakistan falls short owing to inefficiency. Pakistan's exports have declined due to inefficient technology and standards. In addition, they establish specific trading objectives in order to increase trade performance and meet the $15 billion export value target by 2018 (Ministry of Commerce, 2016).

The proposed study examines regional and multilateral trade, as well as partner nations' adoption of SPS procedures for Pakistan's exporting commodities under the HS2 Section. WTO compliant tariffs are levies on manufactured goods that provide a cost advantage for producing identical goods locally. Good health, taxes or charges, labour standards, domestic subsidies and environmental standards inflicted on imports are all examples of non-tariff barriers (NTBs).

The implications of the SPS Agreement on Pakistan's agricultural and food exports are also examined in this study. The findings were evaluated to highlight the challenges Pakistan faces in satisfying SPS criteria, as well as how these challenges are addressed using the idea of SPS measures and the consistency assets accessible to Pakistan's government and inventory network. It discusses Pakistan's participation in the SPS Agreement as well as its concerns about how it is being implemented.

The study focuses on SPS measures, which are the most common kind of NTBs adopted by Pakistani and other governments throughout the world. It sets basic food security rules and health condition of plant and animals, as well as other standards such as licenses for import, checking protocols, testing and training specifications, packaging, and quarantine.

'WTO members should confine the implementation of SPS measures to G-90 nations and enhance the accuracy of SPS export requirements for G-90 agricultural commodities with specialized and financial support,' one of these components stated. Economists investigated the influence of SPS on trade flows. According to the Nile perch trade research (Henson and Mitullah, 2004), tougher food safety requirements in industrialized nations

have encouraged Kenyan exporters and the government to reform and improve (to enhance hygiene standards). Outside of this trade-oriented supply chain, as well as their deceptive trade practices.

If the only actual barrier is to protect domestic manufacturers from import competition, lowering this barrier would raise consumer welfare, diminish production welfare, and give net advantages in social security. Both consumers and producers might theoretically get profit, if customers compensate producers for removing arbitrary technical barriers. Protecting an industry from the costs of introducing a foreign plant infection or disease would diminish production welfare even further if a phytosanitary technological barrier could be removed.

Rashid & Hanif (2019) examined that The World Trade Organization (WTO) is the sole international organization that deals with international trade rules. WTO standards, on the other hand, help to ensure that these items are traded safely and that health-protection measures aren't utilized to shield domestic producers. In this light, the thesis seeks to answer two fundamental questions: how to work out SPS measure agreement and what are the problems and potential of SPS measures in terms of market access implications. The research method is based on inquisitive exploratory investigation. The Agreement on the Application of Sanitary and Phytosanitary Measures establishes the fundamental guidelines for food safety as well as animal and plant health standards. It gives countries the freedom to define their own standards. The SPS Agreement's major goal is to preserve every government's sovereign right to offer whatever level of health protection it considers essential, while also ensuring that these sovereign rights are not utilized for protectionist objectives or to erect unwarranted hurdles to international trade. While allowing states to retain proper sanitary and phytosanitary protection, the SPS Agreement limits the possibility of arbitrariness and supports consistent decision-making. It stipulates that sanitary and phytosanitary procedures be used solely to ensure food safety and the health of animals and plants. The agreement, in particular, specifies which factors should be considered when assessing the risk involved. Bangladesh is fully covered under the agreement. Measures to promote food safety and safeguard animal and plant health should be based on the study and assessment of objective and accurate scientific facts as much as feasible. The SPS Agreement urges states to put in place national SPS policies that are in conformity with international standards, guidelines, and recommendations. Harmonization is a term used to describe this process. Depending on the place of origin of the food, animal, or plant product

in question, sanitary and phytosanitary measures may differ. Such standards are not being developed by the WTO and will not be developed by the WTO.

The Pakistani Ministry of Commerce collaborated with standardizing organizations. Technical standards and testing assessments for the execution of SPS agreements for exporters and importers will be carried out by the Pakistan Standards and Quality Control Authority (PSQCA) as well as the Pakistan National Accreditation Council, both under the Ministry of Science and Technology. The bodies make technical standardized policies and programs. The body also gives recommendations to government organizations, industrialists, trade unions, and other stakeholders in order to increase industrial and agricultural yield and trade.

These organizations, such as the International Standard Organization (ISO) and the codex aliment arius[2], are also pivotal points for SPS for both domestic and global entities. The General Administration of Quality Supervision, Inspection, and Quarantine China is the quality benchmarks connected NTBs enquiring and providing experts. Traders, manufacturers, and exporters must be listed with these organizations in order to ensure that SPS notifications are implemented and responded (Hera, Shafique and Mustafa, 2017).

This study has examined bilateral trade between Pakistan and its exporting partners using a conventional trade gravity model and empirically examines the implementation of SPS deals initiated and enforced by Pakistan's export partners. This study has also looked at the impact of tariffs and technical non-tariff trade barriers on Pakistani exports, as well as, which export partner's trade barriers have the greatest impact on Pakistani exports.

During the period 2003-2018, the study has examined at the influence of non-tariff barriers on exports as well as other factors such as Pakistan's GDP and its trade partners' GDP, currency rate, and tariff rate of all Harmonized System (HS) sector level goods items between Pakistan and its top export partner nations. These policies are likely to both restrict and boost country trade. If the impacted country complies with WTO product requirements, their export volume may increase. Some policy proposals for improving product quality and standards are offered, which may be useful to exporters and policymakers.

[2] ISO and Codex Aliment Arius are international standard organization which provides the type of quality of products which imports to other countries.

1.2 Objective of the Study

The SPS is a trade barrier that mostly impacts developing countries exporters. Simply implementing SPS in trade can limit a country's trade volume; traditionally, developed countries have initiated this barrier to administer their trade volume.

This research has the following objectives:

- Analyse the impact of SPS measures on the extent to which SPS measures impede agriculture exports of Pakistan with the selected trading partners.
- Compare impacts of SPS cases initiations by the European and North American countries against agriculture exports of Pakistan.
- Examine the impact of tariff on agriculture export of Pakistan to the selected regions.

1.3 Delamination of the study

- In this research exporting country is only Pakistan.
- SPS are not only non-tariff barriers, which can influence agriculture export; there are other NTBs that can use in future research, which can influence the agriculture export.
- In this research only Pakistan's 19 exporting countries are included.

1.4 Hypothesis

$H0_a$: There is no impact of the sanitary and phytosanitary measures on agriculture export of Pakistan.

$H1_a$: There is an impact of sanitary and phytosanitory measures on agriculture export of Pakistan.

$H0_b$: There is no impact of tariff on agriculture exports of Pakistan

$H1_b$: There is the impact of tariff on agriculture exports of Pakistan

1.5 Research Question

- R1: What extent SPS measures have impeded on agriculture exports of Pakistan to selected region?
- R2: How does tariff affect Pakistan agriculture exports to selected region?

- R3: What does impact of SPS cases initiations by the selected countries?

1.6 Significance of the Study

Lot of research has been conducted on tariff and non-tariff measures impact on agriculture exports and some of them also measure the effect of tariff on agriculture exports of Pakistan. This is the first study who focuses on combine effect of SPS and tariff on agriculture exports of Pakistan of selected region to European and North American nations. In this analysis, the available recent data from 2003 to 2018 is deployed. Academicians will have a better understanding of SPS as well as information on agricultural product trading as a result of this research.

1.7 Research Problem

Pakistan exports mostly decline due to quality and standards in agriculture sectors. European Union and North American countries have imposed complex and complicated SPS measures on Pakistan’s agriculture exports because the country fails to meet SPS requirements. Developed countries impose strict trade barriers on developing countries to restrict trade. Most of the researchers conclude that sanitary and phytosanitary interventions, as well as technological trade barriers imposed by trade partners on exporters' goods, reduce the amount of trade between exporting countries. While other studies have shown that trade barriers have together trade restriction effects and export promotions, both impact on exports is dependent on the country's level of growth. To meet the SPS requirements, Pakistan have to adopt SPS criteria. SPS standards are increasing day by day, because of this Pakistan exports capacity charges are increasing.

1.8 Plan of the Study

The study is organized as follows: Chapter 1 is the thesis introduction, which also includes the research objectives. The second chapter is devoted to a review of the literature. The historical trade pattern of Pakistan is discussed in Chapter 3, and the study approach, which includes an econometric model and estimating methodologies, is explained in Chapter 4. A description of selected variables is included in Chapter 5. The outcomes of variables are interpreted in Chapter 6. The study's conclusion and recommendations are forwarded in Chapter 7. Finally, references to the sources used in the research are provided. The study's additional information is given in different appendices.

CHAPTER 02

LITERATURE REVIEW

2.1. Introduction

The chapter involves the examination of international empirical studies to determine the effects of sanitary and phytosanitary measures (SPS) enforced on agricultural products. Sanitary and phytosanitary measures are used to shield animal, plant, and human being from the dangers posed by additives, pollutants, poisons, or disease-causing organisms. SPS measures have a variety of effects on trade; for example, production cost will increase through these types of merchandise standard necessities, but they also act as a main quality sign, helping countries with exportable items that fulfill great standards. Non-tariff barriers are merchandises quality regulations, it increases consumer trust and self-confidence in foreign products' quality. SPS standards necessitate investment in technology upgrades to meet foreign requirements, which aid in increasing production and exports. Many theoretical and empirical researches have indicated that SPS measures have an impact on trade. The gravity model of bilateral trade can be used to determine the relationship between non-tariff and tariff obstacles to trade.

Even there is inconsistency between the results of several studies founded on the effects of NTB in emerging and industrialised nations. The HS Code system was utilized in the literature to determine the relationship between these non-tariff barriers and bilateral goods exports. On the influence of non-tariff barriers on trade many researches have been conducted at the international level, but only a few have been conducted at the national level. In Pakistan, there is currently a need for research and innovation in terms of product standard and quality so that policymakers may establish effective agriculture policies and deal effectively with sanitary and phytosanitary barriers to trade, as well as tariffs.

2.2 Theoretical Review

For trade models, the literature gravity model is often utilized. Tinbergen (1962) first proposes a gravity model of trade, states that the economies scope and distance from one another between two countries is measured the volume of trade; where their trade is

positively related to their GDPs, but negatively related to their distance apart. Distance between trading partners indicates their trade costs, which will reduce the number of exporters (Melitz, 2003). The trade cost is classified by Anderson and Van Wincoop (2003) into distance and other border effects. Language, demographic, and cultural boundaries all contribute to the border effect. Later, border effects between trading partners include tariff and non-tariff barriers. In their book, Kurgman *et al.* (2012) demonstrate the gravity model relationship and its importance in international trade.

In a competitive global market, sanitary and phytosanitary (SPS) measures play a critical role in product demand. These standards raise the elasticity of demand for alternatives of similar items, altering international trade dynamics (Harrison, *et al.* 1996). Sanitary and phytosanitary (SPS) measures are now required characteristics of traded products, bringing standardized items closer to becoming interchangeable. As a result of standardization, demand for imported goods has become more elastic (Baldwin *et al.*, 2000).

The Pakistan National Accreditation Council (PNAC) and Pakistan Standard and Quality Control Authority (PSQCA) must inform exporters about health-related obligations. Exporters benefit from the delivery of information on higher requirements to farmers and the provision of financial aid. Farmers' training in terms of meeting criteria increases their trading volume. Seminars and conferences could be held to raise awareness among farmers and exporters about product updates and to educate scientists about WTO standards using electronic and print media. They claim that the main NTBs that cause food rejection include unsanitary product conditions, the presence of viral germs, and erroneous food labeling. Inquiry points for sanitary and phytosanitary (SPS) measures in Pakistan may emerge, so that they can provide technical advice to exporters regarding WTO-notified standards, as well as receive input from exporters and transmit their complaints to international forums (Khan and Saqib, 2004).

According to theoretical research, SPS imposes additional product standard compliance expenses on exporters, raising trade costs. The negative consequences of these compliance costs on exported items vary, depending on exporting enterprises, exported products, and total trade volume. In most of the developing countries, trade costs are mostly attributable to the presence of inefficient technology in the manufacturing process,

which necessitates time for the adaption of new production processes, as well as deficient product certification procedures (Schlueter *et al.*, 2009).

The sanitary and phytosanitary measures influence are trade obstacles on exports and trade in various regions is revealed in certain literature. In the production of agricultural products, Pakistan has a potential comparative advantage over developing countries. However, it is contingent on the agriculture sector's capacity to meet consumer demand among trading partners, while adhering to quality standards requirements. If Pakistan does not fully comply with the sanitary criteria for exporting products, Pakistan's agricultural trade could be severely hampered in the future. Exporters and officials in Pakistan should actively engage in WTO sponsored conferences and seminars on product standard policies. At the national level, testing equipment and methods require more attention, as well as possible laboratory financing. To reduce the negative effects of NTBs, information dissemination to farmers on high product quality standards could be strengthened, financial aid could be enhanced, and farmers should be trained on how to meet these standards. It is necessary to hold conferences, seminars, and trainings to educate scholars, policymakers, farmers, and other stakeholders about various aspects of the WTO (Mustafa and Ahmad, 2003).

Non-tariff barriers (NTBs) are routinely used by almost all the countries to ensure the safety of people and goods. Non-tariff barriers (NTBs) are regularly used by Pakistan's trading partners on Pakistani goods. Pakistan utilizes non-tariff barriers to protect local farmers, primarily on agricultural imports. Non-tariff barriers are used by trade partners as a protectionist tactic to stimulate and defend local manufacturing businesses. Because Pakistan's export volume is primarily comprised of agricultural products, the presence of significant trade obstacles erected by trading partners has a negative impact on the country's overall export volume. The comparative effect of non-tariff trade barriers indicates that Pakistani trade obstacles completely prohibit imported items that do not meet international quality standards, whilst other trading countries use non-tariff barriers to raise the cost of doing business for importers in their country. This has a negative influence on Pakistani exporters, as they are unable to acquire a competitive advantage in the agricultural sector in other nations. As a result, Pakistan's export production costs rise, making it more expensive for foreign buyers (Kayani and Shah, 2014).

2.3. Empirical Review of Studies at International Level

Agricultural exports in African countries are discouraged by sanitary and phytosanitary regulations. A survey of Codex Alimentarius members was used to investigate this analysis. The results suggest that during product inspection at borders, 57 percent of merchandised products were rejected due to the presence of microbiological and contaminated chemicals in product revels. Before exporting these countries, they must pass food inspection testing. Although all of these countries, analyze food goods before exporting them to other markets, the testing technique may be inefficient due to cost restrictions (Mutasa and Nyamandi, 1998).

Non-tariff barriers (NTBs) are obstacles that limit a company's or a country's capacity to export. Tariffs have a less impact on trade than non-tariff barriers. Non-tariff barriers (NTB) are reducing the export of emerging nations like European Union countries and Iran, when related to tariffs. Iran is weak to meet demand for the agricultural foodstuffs due to poor packaging, labeling, quality and product values. Exports and global demand for agricultural products are expanding, with an emphasis on product quality, packaging, labeling, and standards. These features must be taken into account by policymakers in agricultural exporting countries like Iran. As a result, if Iran develops modern production processes, its agricultural exports will rise (Ardakani et al., 2009).

Non-tariff barriers (NTBs) are more vulnerable in developing nations due to non-tariff with sanitary and technical requirements in agriculture, textiles, food, iron, steel and garments. These products are top most exporting, and non-compliance with standards and caused in a decrease in export volume in these industries, affecting the entire volume of trade in emerging nations (Bora, Kuwahara and Laird, 2002).

In bilateral trade, the sanitary and phytosanitary (SPS) measures are increasingly being used as commercial policy instruments. However, the question of quantifying these hurdles had never been addressed before, and no such tool for helping trading had been developed. Exporters are unable to predict the effectiveness of these non-tariff barriers (NTB), which impose additional export costs on developing-country exporters despite satisfying mandatory criteria, and result in market failures in the nations affected. Later, Beghin and Breau (2001) give a quantitative instrument and method for examining the impact of non-tariff trade barriers. They present an inventory strategy for quantifying the effect of non-tariff fences on a specific product in bilateral trade, which includes frequency index and coverage ratio methodologies. The effect of these obstacles on trade flows, economic efficiency, market equilibrium, and consumer wellbeing is the emphasis of their

methodology.Non-tariff barriers (NTBs) have a negative impact on Ecuadorian exporters according to Wong (2008). To obtain export data that is affected by SPS rules, they use interview and survey methods. Their calculations suggest that the SPS policy has a significant negative impact on some Ecuadorian small farmers who do not receive any technical assistance. The main challenges in complying with non-tariff regulations are the high cost of compliance and budget constraints. Medium and large producers have higher productivity than in small producers.

