Increasing Pakistan's Share of Fruit Exports

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Abstract:

Pakistan's fruit sector is a shining example of how fast it has grown and the opportunities that hold in the realm of agriculture and its ability to overcome global competition. Pakistan takes pride in diverse fruit types that are widely spread over its vast fertile lands, making it an important state player in the world fruit business. This preface is a preamble for comprehensive analysis of public policies aimed at nurturing and harnessing full potential of Pakistan's fruit industry. Having increased significantly over the last decade, citrus and mangoes have been leading exporters of Pakistani fruits. This growth has been underscored by robust government interventions like "National Programme for Enhancing Command Area of Barani Areas of Pakistan" and 'Pakistan Fruits and Vegetables Export Strategy 2023-2027'. Such measures together with partnerships and pro-active moves have boosted Pakistan's capacity of fruit production to new heights thus contributing meaningfully to national economies as well as global trade. In spite of natural calamities as well as market fluctuation challenges, resilience and hope are shown by Pakistan's exports of fruits. The government's dedication to promoting fruit farming plus enabling regulations combined with a series.

Key words:

Fruit sector, Export strategy, Citrus and mangoes, Government interventions, Global trade

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Executive summary

The horticulture sector in Pakistan presents significant potential for growth in exports, but it faces various challenges that need to be addressed to capitalize on this opportunity. Key strategies to enhance fruit exports include improving yields through methods like Ultra-High Density Plantation and better seeds, establishing model processing facilities and cold chain infrastructure, fast-tracking quality and health safety standards protocols, obtaining organic and Geographical Indication certifications, fostering public-private partnerships, diversifying markets and products, offering export incentives, attracting investments from international market leaders, providing credit lines for processing units, and focusing on capacity building, training, and technical support for farmers. By implementing these strategies, Pakistan can unlock its horticulture sector's full potential, contributing to economic growth and development.

Background

Pakistan's fruit exports have experienced significant growth, with a recorded value of USD 492 million in 2021, marking a notable increase of 17.7% compared to previous years and with a slight decline to USD 370 million in 2022 (Map, 2024). Currently, approximately 91% of the fruits produced in Pakistan are consumed locally, as the domestic demand, driven by a growing population and rising disposable incomes, absorb most of the horticulture produce. The remaining 9% is either exported (6%) or processed into value-added product such as pulps, concentrates, frozen and preserved products (3%). Citrus and mangoes stand out as the primary fruits exported from Pakistan, collectively constituting over 60% of the total fruit exports. The government of Pakistan has been actively involved in implementing initiatives aimed at enhancing fruit production and expanding export volumes. For instance, strategies such as the 'Pakistan Fruits and Vegetables Export Strategy 2023-2027,' as part of the National Priority Sectors Export Strategy (NPSES) Initiative, underscore the government's commitment to bolstering horticulture exports in the forthcoming years. In addition to this, Trade Development Authority of Pakistan is also working on enhancing quality fruit production and exploring venues for export. Furthermore, the "National Programme for Enhancing Command Area of Barani Areas of Pakistan" was launched with the objective of cultivating fruit crops on over 18,000 hectares within five years. The total fruit production in Pakistan has demonstrated an upward trajectory, increasing from 9.48 million metric tons to 11.13 million metric tons during the period of 2018-2021. This surge in production capacity has contributed significantly to the growth in fruit exports. Despite challenges such as natural disasters impacting fruit crops,

particularly floods affecting vegetable cultivation, Pakistan's fruit exports exhibit resilience and promising growth prospects. The government's concerted efforts to boost fruit production, coupled with supportive policies and exploration of new markets, position Pakistan favorably in the global fruit export arena.

Introduction

Since its creation, Pakistan has faced a trade deficit, except for brief periods. While the country exports goods like cotton products, rice, leather, fish, and sporting goods, the variety remains limited. Additionally, the export markets are concentrated, with nearly half of all exports heading to just seven countries: The United States, the UAE, China, the United Kingdom, Afghanistan, Iran, and Germany. Owing to continuous trade deficit, the recent trade policies mainly focused on export expansion, competitiveness and transformation from factor to efficiency and innovation based economy.