Technical non-tariff barriers have a considerable and negative influence on agricultural products supplied to developed countries by emerging and least developing countries (HS6-digit level). After adopting hygienic standards in their export and imported goods, the trade volume of developed countries increases. Their export volume increases as a result of improved product standards education, cooperative marketing groups, and strict adherence to standards. Exporters that adhere to WTO product standards will be able to access better, more profitable market prospects, as well as increase the productivity of their export products and their proportion of overall export volume. According to econometric findings, the impact of SPS regulations on trade varies between industrialized, developing, and least developed countries. Because such measures have a detrimental impact on developing and LDC agriculture trade due to agrochemicals and a lack of farmer understanding about sanitary and phytosanitary standards, improving the hazard of food refusal, they propose that technical help and special action concerning SPS contracts be provided to emerging and LDC nations in order to maintain product quality standards, implement, and enforce SPS agreements and take advantage of the agreements (Disdier *et al.,* 2008).

Alaeibakhsh and Ardakani (2012) investigated the impact of sanitary and phytosanitary (SPS) regulations on EU Trade. Non-tariff barriers are widely used by European Union (EU) countries against imports, causing significant trade volume losses for importers from Africa and the Caribbean. Iran has reduced its agricultural exports to European Union countries due to a lack of sanitary and phytosanitary (SPS) compliance. They can enhance agricultural product exports after developing production techniques. Research initiatives should be funded in order to evaluate the trade impact of non-tariff barriers, which will aid decision-making. In contrast to earlier research, this paper uses a gravity model to quantify the trade impact of SPS and TBT rules on Pistachio exports from Iran. The findings indicate that these metrics have a negative influence on pistachio

exports from Iran. The export and global demand for agricultural products place a premium on product quality, packaging, labelling, and standards. Policymakers in agricultural exporting countries, such as Iran, must take such traits into account while developing their policies. As a result, if Iran develops modern production processes, its agricultural exports will expand.

For the years 1997 to 2010, Bianco *et al*. (2016) empirically study the effects of trade barriers on global exports, including sanitary and phytosanitary (SPS) regulations. Poison was estimated using pseudo-maximum likelihood methods. Their findings demonstrate that the sanitary and phyto-sanitary (SPS) procedures not appear to block transfers; technical obstacles have a variable impact on trade due to labeling restrictions implemented to verify the existence of compounds that may cause allergic responses. SPS and TBT restrictions are extensively used non-tariff obstacles (NTBs) by various nations, according to the World Trade report (2012) as compared to the tariff. Not only do non-tariff restrictions for goods stifle trade, but they also stifle trade in services, according to the paper. Tariffs, TBTs, and SPS measures in goods and services are significantly reduced as a result of trade liberalisation. Non-tariff barriers (NTBs) are significantly more trade restrictive than tariffs, according to the estimates. TBTs have beneficial trade benefits in more technologically sophisticated industries, whereas they have negative trade consequences in agriculture. Using the maximum doses of pesticides on items to meet SPS requirements has a negative impact on agricultural. Our findings show, which rules have a negative impact on trade, which is useful information for policymakers participating in trade discussions. Technical obstacles have a variable influence on trade, but SPS measures do not appear to block exports. More rigorous technical obstacles have largely compensated for a downward trend in tariffs. Overall, frictions in the global wine trade have remained unchanged during the last 15 years.

Harmonization of technical non-tariff barriers (sanitary and phytosanitary measures) with other regions is critical for any country's trade prospects; agricultural merchandises are frequently forbidden owing to non-compliance with sanitary and phytosanitary standards. In recent times, the European Union has refused to approve imported agricultural biotechnology goods from the US due to the presence of hormones altering chemicals and many germs in meat, citing SPS procedures. Following international product standards, the United States' exports to the European Union have increased (Johnson, 2014).

Brenton *et al.* (2001) found that regions, where technical barriers are low are more likely to lead to increased trade within the European Union. They discovered that a number of trade costs, such as infrastructure efficiency, tariffs, and transportation costs, have a huge impact on international trade patterns. When examining the differential effects of trade on economic growth and investment based on cross-country data, the positive impact of trade on economic growth has been consistently demonstrated, with differences in the size of FDI- and domestic investment countries as the key factors. The void, according to Eaton and Kortum (2018), is the foundation for developing a gravity model. The greater the gap, the higher the supplier's supply prices are, which is supposed to lower the export value. This claim must be checked, and the true cost of trade logistics must be determined.

Governments all around the world have recently replaced tariff and quota obstacles with non-tariff barriers. Non-tariff barriers, such as sanitary and phytosanitary (SPS) controls, have a minor impact on overall export diversification. Firms and exporters face increased compliance costs as a result of these non-tariff barriers. Only a small number of exporting enterprises can afford that cost and thrive in the market, therefore these trade obstacles have a greater impact on small exporting enterprises. The behavior of exporters in the face of non-tariff barriers was previously explained in Melitz's (2003) model. However, the impact of these trade obstacles does not manifest itself in a year's time; after a period of time, the behavior of exporters and enterprises may be plainly noticed. For export growth, the nation's own national trade policy and organized framework are more crucial. In order to enhance exports in developing nations, struggles should be made not just to eliminate external trade fences like sanitary and phytosanitary (SPS), but also to eliminate local trade restrictions (Besedina, 2015).

Beverelli *et al.* (2014) look at the SPS Specific Trade Concern (STC) and the tariffs that have been levied in the past. The findings reveal that sample substitution remains true for both rich and developing economies when it comes to SPS. Slower economic growth may increase the requirement for financial assistance to domestic producers, according to GDP growth. Because wealthier countries have greater regulatory capacity, high level of GDP per-capita involves to the higher likelihood of facing an STC. Jiang (2008) investigates the relationship between China's exports, and tariff and non-tariff barriers. As a result of NTBs, textile items have expanded, and market shares have increased in comparison to tariffs.

Beghin and Bureau (2001) looked at the methodologies used to model and quantify non-tariff trade barriers in the agricultural and alimentary sectors. The research looks at hygiene, phytosanitary, and technological regulations that can influence trade. The paper discusses strategies for providing a quantitative evaluation of how trade barriers influence market trade balance, economic performance, and welfare. Future applied research areas are being considered.

Large real exchange rate swings, according to Feenstra (1989), can have a comparable impact on business revenues and survival (entry and departure) as large tariff adjustments. According to Harris (2001), the considerable depreciation of the Canadian dollar in the 1990s may have widened the productivity gap between Canada and the United States by raising the cost of investment products, extending the innovation gap, and reducing creative destruction. Yan (2002) explained that real exchange rate movements occur one to two years ahead of changes in the US-Canada productivity divergence, meaning that exchange rate movements can effect relative productivity growth. The mechanism through which exchange rate fluctuations affect business sales and survival, as well as industry productivity, is uncertain.

Trefler (2004) looked at the significant consequences of minor tariff shifts. He discovered that the FTA resulted in a 12% reduction in jobs in the most import-competing industries and a 14% rise in plant productivity in the most export-oriented industries. If these comparatively smaller tariff reductions had a significant impact on business efficiency, it's fair to assume that the much larger exchange rate fluctuations had a similar impact. According to Fung (2006), "our empirical research examines whether an increase in the exchange rate decreases the likelihood of company survival and lowers the entry rate of firms into a sector."

Hermawan (2019) looked at ASEAN rice non-tariff measures (NTMs) and how they affect food safety. However, to decide whether non-tariff measures support or hinder rice trade in ASEAN nations, the Gravity Model with the Pseudo Poisson Maximum Likelihood (PPML) technique was used. NTM equivalents were calculated using indirect ad valorem methods. They also used the gravity model result to the Global Trade Analysis Project (GTAP) model, 19 industries and 16 countries combined a standard GTAP model to analyze the impact of ASEAN rice NTM on Indonesian food security. Based on a tariff equivalency calculation and the impact of ASEAN rice NTMs on Indonesian food security, the highest rice NTMs were found in Brunei Darussalam, Thailand, and

Cambodia. Even though NTMs in rice will increase rice availability and accessibility, as well as rice production. Within NTMs, open trade and liberalization policies existed. When temporarily enforcing NTMs on rice, the government should be careful and sensitive. Based on an estimate of tariff equivalent computation, the results showed that (a) Brunei Darussalam, Thailand, and Cambodia have the highest rice NTMs, and (b) implementing ASEAN rice NTMs has a detrimental impact on Indonesian food security. Despite the fact that rice NTMs will increase rice supply, particularly in rice production, they would have a negative impact on its utility and accessibility. The government should be intelligent and cautious in imposing rice NTMs as a transitory policy because there was a trade-off between NTMs and trade liberalization strategy.

Santeramo and Lamonaca (2018) investigated the effect of non-tariff policies on the African agriculture food sector's trade efficiency. The shared interest of politicians and instructors in (NTMs) has prompted a rising body of writings to examine their effect on African countries' agri-food trade. However, there is some evidence that NTMs are a financial roadblock. According to some reports, they may act as a trade stimulant. Significant conclusions could be drawn if the drivers and existing differentiating effects were better understood. Governments all over the world are increasingly replacing traditional commercial policy frameworks like tariffs and quotas with non-tariff barriers (NTB) instruments, according to Besedina (2015). They addressed how the introduction of two types of non-tariff policies would affect exporters in different countries. According to the heterogeneous model trade theory, any increase in export costs would lead some firms to stop exporting, resulting in a decrease in the number of exporting firms and goods. They tested this forecast, which is dominated by other factors affecting export dynamics, using two main data sources. In contrast to previous research, the findings have little effect on export concentration and entry in relation to the implementation of NTBs (Melitz, 2003)

The impact of SPS steps on the role of trade intermediaries and China's agricultural exports was investigated by Gibson and Wang (2018). This system opposes China's promotion at the WTO. As SPS regulations and agricultural exports have increased, the use of commercial mediators has decreased dramatically. At the heterogeneous producer stage, they have created an export model that is reliable with this template. They looked at the impact of SPS measures and trade intermediaries in customs transactional data on Chinese vegetable and fruit exports in their econometric study. There are some indicators

that SPS policies, commercial intermediaries, and exports have a positive effect, contrary to much of the literature.

Murina and Nicita (2014) explored how (SPS) measures have an effect on the capability of lower-income countries to export to the EU. SPS cost of execution varies widely between countries, and product standards are more trade preventive for low-income nations than high- and middle-income nations, because of absence of technical and fiscal support needed to obey with WTO regulations. They also advised providing focused technical support to low-income countries, which might result in significant dividends for these countries. The impact of the European Union's sanitary and phytosanitary (SPS) rules on 21 main categories of agricultural goods is investigated using an econometric model. The findings show that SPS regulations impose a disproportionately high burden on low-income nations, but that membership in deep trade agreements appears to alleviate the challenges associated with SPS compliance. Overall, the additional trade distortionary effect of the European Union SPS regulations is estimated to be a 3 billion dollar drop in agricultural exports from low-income nations (equivalent to about 14 percent of the agricultural trade from lower income countries to the European Union). These findings support the concept that, whereas many middle and high-income nations have the internal capacity to comply with SPS requirements, lower-income countries lack this capacity. In a larger sense, these findings suggest that technical support can help lower-income nations meet the compliance costs associated with SPS policies.

Fontagne et al. (2015) examine the trade effect of (SPS) measures on trade limits for a wide section of United States enterprises on the same grounds. According to the OLS estimate approach, the SPS measure reduces small company trade values by 22%. The EU voiced concerned that the United States plant and Animal Health Assessment Service demanded that just pesticides made in the United States be recycled during production that is not allowed within the EU. Certain insects are used to shield crops in the EU, on the other hand, were not allowed into the United States. Sanitary and phytosanitary (SPS) regulations stifle trade more than tariffs do.

In the outcome of the Uruguay Round Agreement on Agriculture, Gebrehiwet, Ngqangweni, and Kirsten (2007) estimated that strict SPS had multiplied (URAA, 1994). These were quickly becoming a major impediment to developing country agricultural trade. In addition to being limited by a lack of expertise, these countries also have a poor relationship with SPS, which prevents them from expressing their preferences and

concerns in the development of international agricultural standards. They used a gravity model to calculate the impact of entire affiliation levels established by 5 OECD countries (Germany, Sweden Italy, Ireland and United States) on trade in South African food exports.

The results backed up the theory that strict SPS requirements were severely do. The aflatoxin norm has a trade elasticity of 0.41, which is statistically important. Furthermore, relying on the hypothesis that these 5 OECD nations follow CODEX's whole aflatoxin level recommendation, the simulation result would have increased an extra measure of US$ 69 million from 1995 to 1999.

Grant and Arita (2017) used detailed information from the SPS to analyse the NTM issues that exporters face. For the period 1995-2014, they defined the character and duration of these acts in each country, commodity, and specific class of NTMs. According to their findings, developed countries have a significant role to play in communicating specific issues, whereas developing country warnings have increased. The findings suggest that the WTO's mechanism for discussing SPS trade issues can aid in resolving SPS concerns, and that progress is often contingent on the nature of the issue and members' involvement in the matter or retaining the measurability.

Klingbeil and Todd (2018) addressed the international standard, with a focus on the Middle East and Northern Africa (MENA) area, coercion, and/or chances for the agri-food industry in emerging nations. In terms of food security and control structures, there is a major gap between MENA countries and developed countries. This has a positive impact on the protection of fresh and agricultural goods, which stymies global food trade development. In order to overcome private and legal standards, food security should be a national primacy in MENA countries for maintainable farming development. Domestic governments played a key role in implementing the vision to develop and allow the application of domestic Good Agricultural Practices standards that are consistent to international desires and tailored to domestic policies and the environment. Together, private and public investment creates the expertise and organization needed to improve the safety and efficiency of the agri-food supply chain.

Andersson (2018) looked at the effect of SPS on EU exports. Since WTO work has restricted the likelihood of rising the limits on conventional trade as customs tariffs, protectionism has expanded globally, opening up debates and studies on non-tariff

enterprise. Non-tariff policies and administrative standards subsequently motivated policymakers. The aim of this study is to see whether non-tariff measures, especially (SPS) measures, have harmed trade between 2002 and 2017. The importer imposes SPS measures on these products in order to investigate, and the consequences of EU agri-food exports are investigated. The results are obtained by using the maximum likelihood and pseudo-poison to measure the trade model. The data covered EU agri-food exports to 122 countries from 2002 to 2017. In this report, there is no decrease in EU exports. The results, on the other hand, are generally marginal and cannot be concluded without a clear conclusion. Despite this, there is evidence that as the SPS measures take effect, trade with low-income countries is declining. There is, however, substantial evidence of a drop in exports to low-income nations as a result of SPS regulations.

Disdier *et al.* (2008) observed the distortive effect of SPS measures on agricultural exports by members of the Organization for Economic Co-operation and Development (OECD), finding that SPS measures substantially reduce developed countries' exports to OECD countries, while having no effect on trade between OECD members. SPS measures imposed on the Egyptian exports, according to Hoda et al. (2016), have a detrimental impact on the chance of exporting new commodities to a new destination. These findings have implications for developing countries' export profits and incomes. They also have an impact on their efforts to reduce poverty, unemployment, and reliance on small-scale farmers in order to achieve more sustainable development. According to the inventory method, European countries have among of the lowest coverage ratios of all the OECD countries. We also calculate their stringency using a gravity equation. Our findings imply that they lower developing nations' exports to the OECD countries while having no effect on trade among OECD members. Furthermore, SPS and TBTs have a greater negative impact on European imports than on imports from other OECD nations.

According to Ganslandt and Markusen (2001), SPS requirements restrict the ability of developing countries to export agricultural and food products to industrialized countries. This serves to demonstrate that rich countries often take more stringent SPS measures than developing countries, and that most developing countries' SPS control systems are inadequate and fragmented. Furthermore, in some circumstances, the SPS criteria are incompatible with the developing countries' existing industrial methods. As a result, significant legal and organizational adjustments will be required to comply with the applicable measures. On the other hand, access to important scientific and technology

resources is a critical issue that must be addressed. Indeed, understanding of SPS issues is poor in many developing countries, both within government and within the food supply chain, which may indicate that the skills required to appropriately evaluate the solutions are also missing. Despite the conclusions of many studies to the contrary, it's also worth noting that SPS actions can benefit both domestic and overseas providers.

According to Maertens and Swinnen (2009), SPS laws have compelled producers/exporters to spend in product upgrading as demand for high-quality commodities has grown, allowing them to secure wider market access for their agricultural products. These findings suggest that, while exporters may initially experience some enforcement costs, these costs can be stabilized over time, allowing them to grow their export volumes to abroad markets. In reality, an exporter must achieve specific standards before a product may reach any market. In most cases where SPS steps were shown to boost trade levels, they used a single standard requirement as part of their research.

Michael and Jensen (2002) investigated the SPS in agricultural product. They were introduced to confirm that food is harmless for users and to avoid the spread of diseases and pests among plants and animals. It can, however, be utilized as a protective device to keep overseas investors out. The world trade organization SPS agreement was established to differentiate these two positions. The conclusion is that, while developing countries demand such an efficient agreement, they face many challenges in putting it into practice. While most countries lack the necessary human, financial, and technical resources to use the agreement, it appears to have clear benefits for some large middle-income countries. The least developed countries bear a disproportionate share of the SPS agreement's implementation costs.

The North American Free Trade Agreement imposed the most sanitary and phytosanitary regulations, technical trade barriers, anti-dumping, countervailing, and special safeguards of any trade agreement. The ASEAN trading group, on the other hand, adopted a greater number of protections and quantitative constraints. Higher tariff rate quotas and export subsidies were imposed by the European Free Trade Area, Common Market of the South, and South American Regional Economic Organization trading blocs, respectively. India offered indigenous goods a higher price advantage. Higher tariffs were applied by the United States and the European Union on both farm and non-agricultural products. Except for South Korea and Switzerland, the majority of countries' Agricultural Orientation Index (AOI) is less than unity, indicating that agriculture is not given priority

in budget allocation. These findings will have a substantial impact on international trade talks, trading regulations, WTO agreements, policies, and initiatives, and multilateral agreement.

Chobanova (2018) analyzed that the most significant global concerns is managing economic globalization so as to encourage trade without compromising food safety or the protection of human, animal, and plant health. The management and avoidance of health and safety concerns, as well as the avoidance of unnecessary barriers to international trade flows, require close cooperation among national regulators and policies. The role of several techniques for attaining regulatory cooperation in the context of sanitary and phytosanitary (SPS) measures at both the international and regional levels is examined and compared in this study. It examined the successes and problems of global SPS regulatory cooperation, with a focus on the role of the World Trade Organization's (WTO) SPS Committee. These efforts are in line with regional cooperative efforts, such as the ambitious nature of recent mega-regional trade agreements. Following that, the chapter looks into the possibilities of multilatering the lessons learned from these regional regulatory convergence programs in order to improve WTO cooperation.

The most significant technological barriers to trade in healthcare and SPS, as well as food safety, were defined by Orden and Roberts (1997). This has been addressed in a variety of forms in recent trade agreements. The agricultural terms of the Uruguay Round trade Agreements (URA) are set against a backdrop of non-tariff obstacles and reduced tariffs. The "Sanitary and Phyto-sanitary Measurement Agreements" and "Technical Barriers to Trade Agreement" clauses in the Uruguay Round ensure that SPS-based import controls are more scientifically consistent and theoretically less arbitrary. In the context of SPS research and other technical challenges, case studies were also conducted.

The effect of increasingly common phytosanitary laws on production and trade flows was studied by Roberts and Order (1995). The European Regulation on the Maximum Chemical Residual Generated by Tobacco with Malefic Hydrazine in Cigarettes is the case in point. The paper shows replications of the impacts of tightening European Union controls on the manufacturing industries and tobacco. The study focuses on the market relations between input and output, as well as the substitution of non-US residue for residue contaminated US supply.

As a result of the increased costs, the finished product supply was limited, and U.S. cigarettes were priced higher in Europe. Cross-price impacts leads to the greater EU cigarette sales and, as a result, improved the use of all contributions, comprising US tobacco. If the price of tobacco in the United States can decrease, the direct price impacts in the EU-based market for US tobacco are caused. Despite the protectionist controls on the export market, EU imports of residue-contaminated goods have increased. When the price of US tobacco fluctuates, the law could be anti-protective to EU farmers. The law also has an indirect impact on cigarette producers in the United States.

According to Aleaibakhsh and Ardakani (2012), countries are expected to adapt the rules of the SPS and TBT Agreements to protect human, plant and animal health plus the climate, biodiversity, and human security, under the World Trade Organization (WTO). These requirements are now posing a significant barrier to the food and agricultural trade of developing countries. In contrast to previous studies, this paper uses a gravity model to estimate the trade effects of TBT and SPS regulations on the exportation of pistachios from Iran. Exports of Iranian pistachios are negatively affected by these metrics. Policymakers in countries that export agricultural products, such as Iran, must consider these characteristics when developing their programmers. As a result, when Iran develops modern production systems, it will increase its agricultural exports.

According to Dastagiri, and Sindhuja (2021), trading block is a group of countries in a certain region that manages and promotes trade. The current state of agricultural subsidies, tariffs, and non-tariff measures among WTO members raises important trade policy challenges. The research provides a quantitative analysis and framework of the geopolitical impact of WTO policies on the major regional trading blocs and global agriculture. In terms of total support estimates, the Association of Southeast Asian Nations (ASEAN) trading blocs were the most supportive of the agricultural sector, followed by the South Asian Free Trade Area, while producer support estimates showed the opposite pattern.

Fresh foods are in high demand and have few conventional trade obstacles, according to Lauri (2000). As a result, it represents a significant opportunity for LDC exporters. Fresh food products contribute for the half of entire food and agricultural exports from LDCs to high-income nations. However, as a result of health regulations, these products could face increased risks to food safety as well as potential trade barriers.

They looked at the challenges and issues that LDCs face when it comes to meeting export food safety regulations.

According to Makstutis *et al.* (2012), export levels are causally related to GDP levels. Accepting this dependence, however, is difficult. Exports are the foundation of GDP for poor or resource-dependent countries. If the state succeeds in maintaining a minimum constant share of exports in GDP under these conditions, the amount of GDP will increase. On the other hand, an increase in the main economic indicator will increase domestic demand, reducing the share of GDP exported. According to Ocampo (2018), European countries are attempting to create a shared currency. The absence of currency threats and the need for bureaucratic formalities to buy the currency, according to economic assumptions, positively contribute to the growth of trade. Since most transition countries are not quite ready to launch the common currency, it is worth estimating how much of their exports they could lose.

The variations in the intensity of use of development factors in the exports of European Union states, according to Basile (2017) and Bittmannova (2016), cannot be explained solely by the resources available to these countries. The study found that the resources of production factors have no direct effect on the export structure, or the economic cooperation path chosen. According to Irshad and Xin (2015), Pakistan's exports have recently increased significantly as an outcome of quick improvements in the worldwide trading climate. The export of Pakistan remained at US$ 25.5b in 2015, accounting for 9.44% of GDP, whereas imports stayed at US$ 44b accounting for 16.29% of GDP. Similarly, Pakistan's imports from China totaled US$ 11.08 billion in 2015, accounting for 25.18% of entire imports, whereas Pakistan’s exports to China equaled US$ 1.93b, accounting for 7.56% of entire exports to the world in same year.

The relationship between India's exports and its economic progress was explored by Ronit and Divya (2014). The results reveal that a Granger causality test indicated that GDP increase affects export growth, and the impulse response functions obtained suggest that exports are more sensitive to changes in GDP. Kundu (2013) investigated the exported development of seven SAARC countries. The study employed panel data analysis as well as unit root and co-integration testing. The research concluded that there is sufficient evidence to justify export-led growth to some extent.

Buckley and Casson (1981) discovered that foreign production had a greater fixed cost of service than exports, despite the fact that exports naturally earn greater costs per unit due to higher transport expenses and potential taxes (e.g., building a new plant). This means that corporations will export to avoid the higher fixed costs associated with international production for lower sales levels, and they will turn to overseas production for larger sales levels.

In addition to export taxes, Collier (1998) found that non-tariff and tariff obstacles on imports may affect exports. They would devote money to import substituting operations, discouraging exports, by raising the cost of imports. Furthermore, if companies find it more expensive to import intermediary and capital merchandises, production costs will rise. Despite the fact that under duty drawback programs, exporters are frequently entitled to repayment of import charges, these schemes are frequently cumbersome and inefficiently handled. Tariffs and non-tariff barriers are not the only policy-related trade barriers, according to Milner *et al*. (2000). Customs and trade laws, in addition to these barriers, may influence exports and imports. Exports and imports take a long time to clear customs procedures in many developed countries. Additional indirect payments to customs officers may be required in some situations to ensure timely clearance. Apart from the lengthy processing times, the paperwork associated with importing and exporting might take a long time.

Bergsten, et al. (1978) used data from the Internal Revenue Service and the United States Department of Commerce to conclude that "the relationship between foreign investment and exports or imports is essentially haphazard." While they indicated that there is a noticeable complementarily for investment up to a certain stage, since most of the initial investment goes into marketing and assembly, they also suggested that there is a noticeable complementarily for investment up to a certain level. Lipsey and Weiss (1984) tried to get around the problem by using a greater number of variables in the OLS equations, working within reasonably detailed industries, and looking at the relationships between affiliate output and home-country exports as well as exports from other countries. The theory behind the last method was that it would definitely expose some spurious relationships based on omitted country characteristics, as long as the omitted variables did not have opposite effects on US exports and exports by others.

According to Hagstofan (2011), the export of goods and services has always been important for the Icelandic economy, accounting for about 37% of GDP on average

between 1945 and 2007. After Iceland's economic downturn in 2008, GDP growth slowed, but exports increased. Exports accounted for a whopping 56.5 percent of GDP in 2010. Since 1945, export growth has been quite stable, with an average yearly rate of 5.2 percent. Ugur (2008) investigated the link between imports and economic development in Turkey. In order to conduct its research, the researchers used quarterly time series data on real GDP, real exports, real aggregate imports, real raw materials imported, and real other goods. In order to locate the information, Granger causality was employed in the study to determine whether the elements were influencing or causing each other. The findings show that GDP and the importation of consumer items and other goods have a one-way relationship.

India might also serve as a model for other developing countries looking to internationalize their economies and adopt liberalization measures. Clausing (1997) employed a reduced form strategy to investigate the link between FDI and exports. In their export regressions, they don't include FDI measures, but they do include variables that influence FDI costs (corporate tax rates in the case of Grubert and Mutti and average employee compensation in the case of Clausing). Two more approaches to the issue of unobserved heterogeneity in destination nations are Clausing use of country fixed effects and Blomstrom, Lipsey, and Kulchycky's first differencing of 1970 and 1978 Swedish data. In the 1970s, Baldwin and Gorecki (1986) looked at the average plant scale in Canada and Australia, using the United States as a benchmark. Both studies find that tariff protection enables plants to operate at a suboptimal scale, implying that eliminating tariff protection may result in increased production. They discovered that the scale effects of tariffs are determined by the market structure. Their findings show that between 1970 and 1979, Canadian tariff reductions resulted in scale rises in highly concentrated industries (one-fifth of the 120 industries in their sample). They used a different dependent variable, the change in size in comparison to plants in the United States. Changes in U.S. tariffs are not included in their list of explanatory variables, which often includes changes in import penetration, market size, and industry concentration.

Fresh food commodities have a high income elasticity of demand and minimal traditional trade barriers in high-income markets. As a result, they represent a significant opportunity for exporters from developing countries. Half of all food and agricultural exports from LDCs to high-income countries are fresh food products. However, sanitary regulations may expose these products to increased food safety risks and trade barriers.

The challenges and concerns that LDCs have in satisfying food safety standards for export are discussed in this study. These concerns include: (a) the importance of fresh food product trade by region and the types of problems that result from it; (b) the role of farm to table approaches and hazard analysis critical control points (HACCP)[3] in ensuring safety; (c) The role of the public sector in facilitating trade in LDCs; d) SPS Agreement's potential role in resolving disputes and establishing standards equivalency between high and low-income countries.

Atif *et al.* (2017) examined that rapid economic expansion is the most crucial and pressing goal for emerging countries and exports are commonly regarded as a development engine. Agriculture exports are critical not only for economic growth but also for societal advancement in an agro-based economy. The purpose of this study is to use a stochastic frontier gravity model to examine the key drivers of Pakistani agricultural exports for a sample of 63 countries from 1995 to 2014.

Faridi (2012) studied that the primary goal is to determine and quantify the impact of Pakistan's economic growth on agriculture exports. They used the Johansen co-integration methodology to assess the link between Pakistan's agriculture exports and Gross Domestic Product from 1972 to 2008. According to the study's findings, agricultural exports have a negative and considerable influence on economic growth, with an elasticity of 0.58. Furthermore, real Gross Domestic Product and agricultural exports have a bidirectional causal relationship.

According to Hatab *et al*. (2010), Egypt's currency has depreciated in recent years, although the country's population has grown rapidly, increasing demand in basic necessities. As per author, Egyptian agricultural exports are negatively affected due expensive transportation. Daramola (2005) looked at Nigeria's agricultural export prospects from 1971 to 2004. He concluded that Nigeria's agriculture exports have decreased over the last decade, and the country has gradually lost its share in agriculture exports across the globe. Low investment is the cause of low agricultural exports, according to the findings. Kumar and Rai (2007) determined the impact of free trade on tomato trade creation in India twice before the WTO started in 1985 and after the WTO

[3] HACCP approach is internationally recognized as being effective in ensuring the safety and suitability of food for human consumption and in international trade. Besides enhancing food safety, other benefits applying HACCP include effective use of resources and timely response to food safety problems.

started in 1995. The discoveries show that India enjoys a serious benefit in tomato fares and item because of the socialization of improved creation and preparing methods.

According to Ahluwalia (2002), India's switch to a flexible exchange rate allowed for a progressive depreciation to offset the effects of import liberalization and tariff reduction. This suggests that, following the liberalization of imports, significant currency depreciation was required to reduce import demand. A low amount of pass through appears to be indicated by a poor correlation between exchange rate and import prices, demanding a closer analysis of overseas exporters' pricing activities. Furthermore, more flexible exchange rate regimes could decrease the impact of any terms-of-trade shocks on the current account.

Baldwin and Yan (2012) investigated how real exchange rate fluctuations and trade liberalization affect plant productivity and export market entry or exit. It draws on the experience of Canadian manufacturing plants over three different periods, each with different rates of bilateral tariff reduction and movements in bilateral real exchange rates. In each of the three cycles, the patterns of entry and exit responses, as well as the productivity outcomes, vary significantly. Plants self-select into export markets, according to the study, which means that more productive plants are more likely to enter and less likely to leave export markets, which is consistent with most of the recent literature. Furthermore, newcomers to export markets increase their productivity output compared to the population from which they came, and plants that remain in export markets perform better than comparable plants that leave, bolstering the argument that export improves productivity. Finally, find that overall market access conditions, such as actual exchange rate patterns, have a huge impact on the amount of productivity gains that can be gained from exporting.

The rise in the value of the Canadian dollar, in particular, nearly fully offset the productivity growth advantages that new export-market participants would otherwise enjoy. Tariff reductions result in an improvement in overall efficiency. This is primarily due to productivity gains within surviving plants: as the price of imported intermediates falls, surviving plants substitute domestically generated inputs with cheaper imported inputs, resulting in productivity gains within the plant. The ability of exporters to substitute cheaper intermediates for jobs determines, if they profit more than non-exporters. Gourinchas (1999) looked examined the impact of real exchange variations on gross job flows using data from French firms. He finds that exchange rate appreciations

limit net employment growth as a result of decreased job creation and more job destruction. These trends suggest that exchange rate fluctuations cause no additional reallocation. Gourinchas (1999) looked at the impact of real exchange variations on gross job flows using information from French firms. Exchange rate appreciations limit net employment growth as a result of lower job creation and more job destruction.

The variables influencing Bangladesh's import structure were examined by Roy and Rayhan (2012). They assessed pool information, cross-sectional, and time series to give an outline of different gravity model techniques for the period 1991 to 2007 of every 14 nations. The investigation found that the critical determinants of distance are the GDP of the home and accomplice nations, the conversion standard, and the distance in Bangladesh's imports. The consequences of the cross-sectional gravity model methodology show that Bangladesh has huge import potential in the SAARC locale, particularly with India.

Tinbergen (1962) investigated the principle of Newton's gravitational law in calculating international trade flows. He recommended that mutual trade movements between countries have a direct connection with size of economy and an indirect connection with distance concerning in his work "Shaping the World Economy." This first gravity model lacked a theoretical foundation. In order to explain its theoretical basis, he derived gravity equation from various international trade models.

Karemera *et al*. (1999) tweaked that standard gravity model underpins the profits and causes of Pacific Rim flows of trade. The research incorporated export unit prices, exchange rate, import, dollar volume of trade flows, population, domestic whole sale prices indices gross domestic product, exchange rates and gross domestic product distance used as a proxy for geographical factors and transportation cost hindering trade movements, inflation, spot exchange rate and dummy variables into pool data spanning the years 1984 to 1993. The results show that in the gravity model all variables are important and fundamentals of Rim Pacific trade.

To estimate the impact of transportation costs on bilateral trade, a log-linear model of trade is used by Clark, Dollar, and Micco (2004). Their model includes a long list of explanatory variables, including dummy variables for, GDP, distance, land boundary and common language, as well as a dummy variable for whether the countries shared immigrant. The writers demonstrate that port effectiveness has a major impact on

transportation costs, and that transportation costs are greatly substantial factors of mutual trade, with a negative sign as predicted. Groot *et al.* (2004) investigated institutional proficiency as an explicit factor of mutual trade, realizing that institutional output can have a 6 important effect on transaction costs, which in turn affect trade. The writers use an amplified gravity model to study bilateral trade, which contains dummy variables for a common frontier, common trade region, common language, and common religion, as well as a collection of institutional quality variables like political stability, voice and accountability, government effectiveness, rule of law, regulatory quality, and control of corruption. Multicollinearity is controlled for, and a composite consistency index is used in the study. The findings indicate that raising the overall standard of institutions above the national average would result in a large increase in bilateral trade.

Lai and Zhu (2004) established the determinants of mutual trade by integrating total factor productivity adjusted wages, labor productivity adjusted wages, time varying tariff and average tariffs and distance by using cross sectional and panel data from 34 nations. The findings show that developing country are more benefits through tariff liberalization than rich nations, and that trade reaches to international trading partners from privileged trading sectors.