Pakistan is actively pursuing bilateral and multilateral trade agreements including South Asian Free Trade Area (SAFTA) and Pak-China Free Trade agreements. Pakistan is also a member of the World Trade Organization (WTO) and enjoys GSP and GSP Plus status from the USA and the European Union (EU), respectively. However, Pakistan could not reap benefits from all these arrangements which highlight the need to enhance the competitiveness and supply of exports at international market prices. (Ahmad & Anwar, n.d.).

Agriculture constitutes a significant sector in Pakistan's economy, contributing approximately 19% to the GDP and employing about 42% of the workforce (Ahmad & Anwar, n.d.). Globally, fruit production is increasing by over 2% annually, with fruit trade growing at a rate of 7% per year, exceeding production growth, and accounting for 9% of globally grown fruits (Gabriel, 2023). Notably, Chile is a prominent exporter of diverse fruits, capitalizing on the expanding Asian market. Similarly, Spain leads fruit exports in the EU, particularly excelling in the citrus segment (RoboResearch, 2018). Despite limited cultivable land, these countries achieve high yields per unit area, contributing significantly to the global fruit market.

In terms of monetary value, the Netherlands, USA, and France emerged as the top three fresh fruit exporters in 2019, with exports totaling $1.162 billion, $885 million, and $634 million, respectively (Foreign Agricultural Service, 2019). Pakistan cultivates various fruit varieties across more than 0.87 million hectares, yielding over 7.2 million tons of produce (Gabriel, 2023). However, despite its significant contribution to the global fruit market, Pakistan's fruit exports represent only 0.37% of the total, contributing 0.1% to the GDP of Pakistan.

Pakistan primary exports include citrus, mangoes, and bananas, with 'Kinow' oranges and mangoes leading in export volume. The surge in Kinow demand

amid the COVID-19 pandemic bolstered Pakistan's export revenues, reaching US $253 million. Additionally, Pakistan exceeded its mango export target, achieving 140,000 tons and generating $127.5 million in revenue in 2020 (Shah, 2021).

Various organizations, including the Pakistan Horticulture Development & Export Company (PHDEC), the Trade Development Authority of Pakistan, and the All Pakistan Fruit & Vegetable Exporters, Importers & Merchants Association, actively contribute to increasing fruit exports. Governmental bodies like the Agriculture Department and research institutions such as the Horticultural Research Institute of Ayub Research, Faisalabad, are dedicated to addressing challenges faced by fruit growers and enhancing fruit crop productivity and quality (Gabriel, 2023).

Statement of Problem

Although Pakistan's fruit exports have seen a significant potential, primarily driven by citrus and mangoes, but face challenges threatening growth. Over-reliance on a few fruits, quality control issues, supply chain inefficiencies, and trade barriers hamper progress. To address these challenges, diversifying export products, improving infrastructure, enhancing quality control measures, adopting international agricultural practices, renegotiating trade agreements, and fostering government-stakeholder collaboration are crucial. Therefore, addressing these challenges and coming up with realistic Polices and Frameworks to overcome these impediments are crucial for Pakistan to maintain and enhance its position in the global fruit export market.

Scope / ToRs

The paper aims to address the imperative need for enhancing Pakistan's fruit export share, currently standing at a mere 0.37% of the global market, to 1% within the next five years. Recognizing the significance of the fruit export industry for economic growth and development, the paper will conduct a thorough examination of Pakistan's current fruit export landscape, scrutinizing export destinations, types of fruits exported, and prevailing challenges. It will explore strategies aimed at achieving sustained growth in export tonnage, improving quality assurance and packaging standards to meet international requirements, increasing production per unit of area and leveraging innovative farming techniques. Moreover, the paper will assess existing policies related to fruit exports, identifying necessary reforms to facilitate growth, and evaluate the capacities of relevant organizations involved, proposing enhancements for better coordination and efficiency. The paper will recommend a comprehensive action operational plan to achieve the desired outcome.

Literature Review

Quantitative and qualitative methods of research have been adopted. Primary data was collected through spot interviews with the concerned stakeholders which included the Area Manager TDAP, Peshawar. A meeting through Zoom link was conducted with the Mr. Ijaz Ahamad, Provincial Coordinator KP, FAO. and Mr. Qasim Ali, Research Officer, M/o Commerce, Islamabad, Pakistan. The secondary sources of data were retrieved from Economic Survey of Pakistan, World Bank website, Official websites, Research Reports, Books and Policy Briefs. Analytical tools used to analyze the various situations and conditions are as follow;

- Situational Analysis
- Stakeholders Analysis
- HEAT Analysis
- Comparative Analysis
- SWOT Analysis

Situational Analysis

Global Trade in Fruits

The overall global trade and demand for horticulture commodities has increased over time. It has quadrupled, from USD 134 billion (2018) to USD 154 billion in 2022. Trade has grown six times for fruits. The cumulative import of Fruits has increased to 13% in last 05 years. (Council, 2023)

Pakistan has failed to take advantage of the increasing global demand due to a lack of attention and insufficient investment in essential infrastructure such as cold chain facilities, packing houses, efficient logistics, and processing units etc. While Pakistan exports only two out of the top five traded fruits globally, namely oranges and mangoes, its apple and grape plantations do not meet the quality and variety standards necessary for export and are primarily suited for domestic consumption.

World has a growing interest in new flavors and fruit varieties. This leads to a higher market value for exotic & wild fruits with most imports in US, Europe and other Developed Countries. Communicating the health benefits of these fruits. Dragon Fruit, Passion, Custard Apple, Pomegranates, lychees and passion fruit are grown in Pakistan and are in the highest demand. World Imported value for the year 2022 for Dragon Fruit was 3.8 USD billion whereas Passion Fruit & Rambutan was recorded as 3.8 USD billion and Avocado is leading Exotic Fruit category with the import worth of 7.9 USD billion. (Map, 2024).

Major Exotic Fruit (Importers)

Dragon Fruit

In 2018, global dragon fruit imports amounted to USD 3.34 billion, with a steady increase observed over the following years, reaching USD 3.84 billion by 2022. China emerged as the largest importer, with import values steadily climbing from USD 0.85 billion in 2018 to USD 1.26 billion in 2022. The United States of America followed China, experiencing a slight fluctuation in import values but ultimately increasing from USD 0.22 billion in 2018 to USD 0.30 billion in 2022. (Map, 2024)

Passion Fruit & Rambutan

Top importers countries of Passion Fruit (Fresh tamarinds, cashew apples, jackfruit, lychees, sapodillo plums, passion fruit, carambola, pitahaya)

In 2018, global fruit imports totaled USD 3.34 billion, which increased steadily over the subsequent years, reaching USD 3.84 billion by 2022. China emerged as the largest importer, with its import values rising from USD 0.85 billion in 2018 to USD 1.26 billion in 2022. The United States of America followed, experiencing fluctuations in import values but ultimately increasing from USD 0.22 billion in 2018 to USD 0.30 billion in 2022. (Map, 2024)

Avocado

Top importers countries of Avocado Fruit (Fresh and Dried)

In 2018, global fruit imports amounted to USD 6.04 billion units, marking the commencement of a trend that saw steady growth in subsequent years, reaching USD 7.93 billion units by 2022. The United States of America emerged as the largest importer, consistently increasing its import values from USD 2.44 billion in 2018 to 3.38 billion in 2022. (Map, 2024)