Despite the fact that India has liberalized its imports by lowering tariff barriers and eliminating quantitative restrictions, there are still significant restrictions in place, including nontariff barriers (NTBs), which may limit the flexible exchange rate regime's ability to neutralize terms-of-trade shocks. India is an important case study to analyze the relative contributions of exchange rate depreciation and trade barrier reduction to the determination of import prices because of the simultaneous trade liberalization and change of exchange rate regime included in the 1990s reforms. Because of the simultaneous trade liberalization and change of exchange rate regime included in the 1990s reforms, India is an important case study for analyzing the respective contributions of exchange rate depreciation and trade barrier reduction to the setting of import prices.

The proposed Transatlantic Trade and Investment Partnership (T-TIP) between the US and the EU aims to eliminate tariffs, tariff-rate limitations (TRQs), and non-tariff barriers to agricultural trade (NTMs). Model simulations are used to analyze the impacts of T-TIP on agriculture under three different scenarios: total removal of tariffs and TRQs; elimination of specific NTMs combined with tariffs and TRQs; and a decrease in consumers' desire to buy imported products formerly prohibited by NTMs. As a result of

T-TIP, all scenarios predict an increase in agricultural commerce between the US and the EU, which would benefit both areas. Despite the fact that agricultural exports in the US have expanded, the EU has benefited from cheaper import prices and stronger macroeconomic improvements than the US. When compared to the 2011 base year, the approximate annual increase in agricultural commerce between the United States and the European Union ranges from $6.3 billion to $11.6 billion. Tariffs between the US and the EU, according to Akhtar and Jones (2013), are quite low by worldwide standards. The simple average applied tariff for both commodities is estimated to be 3.5 percent for EU exports to the US and 5.5 percent for US exports to the EU.

Reaz et al. (2017) investigated how the rise in exchange rate volatility has piqued the interest of not just academics but also policymakers around the world. The impact of exchange rate volatility on the financial performance of Malaysian farm enterprises is investigated in this study. For the years 2001 to 2015, the authors used the GMM dynamic panel techniques, wavelet coherence technique, and GARCH (1, 1) methods. The findings show that the volatility of the Malaysian Ringgit's (RM) exchange rate has a negative impact on Malaysian agribusiness firms' financial performance. The ARME and AVA have a positive impact on financial performance for the full sample at the 1% significance level. According to the findings, wavelet coherence affects financial performance, currency rate, consumer price index, and interest rate.

Dinçer *et al*. 2020, used a firm-level database on Turkish enterprises, and estimate an augmented gravity model to explore the trade-exchange rate connection at the intense export margin from 2003 to 2015. They evaluate exchange rate effects separately for firms active in manufacturing and services activities, which is a considerable departure from prior literature, in addition to several additional layers of analysis made feasible by unique properties of our firm level database. The exchange rate effects on exports at the intense margin appear to be somewhat heterogeneous, according to our findings. More GVC-intensive output, on average, attenuates the effect of an exchange change for existing trade flows, especially for the sample's services-intensive enterprises.

De (2006) looked at the impact of non-value variables of global commerce, such as framework and exchange cost, on Northeast Asia's mix. He employed an extended gravity model to examine the effects of trade costs on trade flows in three Northeast Asian Economies: Japan, Korea and China between 1991 and 2004. Commerce, divisions, GDP, GDP per capita, foundation, receptivity, conversion scale, tariff, and exchange costs, as

well as customary distance from the rest of the world, are among the elements integrated for three Northeast Asian economies. Exchange expenses, as well as trade framework offices, were proven to have an impact on trade. The higher the exchange rate between two countries, the less they trade with each other. Furthermore, regulatory difficulties and a high level of inconstancy in delivery costs are genuine commercial barriers in Northeast Asia. The investigation also focused on the receipt of appropriate arrangements in order to lower trade costs, hence promoting trade in the region as well as around the world.

2.4. Empirical Review of Studies at National Literature

According to Altaf and Mehmood (2015), the United States is one of Pakistan's top 10 largest trading partners. The United States is also at the top of the list for imposing massive non-tariff barriers on Pakistani exports. Because of the great distance between Pakistan and the United States, trade expenses are extremely high, and the government-to-government interaction, as well as technical and sanitary standards from the United States, is all highlighted. Pakistan is a country that the United States has designated as a Restricted Entity, and the application of non-tariff barriers has hampered Pakistan's textile and garment industries.

Geographical indicators are extremely essential in determining the impact of trade barriers on the agricultural and non-agricultural sectors. Tariff rates and distances, according to OLS estimates, represent a major bilateral trade barrier. According to the study, Pakistan faces large trade obstacles from its big, established trading partners because these nations adhere to strong standards related to health and not ever compromise on them; second, they aim to safeguard their local sector by banning imports under the influence of non-tariff measures. Pakistan needs strategies relating to the manufacturing process, as well as standardization, in order to successfully reduce the cost of trade between trading followers. The outcome indicates that the gravity indicators are extremely important and support trade. FTAs permit countries to lower non-tariff barriers to trade. Pakistan should vigorously engage in the world trade Organization's (WTO) agreement on trade facilitation measures in order to eliminate non-tariff barriers and trade costs. To get the most out of mega projects like CPEC, trade restrictions must be eliminated (Altaf and Mahmood, 2015).

Hera, Shafique, and Mustafa (2017) investigated the two main technical non-tariff barriers to sanitary and phytosanitary standards developed by the World Trade Organization (WTO) and strictly followed by the WTO Member States. These NTBs are

designed to protect food, animals, and the environment. Trade in developing countries around the world can only be maintained if they adhere to WTO quality and product standards. International trade was hampered by the tariff. Exports in every country are influenced not only by the demand for and availability of commodities, but also by the effectiveness of both micro- and macroeconomic policies.

The impact of TBT and SPS measures implemented as well as imposed by partner countries on Pakistan's export activities was analyzed by Hera, Shafique, and Mustafa (2017) by creating a database of Pakistan and its top export partners (USA, China, and UAE) in HS-2-digit commodity code level from 2003 to 2016. To assess SPS intervention, they used the coverage ratio and frequency index. TBT placed by importers on Pakistan exports was optimistic, according to the literature, whereas SPS discouraged exports. The various effects of these NTBs on the development sectors and agriculture were also investigated.

Sanitary and phytosanitary product standards also affect Pakistani firm-level exports to 22 of the world's most important markets. In 2007, the Pakistani government established export standardization regulations for retail labeling and packaging of transferable items. These strategies deals with sanitary and phytosanitary measures, and the volume of transferable products has improved by 15% as a result of them. However, the impact of these regulations is delayed; it only supports exports after a few years and only if the exported products are in big quantities (Ali, 2016).

Abolagba *et al.* (2010) identified the factors that helped Nigeria increase its cocoa and rubber export levels from 1970 to 2005. Exchange rate, production, domestic consumption, producer price, and interest rate all play a role in the export of rubber and cocoa in Nigeria, according to the findings. By using a value-added process, cocoa exports can be increased.

Shujaat and Shihab (2014) investigated the causal relationship between exports and economic development in Pakistan and Jordan. Both studies used Granger causality to determine the direction of the link between the two variables during the study period. Economic growth and exports have a causal relationship, according to their findings. Changing tastes and habits in importing countries, as well as the desire to safeguard the environment, according to Roberts et al. (1999), all of this has resulted in a rising demand for SPS measures for high-quality agricultural products, particularly in developed markets. As a result, between 1996 and 2015, the world average tariff rate (simple average rates) for agricultural products fell from 14.6 percent to 8.8 percent. While the overall number of

SPS notifications (all kinds) for agricultural products (HS Codes 01–24) climbed from 136 in 1996 to 1199 in 2014. When markets lack adequate health and safety mechanisms, authorities have turned to alternative trade policies to ease the anxieties of well-educated customers.

Pirzada (2019) examined that between 2015 and 2018, Pakistan's exports decreased significantly. The government also introduced a fixed exchange rate policy at this time, resulting in a significant increase in the real effective exchange rate (REER). Despite the REER depreciating by 18 percent between the fourth quarter of 2017 and the second quarter of 2018, the dollar value of exports continued to decline. As a result, some have suggested that an exchange rate strategy is ineffective at rebalancing the economy toward exports. The IMF's emphasis on moving towards a near-floating exchange rate system has reawakened interest in exchange rate strategies. One of the main reasons for this is to allow the exchange rate to act as a shock absorber. The trade balance will be harmed by a rise in the import bill. Allowing the currency rate to fall in reaction to a worsening trade deficit can help to mitigate the impact of a shock by allowing the exchange rate to act as a shock absorber. The Marshall-Lerner condition is satisfied only if the price elasticity of demand for exports and imports is strong enough.

Ahmad (2017) indicated the most important indicators of a country's economic health are its export. Using annual time series data from 1970 to 2015, and investigates the impacts of currency rates on exports in Pakistan. World Bank and The International Monetary Fund (IMF) provide secondary data. To ensure that the data is stationary, the researchers used the Augmented Dicky-Fuller (ADF) and Phillip-Perron (PP) methods. To examine the link between the variables under examination, the researchers used Auto Regressive Distributive Lag (ARDL). The study's findings reveal that the exchange rate has a negative but negligible impact on Pakistan's exports, whereas global income has a positive and considerable impact on exports.

Ahmad, *et al*. (2021) explored that agriculture is a vital part of Pakistan's economy, accounting for almost 19 percent of GDP and employing almost half of the country's workers. It has strong backward and forward ties to manufacturing industries, and it contributes significantly to value-added economic activity. Around two-thirds of the country's population lives in rural areas and depend on agriculture for lifetime, either directly or indirectly. Given the importance of agriculture to the national economy, the administration places a high priority on boosting agricultural productivity in order to improve the country's competitiveness and income levels (Govt. of Pakistan, 2020).

Fruit and vegetable crops are a top priority in agriculture because of their enormous potential for improving the country's socio-economic situations. Laffey index, Relatively trade advantage (RTA), Relative Import advantage (RMA), Relative Export Advantage (RXA) and Revealed Comparative Advantage (RCA) were used as analytical tools to investigate Pakistan's international competitiveness by analyzing the comparative and competitive advantage of vegetables and fruits.

A time-series data set from the International Trade Center from 2011 to 2019 was used for this purpose. According to the findings, Pakistan retained a comparative advantage and competitiveness in fruit imports while disadvantageously affecting vegetable imports. Despite having a competitive export advantage over its competitors, Pakistan continues to import a large number of fruits and vegetables. It is critical to rethink Pakistan's trade policy and invest in the research and development industry in order to improve competitiveness in horticultural product exports and minimize imports.

In addition, the study examines whether there is any untapped agricultural export potential between Pakistan and its trading partners. The findings support the consistency of the gravity model for Pakistani agricultural exports. Similarly, the estimates show that bilateral exchange rates and tariff rates have an impact on agricultural exports. By using dummies, the study has taken into account the effects of a shared border, shared culture, colonial history, and preferential economic agreements. Except for shared language, the analysis verifies the importance of each element and its magnitude. Furthermore, estimations of Pakistan's technological efficiency show that the country has significant export potential with bordering, Middle Eastern, and European countries.

Memon *et al.* (2008) used time series data from 1971 to 2007, this research attempts to analyze the causal links between agriculture and exports in Pakistan. Several initiatives are demonstrating a growing awareness in examining the possible relationship between economic growth and international trade. Cumulative Gross Domestic Product is practically every economy's primary goal. One strategy to achieve economic growth is to promote the country's exports. Pakistan is a developing country that has prioritized increasing exports from its beginnings. In relationships of both value-added and primary goods, agricultural sector accounts for the majority of Pakistan's exports. Because both variables have a strong long-run relationship, the findings have major implications for Pakistan's economic plans. Between total exports and agriculture GDP, there is also a bi-directional Granger-causality. However, neither variable causes the other in either direction in the short run.

Ahmed and Sallam (2018) purposed the short term and long term link between gross domestic products and agricultural exports share. To examine the relationships between the series under examination, co-integration analysis using the Johansen co-integration technique and ECM-GARCH is utilized. The findings show a long-term and short-term positive relationship between GDP proportion of agriculture and agriculture exports, as well as co-integration between the two series examined. Rises in agriculture exports were also accompanied by growths in agriculture's percentage of GDP. The elasticity of agriculture exports and agriculture's portion of Gross Domestic Products is 0.62. Agriculture's contribution of GDP volatility has increased as a result of previous shocks and agricultural trades.

Khan, *et al.* (2013) investigated the major trading associates of Pakistan with mutual trade flows. For this research, a panel data sample with a two-year frequency was used to analyze data from 1990 to 2010. Traditional gravity model variables such as GDP per capita, distance and GDP are important, while trade volume have inversely relationship with cultural comparisons. According to the findings, Pakistan has unexploited trade volume with Malaysia, India, Iran, Japan and Turkey.

The mid-term strategic trade policy framework was developed through a consultation process that took into account current global trading patterns as well as the trend in Pakistan's exports. The Federation of Pakistan Chambers of Commerce and Industry, trade unions, district Chambers, private corporations, trade missions, think tanks, universities, Ministries/Divisions, and other government organizations were among the active participants. An inter-ministerial working group has been formed by the National Food Securities, Commerce, Ministries of Science and Technology and Research to work on quality standardization and harmonization of Pakistani standards, as well as the updating of the list of pre-shipment inspection businesses. The Short-Term Export Enhancement Strategy includes the identification of target items and market relationships. The identification of target items and market relationships is part of the Short-Term Export Enhancement Strategy. For short-term export enhancement, the following four commodity groups will be prioritized: i. meat; ii. horticulture; iii. Basmati rice and meat products. With short-term policy action and support, the items were chosen based on the availability of export surpluses and growth potential (Government of Pakistan, 2015)[4].

(Government of Pakistan, 2015)[4].

2.5. Conclusion

While reviewing numerous reports, I discovered that agriculture exports are heavily reliant on tariff and sanitary and phyto sanitary barriers. When a nation erects SPS barriers to its exports around the world, it must adhere to WTO requirements in order to survive in the market. Developed countries place strict trade barriers on most developing countries. According to the literature, countries that bear non-tariff barriers (NTB) compliance costs and raise their commodity standards perform better in the global trade market. These NTBs initially stifle exports of barriers facing nations, but if they adhere to requirements, trade will greatly improve in the future. Most of the researchers conclude that sanitary and phytosanitary interventions, as well as technological trade barriers imposed by trade partners on exporters' goods, reduce the amount of trade between exporting countries. While other studies have shown that trade barriers have together trade restriction effects and export promotions, both impact on exports is dependent on the country's level of growth.

Pakistan's trade policy framework from 2015-18 stated that government is working to improve exportable product standards. Pakistan's cutlery exports, sports goods, agriculture and electronics remain not growing to main trading partners due to a lack of reliable, developed, and standardized technology. Due to domestic and international shocks, in comparison to the previous year Pakistan's total export volume declined by 4.78 percent. The Pakistan’s government intends to provide monetary assistance to its investors and exporters in order to boost and upgrade technology and quality specifications in order to expand the affected export sectors. There is a need for new policy formulation for local brand certification to ensure product standards compliance, and the government recently decided to provide financial support for Pakistan brand certification. Pakistan has significant potential to increase its agriculture sector exports to major export destinations in the short term by improving quality and complying with WTO product standards (Ministry of Commerce, 2016).

2.6. Literature Gap

A review of several studies showed that a few study were done on Pakistan trade with SPS measures with European Union and North American countries. Hence a detail research is needed that can reveal Pakistan position related to SPS measures applied by European Union and North American countries. In this study we make comparison of

European Union and North American countries that how much impact of SPS and tariff on agriculture exports of Pakistan. The only difference that covers this study is about focusing on agriculture exports of Pakistan with European Union and North American countries while using measures of SPS, agriculture exports, exchange rate, tariff and GDP for the purpose of cultivating broader view of impact of SPS measures on trade of Pakistan with European Union and North American countries.

CHAPTER 03

TRADE PERFORMANCE OF PAKISTAN

3.1 Introduction

Pakistan was ranked 27th in terms of purchasing power parity (PPP) and 42nd in terms of growth in the gross domestic product (GDP) in 2016 (Pakistan Bureau of Statistics, 2017)[5]. Pakistan's economy is affected by internal and external problems, including foreign debt, unemployment, a steady drop in exports, and a growing trade deficit. Budgetary allocations for the war on terror, a depreciating currency, and other fiscal policy challenges all contribute to irregularities and failed economic Pakistan's ability to become a mature and flourishing economy is hampered by these obstacles. The CPEC (China-Pakistan Economic Corridor) is a $ 75 billion project that, when completed in the coming years, has the potential to boost Pakistan's economy. The project is currently under construction, which necessitates a large inflow of costly equipment and machinery for construction of project, resulting in a rise in import payments and the trade deficit.

Despite the fact that Pakistan's economy faces significant obstacles, numerous sectors have produced extraordinary results in the past. A quick assessment of Pakistan's export performance to major export destinations, GDP growth, exchange rate performance, and the development of enforced tariff and non-tariff barriers, as well as sanitary and phytosanitary measures on Pakistan's merchandise products are presented.

3.2. Export Performance

Pakistan's export production peaked at 25.34 billion US dollars in 2011, then fell to 23.63 billion US dollars in 2018. Pakistan's exports rose gradually from 2003 to 2014, then they started to decline. Energy crises, high import taxes, inadequate resources, and other factors played role in 8% growth in 2016. Manufacturers are unable to obtain credit from commercial banks. Exporters' operating costs have increased as a result of above-mentioned reasons, and demand for imported goods has also increased. Pakistan's exports to major destinations rose in 2018 as compared to 2011.

[5] Pakistan Censes, 2017. Pakistan Bureau of Statistics

SN	Countries	Exports	% Share in total Exports	Exports	% Share in total Exports	Change in Export % Share
		2011		2018		
Export to World		$25,343,768,655	20.68	$23,630,892,979	24.066	3.383
North American						
1	Belize	$32,416	0.00	$25,587	0.00	0.00
2	Canada	$213,467,802	0.84	$271,420,184	1.14	0.30
3	Costa Rica	$1,786,864	0.00	$3,269,306	0.01	0.00
4	Cuba	$1,913,558	0.00	$757,836	0.00	-0.00
5	Dominican Rep.	$12,988,519	0.05	$7,087,356	0.03	-0.02
6	El Salvador	$2,950,009	0.01	$3,193,050	0.01	0.00
7	Guatemala	$17,805,839	0.07	$10,353,148	0.04	-0.02
8	Honduras	$3,984,224	0.01	$15,026,101	0.06	0.04
9	Jamaica	$1,481,041	0.00	$1,737,926	0.00	0.00
10	Mexico	$110,572,314	0.43	$102,472,469	0.43	-0.00
11	Nicaragua	$17,214,154	0.06	$4,069,916	0.01	-0.05
12	Panama	$12,000,255	0.04	$15,045,561	0.06	0.01
13	USA	$3,839,158,158	15.14	$3,802,499,708	16.09	0.94
European Union						
14	Bulgaria	$16,167,699	0.06	$15,867,939	0.06	0.00
15	Cyprus	$5,604,228	0.02	$6,134,446	0.02	0.00
16	France	$405,027,961	1.59	$446,832,332	1.89	0.29
17	Hungary	$15,456,574	0.06	$11,625,909	0.04	-0.01
18	Netherlands	$535,413,414	2.11	$942,801,654	3.98	1.87
19	Romania	$28,732,467	0.11	$26,764,061	0.11	-0.00

Table 3.1 Pakistan Exports by Trade Partners

Source**:** UN Comtrade, 2018

Pakistan's export share to the United States has declined substantially, as seen in Table 3.1, from 3.839 billion US dollars in 2011 to 3.802 billion US dollars in 2018. Pakistan's exports to Netherlands were 535.413 million in 2011, while 942.801 million in 2018.

Table 3.2 Pakistan Exports to Major Trade Partners by HS Code Products

HS Code	Countries	Exports	% Share in total Exports	Exports	% Share in total Exports	Change in Export % Share
		2011		2018		
Total		$9,975,200,626	100%	$8,304,740,747	100%	-
HS01	Animals Live	$22,940,883	0.23	$9,767,769	0.11	-0.11
HS02	Meat & Edible Meat Official	$167,270,231	1.67	$227,284,083	2.73	1.05
HS03	Fish & Crustaceans	$261,050,126	2.61	$429,865,532	5.17	2.55
HS04	Dairy Products	$75,378,933	0.75	$50,599,903	0.60	-0.14
HS05	Animal Originated Products	$54,642,823	0.54	$35,223,101	0.42	-0.12
HS06	Trees & other Plants	$1,137,876	0.01	$3,093,139	0.03	0.02
HS07	Vegetables & Certain Roots	$258,920,180	2.59	$245,358,382	2.95	0.35
HS08	Fruit & Nuts	$310,935,939	3.11	$428,714,673	5.16	2.04
HS09	Coffee, Tea, Mate & Spices	$56,485,461	0.56	$106,740,643	1.28	0.71
HS10	Cereals	$2,807,327,472	28.14	$2,325,637,400	28.00	-0.13
HS11	Product of Milling Industry	$367,512,816	3.68	$141,640,472	1.70	-1.97
HS12	Oil Seeds & Oleaginous Fruits	$61,039,223	0.61	$115,755,326	1.39	0.78
HS13	Lac; Gums & Resins	$75,748,835	0.75	$43,040,553	0.51	-0.24
HS14	Vegetable Plaiting Materials	$6,062,925	0.06	$6,203,892	0.07	0.01
HS15	Animal Vegetable Fats	192,508,876	1.92	$39,505,255	0.47	-1.45
HS17	Sugars & Sugar Confectionery	$66,649,859	0.66	$500,788,196	6.03	5.36
HS18	Cocoa & Cocoa Preparation	$96,018	0.00	$717,960	0.00	0.00
HS19	Preparation of Cereals	$49,792,717	0.49	$62,355,516	0.75	0.25
HS50	Silk	$395,529	0.00	$862,224	0.01	0.00
HS52	Cotton	$5,097,132,661	51.09	$3,498,996,688	42.13	-8.96
HS53	Vegetable Textile Fibers	$4,178,217	0.04	$2,394,111	0.02	-0.01
HS54	Man Made Filaments	$37,993,026	0.38	$30,195,929	0.36	-0.01

Source: UN Comtrade, 2018

Cotton products are in high demand, according to Pakistani agriculture and commodity exports to major export destinations, with cotton accounting for 51.09 percent of Pakistan's export volume in 2011, down from 42.13 percent in 2018.

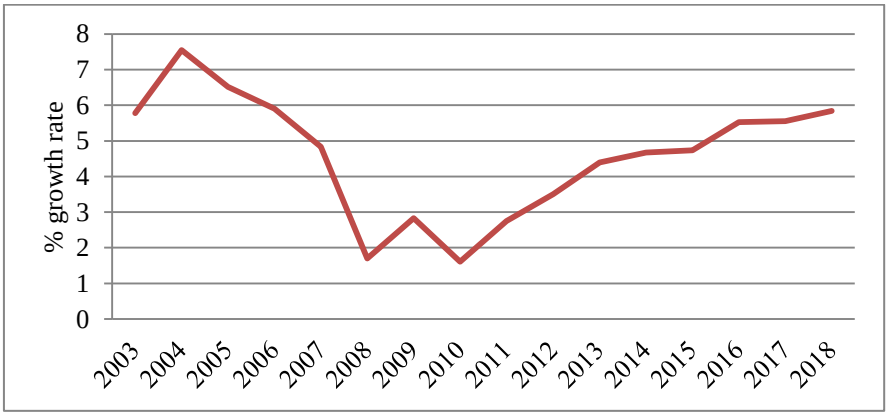
Energy crisis resulted in decrease of cotton exports in 2018. Besides this, cereals' significant contribution to total export value is another entity. In contrast to 2011, cereals commodity has a total share of 28.14 percent, which has decreased to 28 percent in 2018. The export production of all products is shown in Table 3.2 at the HS segment level.

3.3. Gross Domestic Product

Pakistan's economy has faced numerous challenges since independence, including a scarcity of factories and services, a largely agricultural economy, and a lack of adequate infrastructure. The government's priority is to meet the basic needs of immigrants while also reforming the economy. Government economic policies initially resulted in substantial growth in the agricultural and industrial sectors, resulting in higher GDP. In the 1960s, Pakistan's gross domestic products increased rapidly. In the 1970s, development hit double digits, but the economy was severely harmed as a result of the 1971 war and Bangladesh's separation from Pakistan. However, until the year 2000, the GDP growth rate remained inconsistent for a long time, and there were persistent fluctuations.

The GDP increased steadily during Musharraf's military regime in 2001. The manufacturing sector experienced rapid growth in the years 2003-2004, resulting in a significant increase in the GDP growth rate, especially in the fields of fertilization, production, and electronics. Government economic policies, especially in the manufacturing and agriculture sectors, resulted in low growth rates during the PPP era in 2007, and thus economic growth slowed down. Following the general elections in 2013, however, the GDP growth rate had continued to rise until now, owing to improved agricultural and manufacturing productivity, better investment opportunities, and a better security environment.

Figure 3.1. Pakistan GDP Growth Rate



Source: World Development Indicator, 2018

The CPEC project is currently underway, and although it will require a significant initial investment and a significant portion of the budget to complete, the project's potential for economic growth and trade is extremely promising. Initially, the CPEC project was intended to link Pakistan and China, but once completed, it is expected to provide direct access to not only China, but also Central Asian and European markets. The CPEC project can increase the economic size of Pakistan's trading partners. Our top export destinations, as well as annual GDP growth from 2003 to 2018, are listed below. The Gross Domestic Product of export partners will reveal the size of their economies and ability to buy manufactured goods. Pakistan is the most important destination for exports from both developing and developed countries. Figure 3.2 shows the rate of gross domestic product growth.

Figure 3.2. GDP Growth Rate of Pakistan and Export Partners

Source: World Development Indicator, 2018

3.4. Sanitary and Phytosanitary Measures

Non-tariff trade barriers such as sanitary and phytosanitary (SPS) initiatives are successful. Humans, plants, and animals are protected by SPS rules from additives, toxins, pollutants, and disease-causing organisms. Pakistan has few non-tariff barriers in relation to its trading partners. In 2016, Pakistan had 7805 non-tariff export barriers, with 2953 of them including Sanitary and Phytosanitary measures. Trading countries must cut tariff rates on imported goods as a result of trade liberalization policies; yet, in order to maintain their competitive advantage and boost exports, the members of WTO steadily raise the number of sanitary trade restrictions against the trade partners (Mustafa et al., 2017).

Pakistan agriculture goods suffer considerable harm and are unable to meet international safety requirements as a developing country with a lack of knowledge and understanding about laws, poor infrastructure, and low technology, as well as the annual floods. As a result, Pakistan's major export partners have issued a large number of sanitary and phytosanitary warnings. Government agencies under the Ministry of National Food Security handle SPS cases and their associated problems with Pakistani exporters (NFS). In accordance with WTO laws, the NFSR (Ministry of National Food Security and Research) established the NAPHIS (National Animal and Plant Health Inspection Services) to handle SPS-related issues; whereas Pakistan did not pass any new SPS legislation in a long time. However, a phytosanitary act was drafted in 2012 which is still in the works.

Food protection control, sanitary and phytosanitary measures, and SPS implementation are all responsibilities of NAPHIS. Meat regulations are handled by the Department of Customs, Plant Protection, and Quarantine (PPQ), while animal and animal product regulations are handled by the Department of Animal Quarantine (DAQ). The aim of this nodal opinion is to provide information on international product quality standards and to advise the manufacturers, government and other sectors on how to safely enforce international regulations, notifications against merchandise goods and standards, in order to promote export of the nations (World Trade Organization, 2015).

Exporters in the agriculture and manufacturing sectors must register with these organizations in order to enforce standards and respond to SPS-related warnings from trade partners at the world trade organization. Exporters face difficulties when attempting to export their products around the world because these organizations are not fully developed. The numbers of SPS cases faced by Pakistan based exporters in major export destinations has increased significantly since 2003, as shown in Table 3.4.

Table 3.4 shows that, despite the fact that some export partners did not impose SPS measures against Pakistan exports in 2003, a large number of SPS cases were levied on Pakistan's exports in 2018 from both North American and European Union selected countries, including Canada, which imposed 66 SPS related products standard cases against Pakistan's exports.

Table 3.3 Sanitary and Phytosanitary Share and Measures by Exports Partners

SN	Countries	SPS	% Share in total SPS	SPS	% Share in total SPS	Change in SPS % Share
		2011		2018		
Total		132	100%	124	100%	%
North American						
1	Belize	7	5.30	0	0.00	-5.30
2	Canada	57	43.18	66	53.22	10.04
3	Costa Rica	11	8.33	6	4.83	-3.49
4	Cuba	0	0.00	0	0.00	0.00
5	Dominican Republic	0	0.00	0	0.00	0.00
6	El Salvador	2	1.51	3	2.41	0.90
7	Guatemala	2	1.51	3	2.41	0.90
8	Honduras	4	3.03	4	3.22	0.19
9	Jamaica	0	0.00	0	0.00	0.00
10	Mexico	3	2.27	19	15.32	13.04
11	Nicaragua	2	1.51	2	1.61	0.09
12	Panama	0	0.00	2	1.61	1.61
13	USA	43	32.57	19	15.32	-17.25
European Union						
14	Bulgaria	0	0.00	0	0.00	0.00
15	Cyprus	0	0.00	0	0.00	0.00
16	France	0	0.00	0	0.00	0.00
17	Hungary	0	0.00	0	0.00	0.00
18	Netherlands	1	0.75	0	0.00	-0.75
19	Romania	0	0.00	0	0.00	0.00

Source**:** I-TIP, WTO, 2018

In Pakistan, sanitary and phytosanitary steps have affected all agriculture products with HS codes of 01, 02, and 10, which include animal, meat, fruits, cereals, and their related products, as well as other foodstuff. In contrast to 2011, Table 3.5 provides detailed figures for all effected products in 2018. According to statistics, Pakistan's exports

received a higher number of SPS notifications in 2018 than in 2011, particularly for agricultural products.

Table 3.4 Sanitary and Phytosanitary Measures and Share by

HS Code	Countries	SPS	% Share in total SPS	SPS	% Share in total SPS	Change in SPS % Share
		2011		2018		
Total		705	100%	937	100%	%
HS01	Animals Live	66	9.36	63	6.72	-2.63
HS02	Meat & Edible Meat Official	38	5.39	63	6.72	1.33
HS03	Fish & Crustaceans	27	3.82	60	6.40	2.57
HS04	Dairy Products	34	4.82	73	7.79	2.96
HS05	Animal Originated Products	5	0.70	0	0.00	-0.70
HS06	Trees & other Plants	62	8.79	66	7.04	-1.75
HS07	Vegetables & Certain Roots	65	9.21	62	6.61	-2.60
HS08	Fruit & Nuts	75	10.63	70	7.47	-3.16
HS09	Coffee, Tea, Mate & Spices	59	8.36	59	6.29	-2.07
HS10	Cereals	57	8.08	67	7.15	-0.93
HS11	Product of Milling Industry	57	8.08	60	6.40	-1.68
HS12	Oil Seeds & Oleaginous Fruits	57	8.08	68	7.25	-0.82
HS13	Lac; Gums & Resins	0	0.00	1	0.10	0.10
HS14	Vegetable Plaiting Materials	0	0.00	0	0.00	0.00
HS15	Animal Vegetable Fats	27	3.82	56	5.97	2.14
HS17	Sugars & Sugar Confectionery	17	2.41	56	5.97	3.56
HS18	Cocoa & Cocoa Preparation	18	2.55	56	5.97	3.42
HS19	Preparation of Cereals	41	5.81	57	6.08	0.26
HS50	Silk	0	0.00	0	0.00	0.00
HS52	Cotton	0	0.00	0	0.00	0.00
HS53	Vegetable Textile Fibers	0	0.00	0	0.00	0.00
HS54	Man Made Filaments	0	0.00	0	0.00	0.00

HS Products

Source**:** I-TIP WTO, 2018

3.5 Tariff Rate

Tariffs are the duties and taxes imposed on imported products. It is an import tax levied by the government. Tariffs are generally imposed by trading partners as protective measures to restrict trade flow. Regardless of economic development level, all WTO members use the simple average tariff against imports from other WTO members. During bilateral trade, this basic average tariff rate is the most stringent rate that WTO members would place on all goods and services from other WTO members. As a result of trade liberalization policies, the average imposed simple average tariff on Pakistan exports has decreased. In 2018, both North American and European Union countries reduced their tariff rates in relation to 2011. The table as shown below explains trading partners Belize, Cuba, and the Dominican Republic levied a significant number of tariffs on Pakistani exports.

Table 3.5 Tariff Imposed on Pakistan by Export Partners

Sr. No.	Countries	Average Tariff	% Share in Total Tariff	Average Tariff	% Share in Total Tariff	Change in Tariff % Share
		2011		2018		
	Total	162.57	100%	148.761	100%	
North America						
1	Belize	7.32	4.50	15.79	10.61	6.10
2	Canada	4.69	2.88	4.09	2.74	-0.13
3	Costa Rica	11.04	6.79	10.85	7.29	0.50
4	Cuba	15.22	9.36	14.59	9.80	0.44
5	Dominican Republic	13.01	8.00	14.21	9.55	1.54
6	El Salvador	9.43	5.80	10.65	7.19	1.35
7	Guatemala	7.94	4.88	7.72	5.19	0.30
8	Honduras	10.19	6.27	9.81	6.59	0.32
9	Jamaica	13.61	8.37	12.34	8.29	-0.07
10	Mexico	13.39	8.24	10.97	7.37	-0.86
11	Nicaragua	11.00	6.76	11.31	7.60	0.84
12	Panama	8.56	5.26	5.85	3.93	-1.32
13	USA	4.87	2.99	4.43	2.97	-0.02
European Union						
14	Bulgaria	18.59	11.43	13.96	9.38	-2.05
15	Cyprus	-	-	-	-	-
16	France	-	-	-	-	-
17	Hungary	-	-	-	-	-

18	Netherlands	-	-	-	-	-
19	Romania	13.65	8.39	2.16	1.45	-6.94

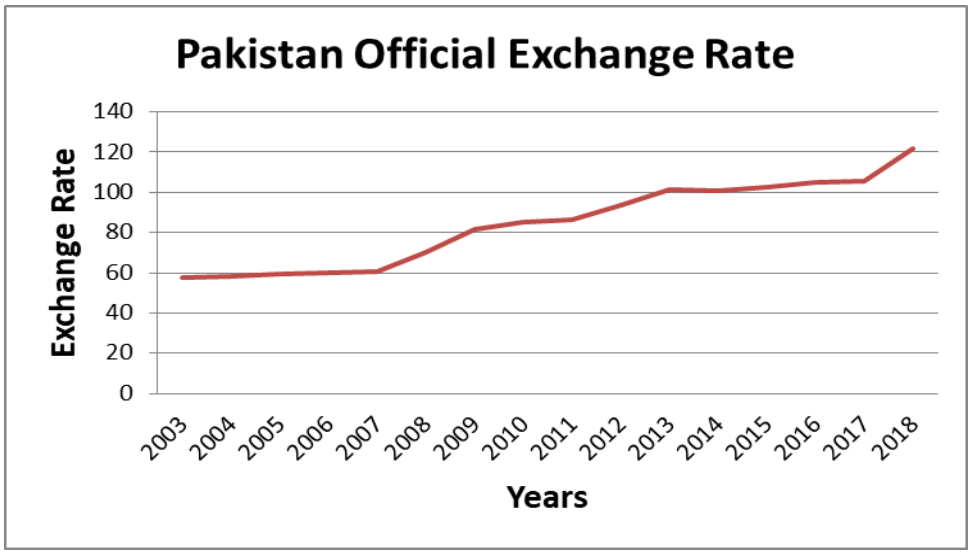
Source**:** WITS, World Bank, 2018

As seen in Table 3.6, the US tariff rate has not improved significantly since 2011. However, some North American and European Union nations, such as Panama, Mexico, Canada, Cuba, and Honduras, saw their tariff rates fall sharply in 2018 compared to 2011. Except for Bulgaria, USA, Nicaragua, Jamaica, Guatemala, and Belize have increased dramatically tariff rates.

3.6 Exchange Rate

In order to keep macroeconomic stability, a country's financial system must be stable and safe. It is a critical macroeconomic axis that affects both domestic and international trade, as well as national and international economic sectors. In the agricultural and manufacturing sectors, as well as in trade, Pakistan's exchange rate is extremely important. The State Bank of Pakistan maintains Pakistan's official exchange rate against the US dollar (SBP). In the year 2000, the SBP implemented several steps to keep the exchange rate steady, all of which proved to be successful. The exchange rate stays stable and appreciates in 2002-2003. There are small fluctuations in the exchange rate until 2006. The Pakistani rupee has been steadily depreciating since 2007, and this trend has continued in 2016.

Figure 3.4. Pakistan Official Exchange Rate (US dollar)



Source: World Development Indicator, 2018

Depreciation of a domestic currency in comparison to the US dollar is known as currency depreciation. The Pakistani rupee fell by double digits against the US dollar in 2013. Pakistan's military regime adopted stable economic policies from 1999 to 2007, resulting in improvements in almost all economic variables such as export growth and exchange rate appreciation. The Pakistan People's Party (PPP) took control after military dictatorship ended in 2007, followed by the Pakistan Muslim League-Nawaz (PMLN) in 2013. The new government increased government spending, but not tax collection. The government began expanding the money supply by printing new money as a result of an insufficient tax collection mechanism, causing the exchange rate to depreciate.

CHAPTER 04

Methodology

Based on the literature review, the relationship between the dependent variable: agricultural exports and the independent variables: tariff, sanitary and phytosanitary, exchange rate, and GDP have been analyzed. This research is based on data from Pakistan's exports to European and North American countries from 2003 to 2018. The SPS measure boosted agricultural sector exports.

According to the Gravity Model's econometric model, bilateral trade flows are proportionate to the size of their economies and inversely linked to the distance between them. Jan Tinbergen (1962) gave the simplest description of the gravity model, which is as follows:

$$X_{pjt} = \beta_0 (GDP_{it})^{\beta 1}(GDP_{jt})^{\beta 2} (Dist_{pj})^{\beta 3} \mu_{ij} \quad \ldots\ldots\ldots(1)$$

Where X_{pjt} represents the value of bilateral trade between exporter i and importer j at time t. GDP_{it} and GDP_{jt} are the actual gross product levels in countries i and j for the time period t. The bilateral geographical distance between countries p and j is known as $Dist_{pj}$, where the error term u_{ij} is supposed to be distributed uniformly and independently. Tinbergen was the first to specify the gravity model for use in investigating international trade flows (Tinbergen, 1962) specification contained the three variables in Equation (1), as well as a fourth variable (A_{ijt}) that accounts for other variables that promote or hinder trade between countries i and j at time t, as indicated in the following equation:

$$X_{pjt} = \beta_0 (GDP_{it})^{\beta 1}(GDP_{jt})^{\beta 2} (Dist_{pj})^{\beta 3} (A_{ijt})^{\beta 4} \mu_{ij} \quad \ldots\ldots\ldots (2)$$

If take its natural log then Equation (2) will be

$$\ln X_{pjt} = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(Dist_{pj}) + \beta_4 \ln(A_{ijt}) + \mu_{ij} \quad \ldots. (3)$$

The coefficients $\beta 1 > 0$, $\beta 2 > 0$, $\beta 3 < 0$ and $\beta 4 < 0$ in the given equation are expected. The coefficient β_3 denotes trade friction caused by trade costs, particularly transportation costs. Gravity model equation captures the effect (A_{ijt}) includes tariff and non-tariff barriers (World Trade Report, 2012). Exchange rate volatility largely affects exports in a country like Pakistan. Ln(Dist) is used to measure the transportation cost, because distance is statistic / constant value and create the problem in the results. So that's why ignores the effect of distance and merge it into error term. The final model that captures the following characteristics is as in Equation (4).

4.1 Main Model:

$(AX_{ijt})^k = \alpha_0 + \alpha_1 \ln(GDP_{it}) + \alpha_1 \ln(GDP_{jt}) + \alpha_2 (SPSc_{ijt})^k + \alpha_3 (Tariff_{ijt})^k + \alpha_4 (ER_{it}) + \mu_{it}$ … (4)

Where

p= Exporting country (Pakistan)

j= Importing countries (1…..13) North American & (1……6) European Union,

t= 1….18, (2003……2018)

k= Products at HS2 level of selected products.

Variables	Descriptions	Sources
AX_{jt}^k	In year t, the value of Pakistan's agriculture exports of HS level k from country j	UN Comtrade
GDP_{it}	Gross domestic product of Pakistan	World Development Indicator (WDI)
GDP_{jt}	Gross domestic product of importing country j	WDI
$SPSc_{jt}^k$	In year t, cumulative sanitary and phytosanitary measures were applied to product k of nation j	I-TIP WTO
$Tariff_{jt}^k$	Importing country j tariff applied to product k of exporting country p in year t	World Integrated Trade Solution (WITS)
ER_{it}	Pakistan's exchange rate in year t.	WDI

Where the explanatory and explained variables are defined as follows:

4.2 Data Selection

This study is focused on panel data, and the econometrics techniques used to estimate panel data are discussed in this chapter. Since panel data provides both time and cross-sectional measurements, it is commonly used. Panel data provides various advantages over cross-sectional data. Panel data has the advantage of allowing the sample size to be significantly increased, resulting in more efficient performance (Baltagi, 1998).

The second benefit of panel data is that the issue of omitted variable bias might be less likely to occur. There are two types of panel data: balanced and unbalanced. When the time span for and cross section observation is the same, balanced is considered panel data. The number of observations in an unbalanced panel data set, on the other hand, fluctuates over the cross section.

According to Pakistan Federal Bureau of Statics, Pakistan's top North America and European Union export partner countries are USA, Panama, Nicaragua, Mexico, Jamaica, Honduras, Guatemala, El Salvador, Dominica Republic, Cuba, Costa Rica, Canada, Belize, Bulgaria, Cyprus, France, Hungary, Netherlands and Romania. These countries have all taken sanitary and phytosanitary (SPS) measures against Pakistan exports and have applied them. All countries are members of the (WTO) World Trade Organization, but their WTO membership dates vary. Pakistan entered the WTO in 1995, and the study gathered SPS data from the WTO's I-TIPS database for the years 2003 to 2018. In our analysis, Pakistan is an exporting country, whereas the above exporting partners are for all agricultural products. The following countries' SPS cases against Pakistan are summarized in the appendix for each year.

The impact of tariffs, SPS, exchange rates, Pakistan's GDP, and the GDP of other importing countries on Pakistan's export output will be examined in this study. The size of a country and its level of economic growth can influence dynamics of export Besedina (2015). Standard meals and goods are predicted to be in high demand in rich countries.

4.3 Descriptive Statistics

The descriptive statistics for all variables used in the study are presented in the first stage. Descriptive statistics are used to quantify the summary of all data variables. The sample is defined using descriptive statistics, one of which is the central tendency and the other is the measure of dispersion. The number of observations included in the study is recorded first, followed by the central trend, which includes mean, median, mode, maximum, and minimum values, finally, there's the standard deviation, which is used to quantify dispersion.

4.4 Diagnostic Tests

Before running regression analysis, several diagnostic tests are performed before moving on to the main estimation technique. The results of each test are listed below.

4.4.1 Test for Stationary

The unit root test is commonly used to ensure that included variables are stationary. All regression analysis results are invalid if a series is non-stationary. The Levin, Lin, and Chu (2002) and Im, Pesaran and Shin (2003) unit root are used to determine whether variables are stationary. The combined unit root values of panel data are shown in the unit root test IPS, while the individual unit root values of variables are shown in the LLC test.

4.4.1.1. Panel Unit Root Test

It is necessary to establish the presence of a unit root in a time series. The Levin, Lin, and Chu (2002) and Im, Pesaran and Shin (2003) stationary test is used for this study. In these tests, the null hypothesis is that the panel data has a unit root. For the inclusion of unit roots in panels that combined knowledge from individual unit root t-statistics, the lm, Perasan, and Shin (IPS) test is used.

Now, talk about the panel data econometrics techniques that is used in this study. First, the study will use the Hausman test to create a choice between random effect and fixed effect techniques. The problem of heteroscedasticity and endogeneity is then addressed using the panel Generalized Method of Moment (GMM) estimation technique.

4.4.2. Hausman Specification Test

The problem of endogeneity between the error term and the Explanatory variables can be found using the Hausman test after the variables have been tested stationary. This problem may create biased ordinary test square OLS regression. Two OLS regressions can be used to perform the Hausman test. If an explanatory variable is suspected to have an endogeneity problem, it is treated as a dependent variable in the first regression and regressed against the other independent variables and instruments. The residuals of that equation are then calculated. The original equation is re-estimated in the second stage using the new residual obtained as well as the original model residuals as additional repressors. The coefficient in the residuals from the first regression is significantly zero, and the OLS estimates from that model are consistent. Inconsistency in OLS estimates implies substantial probability values, but it also confirms that the model has an endogeneity problem.

Hausman test is used to examine if the model is Random effect model (REM) or Fixed effect model (FEM). By permitting various intercepts for each cross sectional unit,

the fixed effect technique is considering the individual characteristics of each cross section The Random effects model, on the other hand, assumes that between entities the variance is random. However, error term of random effects entity is not related with the independent variable, allowing some time invariant variables to be utilized as an explanatory variable.

4.4.3. Sargan j-Test

Sarjan j test is a statistical test that is utilized to check the validity of instruments used in a model and for identifying restrictions. When the number of instrument exceeds the number of endogenous variables, the over identified restriction is fulfilled. The consistency of GMM estimators is verified using the validity of instruments. Instruments that are exogenous are uncorrelated with the error term. Sargan checks the overall validity of instruments and tests the over identifying restrictions.

The J test is Ho; The over –identifying restrictions are valid

H1: The over-identifying restrictions are not valid Since the number of observations is not multiplied by the Sargan j-statistics in e-views, we calculate the R square statistics by multiplying it by the number of observations-numbers of instruments. At a 95 percent level of significance, the critical value is determined using a chi-square distribution with the number of instruments (L)-number of endogenous variables (k) degrees of freedom.

Now we compare Sargan J-statistics value with critical value= $J \sim \chi^2(L\text{-}K)$

lf Sargan j-statics < Critical value, then accept the null hypothesis and conclude the over-identified restrictions are valid.

4.5 Estimation Technique

If the endogeneity is an issue in the data than different techniques are used to tackle that problem. An endogenity problem arises when included explanatory variables are linked to the model error term. If the model has an endogeneity problem, OLS estimates will be biased and inconsistent. Arellano and Bond explored the GMM technique in 1991. It is hard to find exogenous devices that are suitable for models. Consequently, model instrument variables can include both dependent and independent variables. In the model, instrument variables are lagged values of variables such as exports, GDP of Pakistan and its export destinations, sanitary measures, tariff, distance, and currency rate.

Serial correlation and issue are also removed from the model by using GMM estimation. The GMM model employ instrumental variables technique, which is utilized in regression to address simultaneity bias issues among dependent and independent variables as well as error term. Even when the model has autocorrelation and other problems, the GMM estimations technique is a more sophisticated version of the instrumental variable technique that provides accurate and unbiased estimations values. The study always searches for endogeneity issues with panel data. For instrumental variables to be correct, they must meet two criteria.

a). Should be strictly correlate with endogenous variable x that is

$$\text{Coy}\ (X, Z) \neq 0$$

b). should not be correlated with error term

$$\text{Cov}\ (Z, \mu) = 0$$

By maximizing the objective function that includes the moment restrictions, the generalized method of moment estimations methodology delivers consistent parameters. GMM is a superior estimating methodology than two-stage least square (TSLS), three-stage least square (3SLS), and generalized least square (GLS). Lower order moments such as mean, median, and mode are reported by the GMM estimation approach, while higher order moments such as skewness and Kurtosis are also reported. Consistency estimators are generated using the E views panel generalized method of moment approach.

4.6. Data and Selection of Variables

This chapter analyses the influence of sanitary and phytosanitary measures on Pakistani trade with the EU and North America by outlining the variables employed in the study. The WTO (World Trade Organization), the WB (World Bank), the UNC (United Nations Comtrade), and the CEPIL (Centre for Prospective Studies and International Information) all provide data for the variables. The research estimates the GMM (generalized method of moment) to evaluate the above relationship using sanitary and phytosanitary (SPS) measures. The panel GMM model is also estimated in this study using GDP, distance, tariff, and exchange rate. These variables are listed in more detail below.

4.7. Exports

An export is a form of foreign trade transaction in which products manufactured in one country with the help of labor and machinery are delivered to another nation for sale and trade in the future. The selling of these products generates revenue for the nation and

helps to boost its GDP. Exports are important when evaluating a country's development and economic performance. The effect of tariffs, SPS, and other factors on Pakistani exports is investigated using a gravity model with bilateral exports as the dependent variable. Pakistan's official bilateral exports data, in millions of dollars, with each of the 19 developing and developed countries, from UN Comtrade from 2003 to 2018.

Official Pakistani bilateral exports are collected separately with each trading country at the (Harmonized System) HS 2-digit code level. The HS segment level is generated by aggregating the data from the exports at the HS 2-digit level. A gravity model of trade is a widely used method in the literature for identifying bilateral trade relations between countries and understanding trade patterns in a globalized world. The bilateral trade value between countries is proportional to the product of the two countries' GDPs and diminishes with the increase in distance between the two countries, according to the gravity model (Tinbergen, 1962). When estimating trade flows, the gravity model can consider for the impact of trade-enhancing variables, geographical considerations, and various forms of trade obstacles, such as tariffs and non-tariff obstacles (Moenius, 2004 and Mahe, 1997).

The gravity model includes explanatory variables such as Pakistan's GDP and that of its trading partners, tariff, sanitary and phytosanitary (SPS) regulations, and Pakistan's official exchange rate. The definitions of variables that are utilized in this study are mentioned below.

4.8. Gross Domestic Product

In this research, the gross domestic product, which calculates a country's economic production, is used. In current US dollars, Pakistan's GDP and that of its exporting partners are measured. The Gross Domestic Product (GDP) of Pakistan is a proxy for the country's export supply potential. The Gross Domestic Product (GDP) is the total value of all final services and products produced in a country each year. It refers to all the goods and services produced inside a country's boundaries. Personal consumer expenditures, government spending, net exports, and business investment all contribute to a country's GDP.

Investment, revenue, and production are the three means to calculate gross domestic product. In fact, "the expenditure approach only includes the amount of final consumer spending, while the income approach includes the total of all income generated by production. Both value-added products are included in the production approach at every

point of processing. GDP has a major effect on a country's economic performance, according to the literature (Anzuini *et al*., 2012). GDP is the entire market value of all final products and services produced in a nation each year, including government expenditures, total consumption, net exports (exports less imports) and investment. The Gross Domestic Product (GDP) is a metric for a country's economic output and growth. Nominal GDP refers to the present monetary value of all final products and services produced in a nation; real GDP refers to the real monetary value of all final products and services produced in a nation. The nominal value of real GDP is adjusted for inflation.

The GDP of trading countries indicates both the production and consumption power that determines trade flow between them, according to Jan Tinbergen's (1962) gravitation theory. The GDP of the importing country has a significant impact on trade partner countries' exports. This is because consumer income, which is a major factor in deciding demand for goods and services in export partner countries, is included in their GDP. The GDP of an exporting country is also important in determining their production potential, or the number of goods they will supply to an importing country. According to the gravity model, GDP of an exporting country is less important than GDP of an importing country in determining demand for exporting countries' goods. The GDP of the importing country represents market demand for imported goods.

Countries with higher GDP have a direct and positive relationship with their imports, according to the literature. Consumer demand for variety, protection, and standard products increases as a country's GDP grows, and its import markets change. Countries that can meet the quality standards for export commodities can gain a foothold in foreign markets. Otherwise, they will lose access to their already established export markets and face technological trade barriers as well as sanitary and phytosanitary restrictions on their exports, if they did not do so. According to the literature, countries with a higher GDP have more capacity to create and enforce non-tariff obstacles.

4.9. Tariff Rate

Tariffs are customs obligations or taxes levied on imported goods. It is an import tax levied by the government. Tariffs are normally imposed by trading partners as a protective measure to limit trade flow. Tinbergen's gravity model adds an extra variable to capture the impact of variables that promote or hinder bilateral trade, such as tariffs and non-tariff barriers.

The three forms of tariffs are most favored nation (MFN), tariff, preferential and bound tariff. The highest rate is bound tariff rate. The MFN applicable tariff rate is in the middle of the preferential and bound tariff rates, with the preferential tariff rate being the lowest. For the period 2003-2018, this study used MFN tariff data from all selected North Americans and EU countries, which they applied to Pakistan's exported HS 2-digit coded products. The data gathered from the World Trade Organization's online tariff download tool. All members of the World Trade Organization utilize MFN tariffs. Imports from other WTO members, regardless for their level of economic growth.

The most restrictive tariff rates that WTO members can apply on one another are known as MFN tariff rates. During bilateral trade, a WTO member can buy and sell all another WTO member's goods and services. This is a tariff rate that offers developing countries more time to adjust, lowers their costs, and provides them with specific benefits.

Tariffs have a negative and significant impact on trade, according to literature. Importing countries impose tariffs on exporting countries, increasing the cost of those products for customers in the importing country and reducing demand for further imports. As a result, they begin to use unconventional methods to satisfy the demand. Tariff-imposing countries may satisfy demand for products purchased from other trading nations. Imposing high tariffs on importing nations is suggested not to defend national infant industries, but also as a secure way to turn to other importing partners on occasion. Tariffs are trade barriers that hinder trade and harm exporting countries' trade balances. Import tariffs provide domestically manufactured equivalent goods a price advantage over imported items, while also generating revenue for governments. According to the literature, the anticipated relationship between tariffs and country imports is negative. (Hockman and Nicita, 2011).

Tariffs are more harmful to trade than other non-tariff barriers, according to Bao and Qiu (2009). Tariffs imposed by trading partners raise import and export rates on a bilateral basis. Tariffs reduce the number of exports of trade partners, particularly when high tariffs are imposed on raw materials. Tariffs, agreement if the tariff-sensitive commodity's price does not increase in the importing nation's market as an outcome of tariff, the entire tariff burden has been shifted to exporters, and their trade profits have decreased due to high production costs.

4.10. Implication of Tariff on Trade

In their book International Economics, Kurgman *et al.* (2008) discussed the impact of tariffs on exporters, importers, and overall trade value. Prior to tariffs, the global price of products from the home country was lower in foreign markets, although they could get a high price at home. Exporters will not sell if the overseas price is higher than the domestic price. Prices will rise until they exceed the domestic price of exported goods due to excess demand on the foreign market. In the absence of demand, surplus supply in the exporting nation causes a drop in market price in the domestic market; in the absence of demand, surplus supply in the exporting nation causes a drop in market price in the domestic market. As a result, before the market reaches equilibrium, the price in the foreign country rises while the price in the domestic market falls.

When a market situation exists in which the importing country imposes tariffs on the exporting country's product. When a country sells its exports, the price of those goods falls in the foreign market, so tariffs lift the price in the domestic market. Exporters in the home country have been hard hit as the price of their products has risen in the foreign market, increasing the cost of goods for consumers. Tariffs are raised if the rise in price on the foreign market is not proportional to the tariff cost. The responsibility is transferred to the exporters. Due to the high tariff rates, global export demand in international markets has decreased, resulting in an oversupply of that product in the domestic market. Exporters benefit less in the foreign market as a result of tariffs, while importers benefit less in the global market due to domestically surplus demand. They also face lower prices for such products on the domestic market. It is, however, unprofitable. This means less supply and more demand at home for exporters, resulting in higher prices. The overall exports decreases as the supply of the exporting nation decreases. As a result, the total value of goods traded has risen. The product's value has declined as a result of the tariff that has been levied. The demand for exports from other countries equals the supply at that point. The supply of the exporting country is decreased, resulting in a decrease in trade volume (Kurgman *et al.* 2008).

4.11. Sanitary and Phytosanitary Measure

Various researchers accounts for factors such as tariff and non-tariff barriers that facilitate or restrict bilateral trade. This research examines the influence of both tariff and non-tariff obstacles. From 2003 to 2018, a number of developed and developing countries used SPS policies as a non-tariff measure against Pakistan exported products. The WTO (World Trade Organization's), I-TIP (Integrated Trade Intelligence Portal) provides data

on sanitary and phytosanitary (SPS) measures (urgent, normal, and related trade concerns) implemented and enforced by importing countries against other trading partner products at the HS 2-digit code level. The WTO I-TIPS data source offers detailed information on variety of non-tariff measures, including which trading countries apply these measures and on importing nations. SPS gathers data at the 2-digit code for HS level, aggregates it to the HS section level, and uses to measure on each HS 2-digit product.

According to the definition, "SPS measures are used to protect human, plant, and animal life from risks posed by chemicals, contaminants, toxins, or disease-causing organisms that can damage them" (UNCTAD, 2012; World Trade Organization, WTO) classifications "Specific trade risks," "emergency," and "ordinary" are some of the subcategories of SPS measures. WTO members reservations and reports about WTO members, products, or initiatives are referred to as Specific Trade Concerns (STC). Standard alerts are sent out at an early stage, when improvements can still be made and suggestions can still be considered (time period of notification), until a rule has come into force. In the WTO, however, emergency notices of SPS requirements are applied before they are implemented. In most cases, the date of entry into force is six months after the date of publication (World Trade Organization, 2016).

SPS measures have a range of effects on trade; these commodity safety measures increase production costs, but they will also serve as a major quality signal, promoting exportable products from countries that adhere to strict standards.

These non-tariff initiatives and SPS requirements necessitate a one-time enforcement expenditure in up gradation to comply with international standards, which will help improve production and exports. According to a study of the literature, SPS measures play an important role in commodity demand and exchange. By adjusting the dynamics of international trade, these conditions increase the market elasticity of substitutes for related products (Harrison, et al. 1996). These compliance costs are related to future improvements in the production process, certification processes, and technical advances that are required to suit the needs of countries implementing certain legislation and criteria (Schlueter *et al.,* 2009).

4.12. Exchange Rate

The exchange rate influences both domestic macroeconomic measures and overall trade in the region. The rate at which one currency is exchanged for the value of another currency is known as the exchange rate. The value of a domestic currency in terms of an

international standard currency is known as the exchange rate. For all bilateral trade partners in this article, the official exchange rate of the exporting country (Pakistan) against the US dollar was utilized. From 2003 to 2018, data on Pakistan's official exchange rate was compiled using World Development Indicators (WDI). The official exchange rate against the US dollar is announced by the SBP. For all trading partners, the nominal exchange rate of Pakistan is employed as an explanatory variable in this analysis. The value of the Pakistani rupee in relation to the US dollar is referred to as an "exchange rate direct quote" (PKR/USS).

Exports and exchange rate fluctuations are related, according to the Pakistan National Tariff Commission (2015 uniform trade theory); exchange rate fluctuations affect exports. If a country's domestic exchange rate increases, the value and volume of its trade rises as well. It can afford to buy less foreign goods in exchange for domestic goods exports. As a result of depreciation, domestic goods have become more affordable to visitors.

Manufactured goods become more expensive for domestic customers and producers. Domestic households will be able to buy less imported goods as time goes by, while international consumers will be able to buy a greater number of imported goods. It shows that a weakening of the currency will result in a trade surplus for that country. If the export market for that country's products is elastic, a currency depreciation will benefit the home country. When export demand elasticity is poor, however, domestic product exports do not increase.

While a depreciation of the domestic currency will better the balance of trade if the imported products demand is elastic, it will alter behavior of consumer in the home nation because relative demands for imported goods will decline as the price of such goods raise due to the increase in exchange rate. Consumers in the home country can then compensate for their imported goods consumption by buying domestic goods rather than foreign goods, lowering the value of imports.

Only major exchange rate shocks, according to Baldwin and Krugman (1989), influence trade. In today's globalized world, industries are extremely interconnected. One industry's success is dependent on the success of the other. The value of a company's local currency debt would decline for foreign creditors when the country's currency depreciates, if it produces exported products that depend heavily on imported inputs. The exchange rate coefficient is expected to be negative due to the link between the exchange rate and trade, according to Singh and Mathur (2012).

CHAPTER 05

RESULTS AND DISCUSSION

5.1. Introduction

This chapter of the study examines the descriptive statistics of variables, diagnostic test estimation techniques, and other variables that affect Pakistan's agriculture exports of HS section level products to 19 North American and European Union countries. The analysis and discussion of all estimation results of variables, as well as their effect on Pakistan agriculture exports, are also included in this chapter. In the appendix, there is a list of Pakistan's agriculture exporting markets.

5.2. Descriptive Statistics

In this analysis, the relationship between Pakistan agriculture exports and trade barriers, as well as other macroeconomic variables, is examined using two models: a model for North American partner countries, and a model for European Union partner countries. Each model's descriptive statistics are listed as under.

Table 5.1 Descriptive Statistics of North American Countries:

Variable	Obs.	Mean	Max.	Min.	S.D
Export	208	306000000	4340000000	18433	963000000
GDP Part.	208	1430000000000	17900000000000	1150000000	4110000000000
GDP Pak.	208	186000000000	254000000000	131000000000	34200000000
Tariff	164	9.925	24.970	0.000	3.831
Exchange rate	190	60.158	576.973	0.989	141.276
SPS	208	224.36	9575	0	831.155

Data descriptive statistics are used to start the study. All variables of Pakistan's agriculture export partners (North American) are included in the descriptive statistics in

Table 6.1 above. The table indicates that the total number of observations used for all variables is 208, with 13 countries represented from 2003 to 2018. In this time frame, Pakistan agriculture exported goods worth an average of 306 million US dollars to its major agriculture export partners, with the highest agriculture export value of 4.34 billion US dollars and the lowest value of 18 thousand US dollars. Simple average tariffs on exports are levied at a rate of 9.92 percent, and the standard deviation indicates that there is approximately 3.831 percent dispersion in tariff rates. Sanitary and phytosanitary measures levied on agriculture exports average 224.36, with maximum sanitary and phytosanitary measures of 9575 and minimum sanitary and phytosanitary measures of 1, and standard deviation of approximately 831.155.

The combined GDP of all trading partners is on average 1430 trillion current US dollars, indicating their economy size and demand potential for Pakistan's exports. The overall GDP of all trading partners is 1 trillion and 790 billion current US dollars, and the minimum GDP of all trading partners is 1 billion 150 million US dollars, as shown in Table 6.1. During that time span, Pakistan's current US dollar GDP averaged 186 billion dollars. Pakistan's gross GDP is 254 billion US dollars, while its minimum GDP is 131 billion US dollars. The average tariff is $9.925, with a maximum of $24.970 and a minimum of 0.00. The tariff rate has the smallest standard deviation dispersion of 3.831. Pakistan's maximum exchange rate during that time span was 60.158, with the lowest being 0.989 and the highest being 141.276. All variables have different standard deviations, but the GDP of trading countries has the highest dispersion from mean.

Table 5.2 Descriptive Statistics of European Union Countries

Variables	Obs.	Mean	Max.	Min.	S.D
Export	96	160000000	943000000	1266663	226000000
GDP Part.	96	653000000000	2930000000000	20500000000	956000000000
GDP Pak.	96	186000000000	254000000000	131000000000	34200000000
Tariff	32	14.96	25.61	2.16	5.93
Exchange	96	38.61	281.52	0.68	84.67
SPS	96	9.593	22	0	5.962

All variables of Pakistan's agriculture export partners (European Union) are included in the descriptive statistics in Table 6.2. The table indicates that the total number of observations included for all variables is 96, with 6 countries represented from 2003 to 2018. In this

time frame, Pakistan agriculture exported an average of 160 million US dollars to its key agriculture export partners, with a maximum agriculture export value of 943 million US dollars and a minimum value of 1 million 266 thousand US dollars.

Sanitary and phytosanitary measures are levied on agriculture exports on average 5.593 times, with a maximum of 22 and a minimum of 0, and a standard deviation of approximately 84.67. Table 6.2 indicates that the average current US dollar value is $653 billion. Gross Domestic Product (GDP) of all trading partners indicates the scale and demand of their economies. Pakistan's agriculture export potential, while all trading partners' overall GDP is 293 trillion current US dollars, and all trading partners' minimum GDP is 20 billion 500 million US dollars. Pakistan's gross GDP is 254 billion US dollars, while its minimum GDP is 131 billion US dollars. The average tariff is 14.96, with a maximum of 25.61 and a minimum of 2.16. The tariff rate has the smallest standard deviation dispersion, at 5.93. Pakistan's exchange rate averaged 38.61 during that time frame, with lows of 0.68 and highs of 281.52. All variables have different standard deviations, but the GDP of trading countries have highest dispersion from mean.

5.3 Empirical Results of Panel Unit Root Test

Stationery tests are used in the initial stage to verify the presence of unit root in variables. The presence of unit roots in the data series must be determined. Levin, Lin, and Chu (2002) (LLC) and lm, Perasan, and Shin (2003) (IPS) are employed in this study. At the level, some variables are stationary, while others are stationary at the first difference. Table 6.3 shows the results for North American countries and Table 6.4 shows the results for European Union nations.

Table 5.3 Panel Unit Root (LLC & IPS) Test of North American Countries

	Level		**First Difference**		
	Common Unit Root	**Individual Unit Root**	**Common Unit Root**	**Individual Unit Root**	
Variables	**LLC**	**IPS**	**LLC**	**IPS**	**Decision**
Ln EXP	-2.2447	-1.7689	-10.9635	-7.0323	I(0)
	0.0124	0.0385	0.0000	0.0000	
Ln GDPI	-3.6078	-1.3839	-8.7664	-4.8062	I(1)
	0.0002	0.0832	0.0000	0.0000	

Ln GDPP	-0.0136	-3.6524	-2.3746	1.7827	I(1)
	0.4945	0.0001	0.0088	0.0344	
Ln Tariff	-7.1598	-3.0075	-8.5225	-4.1741	I(0)
	0.0000	0.0013	0.0000	0.0000	
Ln ER	4.0014	-6.4716	-128.672	-48.5361	I(1)
	1.0000	0.0000	0.0000	0.0000	
Ln SPSC	-5.3137	-5.9133	-7.6950	-7.3715	I(0)
	0.0000	0.0000	0.0000	0.0000	

Results of Levin, Lin and Chu (LLC) and Im, Pesaran and Shin (IPS) indicates Ln GDPP, Ln GDPI, and Ln ER are stationary at first difference, while Ln EXP, Ln Tariff and Ln SPSC are stationary at level.

Table 5.4 Panel Unit Root (LLC & LPS) Test of European Union Countries

	Level		**First Difference**		
	Common Unit Root	**Individual Unit Root**	**Common Unit Root**	**Individual Unit Root**	
Variables	**LLC**	**IPS**	**LLC**	**IPS**	**Decisions**
Ln EXP	-3.1265	-1.5715	-8.4187	-6.3463	I(1)
	0.009	0.0580	0.0000	0.0000	
Ln GDPI	-0.6666	-0.2369	-3.7110	-3.4418	I(1)
	0.2525	0.4064	0.0001	0.0000	
Ln GDPP	-0.0092	-2.4813	-2.61327	3.07524	I(1)
	0.4963	0.0065	0.0033	0.0013	
Ln Tariff	7.1765	3.2310	-5.6836	-3.5024	I(1)
	1.0000	0.9994	0.0000	0.0002	
Ln ER	-4.3585	-0.7281	-6.3887	-3.8081	I(1)
	0.0000	0.2333	0.0000	0.0001	
Ln SPSC	-7.4524	-4.0965	-4.4725	-3.6182	I(0)
	0.0000	0.0000	0.0000	0.0001	

Ln GDPP, Ln GDPI, Ln EXP, Ln Tariff, and Ln ER are stationary at first difference, but Ln SPSC is stationary at level, according to findings of Levin, Lin, and Chu (LLC) and lm, Pesaran, and Shin (IPS).

5.4. Hausman Test Results

The Hausman (1978) test is utilized to examine if a model has an endogeneity problem and to choose between random effects (REM) and fixed effects models (FEM). Table 6.5 of the European Union and 6.6 of North American countries shows the Hausman test results for Pakistan's main agriculture export partner countries in North America and Europe. In this regard, based on the variables in this analysis, the following hypothesis have been developed:

Hypothesis:

H0: Random Effect Model is better than Fixed Effect Model.

H1: Fixed Effect Model is better than Random Effect Model.

Table 5.5 Hausman Test Result of European Union Countries

Test Summery	Chi-Sq. Statistics	Chi-Sq. d.f	P-Value
Period Random	7.417593	4	0.1154

The Hausman test result for European Union countries shown above in the table accept the null hypothesis and reject the alternative hypothesis because the p-value is greater than 0.05 which means that random effect model is better than the fixed effect model.

Table 5.6 Hausman Test Result of North American Countries:

Test Summery	Chi-Sq. Statistics	Chi-Sq. d.f	P-Value
Cross Section Random	7.4584	5	0.1887

The Hausman test result for North American countries shown above in the table accept the null hypothesis and reject the alternative hypothesis because the p-value is greater than 0.05 which means that random effect model is better than the fixed effect model.

5.5 Endogeneity Results

The endogeneity problem in both the model of North American countries and the European Union countries is tested using the Durbin-Wu-Hausman (1978) test. Make the independent variable the dependent variable and regress the regression model; then make a residual series of that result and regress it on the main dependent variable; if the p-value of the residual series is less than 0.05, which indicates that it is important, then the issue of

endogeneity between the dependent and independent variables exists. The independent variables of Ln EXP and Ln GDPI, Ln GDPP, Ln ER, Ln Tariff, and Ln SPSC are checked for endogeneity. In this regard, based on the variables in this analysis, the following hypothesis have been developed:

Hypothesis:

H0: There is no endogeneity between variables.

H1: There is endogeneity between variables.

Sr. No.	Variables	Coefficients	P-Value
01	Residual of Ln GDPI	0.9207	0.0000**
02	Residual of Ln GDPP	-1.1764	0.0268*
03	Residual of Ln ER	0.0803	0.6144
04	Residual of Ln Tariff	-0.0140	0.9392
05	Residual of Ln SPSC	0.1088	0.1729

Table. 5.7. Endogeneity Results of North American Countries

Note * denotes that the rejection of null hypothesis at 1 % level of significance &** denotes that the rejection of null hypothesis at 5 % level of significance.

In the table above, the findings of the Durbin-Wu-Hausman test for the North American countries model reject the null hypothesis and confirm the alternative hypothesis. Ln GDPI because the p-value is less than 0.01 and Ln GDPP p-value is less than 0.05, indicating endogeneity between these variables, while Ln ER, Ln Tariff and Ln SPSC don't have endogeneity with Ln Exp because the value of probability of these variables is more than 0.05, indicating that endogeneity may not occur between these variables.

Table. 5.8. Endogeneity Results of European Union Countries

Sr. No.	Variables	Coefficients	P-Value
01	Residual of Ln GDPI	1.5053	0.0044**

02	Residual of Ln GDPP	1.5272	0.0371*
03	Residual of Ln ER	-1.2029	0.2352
04	Residual of Ln Tariff	0.0932	0.7422
05	Residual of Ln SPSC	0.2584	0.3461

Note * denotes that the rejection of null hypothesis at 1 % level of significance &** denotes that the rejection of null hypothesis at 5 % level of significance.

The Durbin-Wu-Hausman test findings for the North American countries model in the above table reject the null hypothesis and accept the alternative hypothesis of Ln GDPI because the p-value is less than 0.01 and Ln GDPP p-value is less than 0.05, indicating that endogeneity exists between these variables, whereas Ln ER, Ln SPSC, and Ln Tariff do not have endogeneity with Ln Exp because the prob value of these variables is greater than 0.05.

5.6 Estimation Technique of Panel Generalized Method of Moment Results

Arellano and Bond (1991) invented the generalized system of moments (GMM) technique. Exogenous instruments for models are difficult to locate that are acceptable for the mode; hence the lagged values of the independent and dependent variables are utilized as model instruments in this analysis.

The model's serial association and heteroscedasticity issues are also solved using the Generalized Method of Moment (GMM). To resolve the endogenous issue in the GMM model, instrumental variables are utilized; this strategy is also utilized in regression to solve simultaneity bias problems between the independent and dependent variables; variables, as well as the error term. GMM is a more advanced form of instrumental variable that provides accurate and unbiased estimates even though the model has autocorrelation and heteroscedasticity issues.

The results of the regression of independent variables on dependent variables utilizing the GMM method are shown in Table 6.9. GMM estimate for all (selected) level of HS segment, goods are exported from Pakistan to major export partners (North America and the European Union). According to the theory of trade, the link between the dependent variable and the independent variable with the expected sign is right.

Table 5.9 GMM Results of North American Countries

Sr. No.	Variables	Coefficients	P-Value

01	Ln GDPI	0.9839	0.0000*
02	Ln GDPP	0.3934	0.4486
03	Ln Tariff	-1.7382	0.0037*
04	Ln ER	-0.0178	0.7682
05	Ln SPSC	-0.4951	0.0000*
07	Constant (C)	6.9046	0.0101
	Number of Observation	103	
	Number of Instruments	15	

Note: * denote the 5-present level of significance.

In these outcomes cross section random impact with unbalanced 103 observations are used and the instruments which are used is Ln GDPI(-1), LN GDPP(-1), LN ER(-1), Ln Tariff(-1), Ln GDPI(-2), LN GDPP(-2), LN ER(-2), Ln Tariff(-2), Ln GDPI(-3), LN GDPP(-3), LN ER(-3) and Ln Tariff(-3), to find the impact of SPSC and Tariff on agriculture exports of Pakistan to North American countries. The above table shows that due to a 1% change in GDP of partner countries, Pakistan increased agriculture exports to these 13 North American countries by 0.98 %, with a p value of 0.0000, which is less than 0.05 highly significant. Due to a 1% change in GDP of Pakistan, Pakistan increased agriculture exports to these 13 North American countries by 0.39 %, with a p value of 0.4486, which is greater than 0.05 highly insignificant. Alaeibakhsh & Ardakani (2012), Kaur and Nanda (2011), Ronen (2017), Chen, and Hartarska, and Wilson (2018) produced similar results. The GDP of the world's major agriculture export markets captures the impact of country size. The GDP of importing countries is a proxy for their market ability to buy Pakistani agriculture exports because GDP rises in tandem with their income and marginal propensity to purchase (MPC). It resulted in increased demand for both local and imported products, resulting in increased import demand for Pakistani products. A 1% increase in GDP of Pak increased agriculture exports by 0.39%.

According to the GMM results, tariffs levied on Pakistan agriculture exports by trade partner’s countries (North American) decreased agriculture exports by 1.73 to these 13 countries from 2003 to 2018. The p – value is 0.0037, indicating that the result is highly significant and has a negative coefficient sign. Chen and Wilson (2017), Olper and Raimondi (2002), and Fassarella, Souza, and Burnquist (2011) was supported by this result. The tariff rate is a crucial and significant factor that influences Pakistan's agriculture exports. Partner countries levy tariffs on Pakistani agriculture exports,

increasing the total cost of the goods and making it less attractive for countries like Pakistan to sustain export volumes.

In Table 6.9, the estimated results of cumulative sanitary and phytosanitary (SPS) measures show that Pakistan agriculture exports 0.49 percent of the 13 North American countries due to one current rise in SPS measures. The p – value is 0.0000, which indicates that is highly significant at a confidence interval of 99 percent. The result is supported by Alaeibakhsh & Ardakani (2012), Peterson et al. (2013), Kareem, et al. (2016), and Thuong (2018). Partner countries have levied cumulative sanitary and phytosanitary (SPSC) measures on Pakistan's exports because the country fails to fulfill the SPS requirements.

The results of the GMM estimation revealed that the impact of Pakistan's exchange rate on agriculture exports to these 13 North American countries is insignificant with a negative sign. As Pakistan's currency depreciates (increases in exchange rate) by 1%, Pakistan's agriculture exports decrease by 0.02 percent. Since the Pakistani currency is depreciating slowly in terms of the US dollar, it has a positive effect on Pakistani imports, but the position of the exchange rate in overall trade is insignificant.

Table 5.10. GMM Result of European Union Countries

Sr. No.	Variables	Coefficients	P-Value
01	Ln GDPI	0.7688	0.0157*
02	LN GDPP	1.0045	0.0303*
03	Ln Tariff	-0.0876	0.0494*
04	Ln ER	-0.7646	0.3600
05	Ln SPSC	-0.2160	0.0444*
	Number of Observation	96	
	Number of Instruments	10	

Note: * denotes the 5 persent level of significance.

GMM with Panel EGLS (Period Weight) with unbalanced 26 observations is used in this study, and the instruments used are Ln GDPI (-2), LN GDPP(-1), LN ER(-1), Ln 1+SPSC(-1), Ln Exp(-1), Ln Exp(-2), LN GDPP(-2), Ln 1+SPSC(-2), and Ln 1+SPSC(-3) to determine the impact of SPS and Tariff on agriculture exports of Pakistan to 6 European Union countries. The results of table 6.10 show that Pakistan's exports to these 06 European Union countries increased by 0.768 percent as a result of a 1% change in GDP in partner countries, with a p value of 0.0157, which is less than 0.05, indicating a positive and strong impact on Pakistan agriculture exports. Pakistan's agriculture exports to these 06 European Union countries increased by 1.0045 as a result of a 1% change in GDP in

Pakistan, with a p value of 0.0303, which is less than 0.05, indicating a positive and strong impact on Pakistan exports. The impact of country economy size is captured in the GDP of the world's major export market countries. The GDP of importing countries is a proxy for their ability to demand Pakistani agriculture exports. Their income level and marginal propensity to consume (MPC) rise in tandem with GDP growth. As a result, demand for both domestic and imported goods have increased. As a result, the demand for Pakistani products has increased.

Similarly, increases in Pakistan's GDP have a strong impact on the export of the country, with a positive indication of 1 percent increases in Pakistan's GDP leads to increase 1.004 percent Pakistan's agriculture exports to European Union countries. The probability value of 0.0303 indicates that Pakistani exports have a significant effect. The researchers including Hartarska, and Wilson (2018), and Devadason and Govindaraju (2016) have forwarded similar results.

According to the GMM results, tariffs levied on Pakistan exports by trade partners countries (European Union) decreased Pakistan agriculture exports by 0.087 percent to these 06 countries from 2003 to 2018. The p-value is 0.0494, indicating that it is significant at a 95% confidence interval with a negative sign. Tariff rates are a critical and significant factor that influences Pakistani agriculture exports. Importing countries levy tariffs on Pakistani agriculture products, increasing the total cost of the goods and making it less attractive for countries like Pakistan to sustain agriculture export volumes. Olper and Raimondi (2002), Fassarella, Souza, and Burnquist (2011), and Dong and Zhu (2015) also produced same results with negative sign.

In Table 6.10, the estimated outcomes of sanitary and phytosanitary (SPS) procedures show that Pakistan's agriculture exports to the 06 European Union countries have decreased by 0.216 percent as a result of 1 present increase in sanitary and phytosanitary (SPSC) measures. The p – value is 0.0444, indicating that it is significant at the 95 percent confidence level. Importing countries enforce sanitary and phytosanitary (SPSC) measures on Pakistani agriculture exports because Pakistan does not fulfill the SPS requirements. The similar results produced by Silva and Tenreyro (2006), Kareem, et al. (2016), Hermawan (2019), and Alaeibakhsh & Ardakani (2012).

In the period 2003-2018, the exchange rate of Pakistan on agriculture export growth of HS section items to selected North American countries is analyzed. The results of the GMM analysis revealed that the impact of Pakistan's exchange rate on agriculture exports to these 13 North American countries is insignificant with a negative sign. As

Pakistan's currency depreciates (increases in exchange rate) by 1%, Pakistan exports fall by 0.764 percent. Since the Pakistani currency is depreciating slowly in terms of the US dollar, it has a positive effect on Pakistani imports, but the position of the exchange rate in overall trade is insignificant.

5.7 Sargan J Test Results

The Sargan test was created by J.D. Sargan to verify the validity of instruments. The accuracy of the GMM estimator is checked using the validity of instruments. If the instruments are exogenous, the error term is uncorrelated. The following is the Sargan test hypothesis:

HO: The instruments are valid.

H1: The instruments are not valid.

Table 5.11. Sargan J test Result of North American Countries

Sargan = (n-k) R^2	Chi square (r, df)	Sargan = Chi Square	Conclusion
6.41	7.815	6.41< 7.815	Accept (H0)

The study supports the null hypothesis since the value of Sargan test is less than the critical value of Chi Square, indicating that the instruments are utilized to evaluate the original GMM findings of 13 North American countries are valid.

Table 5.12. Sargan J test Result of European Union Countries

Sargan = (n-k) R^2	Chi square (r, df)	Sargan = Chi Square	Conclusion
8.32	11.071	8.32 < 11.071	Accept (H0)

The study supports the null hypothesis because the Sargan test value is less than critical value of Chi Square, indicating that the instruments are utilized to evaluate the original GMM results of 06 European Union countries is valid.

CHAPTER 06

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

SPS measures have a very important role on agriculture exports. Non-tariff barriers i.e. SPS is playing a major role in Pakistan's bilateral trade with both European Union and North American countries. According to GMM's estimation in comparison to European Union and North American countries used a disproportionately large number of SPS measures against Pakistan agriculture exports, which hampered export in both selected regions. In this study SPS have negative impact on Pakistan agriculture exports of both European Union and North American countries. Other macroeconomic factors, such as trade partners' GDP and Pakistan GDP have positive effect on Pakistan agriculture exports in both cases of European Union and North American countries. Whereas tariffs and exchange rate, have a substantial but negative impact on Pakistan's agriculture exports. In addition, the study's goals are to investigate the impact of SPS and tariff measures on Pakistan's agriculture exports to both European Union and North American countries. This study makes use of macroeconomic variables such as agriculture exports, Pakistan's GDP, SPS, exchange rate and trade partners GDP. For the period 2003-2018, SPS, tariffs and exchange rates were calculated using panel data at the HS 2 digit code level.

To explore the effect of non-tariff obstacles and other factors on agriculture export of Pakistan, this study employs econometric techniques such as the LLC (Levin, Lin, and Chu) and LPS (Im, Pesaran, and Shin) stationary tests, Hausman test, and Panel Generalized Method of Moment (GMM). The LLC and LPS tests show that Pakistan's GDP, at the level, the tariff and SPS variables are stationary, but exports, export partners' GDP, and Pakistan's GDP variables are stationary at first distinction. For calculating gravity model variables for Pakistan's bilateral exports to European Union and North American countries, the outcomes of Hausman test shows that the cross-section FEM is preferable. For instrument validity, J-statistics is used as a diagnostic test. It demonstrates that the instruments are fit for the purpose of the model.

6.2 Gap for Future Research

Researchers may be able to pinpoint the particular non-tariff barriers that Pakistan employs against imports, as well as how they affect Pakistan's and it's trading partner's

trade volumes. Furthermore, if someone want to research on this topic then they will research on commodity level of different commodities of Pakistan like rice, citric fruits (mangoes) etc to see the impact of SPS on these different commodities. It is very difficult to find data on econometric methods for a long span of all commodities at this time. Its value must therefore be taken in to consideration in the future.

6.3. Recommendations

SPS and other macroeconomic factors have a major impact on Pakistan's exports. Trade barriers, such as SPS measures, as well as the tariff, have hampered Pakistan's exports from 2003 to 2018. The historical trend shows that trade barriers imposed by developing countries have primarily reduced Pakistan's exports. Pakistan's exports may implement such measures as a result of its membership in the WTO. In developed and emerging export markets, agricultural products must meet a significant number of SPS specifications. Some recommendations for dealing with these problems are provided below based on research.

- To increase exports, Pakistan's relevant ministries and institutions may improve trade policies and programs across all sectors, allowing traders to adopt standards that avoid SPS measures. The government could also help exporters by providing scientific and legal access to WTO procedures, as well as the means to comprehend the scientific justifications for trading partners' SPS requirements. Because compliance with SPS standards is critical for the safety of humans, animals, plants, and the environment, Pakistan exporters require financial and technical assistance to improve product quality and upgrade existing technology.
- The findings show that, in addition to SPS measures, Pakistani exportable products face a high tariff, particularly from developed countries. Pakistani governments may renegotiate existing tariff agreements with trading partners in order to reduce the country's massive trade deficit and boost export volume.
- The WTO may reduce the applied tariff rate for its members even further. As a result, developing countries like Pakistan will benefit from trade liberalization as well. Pakistan may enter into additional preferential trade agreements with major trading partners in order to reduce the tariff's impact on trade.

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