Pakistan's Fruit Production

According to agricultural data, Pakistan cultivates approximately 0.87 million hectares of land for fruit production, yielding an annual harvest of 7.2 million tons of fresh fruits. However, the average yield per hectare stands at 8.23 tons, significantly lower than that of advanced nations, which typically range from 20 to 25 tons per hectare. (M/o Commerce, 2023). Horticulture has great potential because of the huge area available for horticultural plantations. Pakistan's climate is most suitable for the cultivation of indigenous and exotic fruits and vegetables. Some of the major fruits produced are Mangoes, Oranges, Apples and Peaches. In Pakistan, while Mangoes and Oranges contribute about 45% of the gross fruit production in Pakistan. Production of Peach, Apples, Dates, Grapes, Persimmon, and Pomegranate, reflecting the strong domestic market demand for horticulture crops. Citrus fruits, primarily the mandarin variety Kinnow, are the largest fruit crop group by volume and is a major export revenue earner. Pakistan is the fifth largest

producer of Dates. The Mangoes production is in millions of tons but only a small fraction of the same is exported annually. A large number of indigenous fruits and vegetable commodities are produced in the country and there is scope for the cultivation of exotic crops as well. The primary horticultural products in Pakistan include citrus and mangoes. Citrus fruits account for 35% of the overall fruit production, followed by mangoes at 25% (NFSR, 2021). Pakistan is 12th largest producer 18th largest exporter of Citrus, 5th largest producer, 7th largest exporter of Mangoes and 5th largest producer, 8th largest exporter of dates. (M/o Commerce, 2023)

Pakistan's Horticulture Production and Exports

In 2018, Pakistan's fruit exports amounted to USD 0.43 billion, witnessing fluctuations in subsequent years, reaching USD 0.37 billion by 2022. This downward trend reflects a degree of variability in the export performance of Pakistan's fruit industry over the specified period, with contribution of 0.098% in GDP 2022. Further analysis of factors influencing these fluctuations, including market dynamics, trade policies, and agricultural practices, would be essential for understanding the trajectory of Pakistan's fruit exports and devising strategies to enhance its export competitiveness in the future. (Map, 2024)

Horticulture development can be categorized into five stages; subsistence, semi-commercial, commercial, value addition through processing, and value addition for high end products. Pakistan falls in the third stage. It has graduated from semi-commercial scale farming and is currently in between commercial scale farming and value-added inputs for processing stage.

Pakistan Current Fruit Exports (World Wide)

Pakistan exports represent 0.3% of world exports for fruits. From 2018 to 2022, global fruit exports witnessed fluctuations, starting at USD 0.43 billion in 2018, declining to USD 0.39 billion USD in 2019, then rising to USD 0.41 billion in 2020, peaking at USD 0.49 billion in 2021, and finally decreasing to USD 0.37 billion in 2022. Notable individual country trends include the United Arab Emirates, which experienced a fluctuating pattern from USD 0.04 billion in 2018 to USD 0.07 billion in 2022. Similarly, Afghanistan's exports fluctuated from USD 0.08 billion in 2018 to USD 0.04 billion in 2022. These fluctuations reflect the dynamic nature of global fruit trade influenced by factors such as market demand, trade policies, and economic conditions (Map, 2024)

Pakistan major Fruits Export Destinations (OEC, 2024)

Tropical Fruits: Exports: $201 million Main destinations: UAE ($45.3M), UK ($40.1M), Kazakhstan ($38M), Afghanistan ($8.06M), Oman ($7.66M)	***Citrus:*** Exports: $220 million Main destinations: Russia ($47.4M), Afghanistan ($35.9M), Indonesia ($34.1M), Philippines ($23.4M), UAE ($14.7M)
Grapes: Exports: $1.62 million	***Bananas:*** Exports: $12.4 million

Main destinations: Greece ($703k), US ($373k), Australia ($128k), Canada ($66.4k), UK ($53.6k)	Main destinations: Afghanistan ($6.53M), Kazakhstan ($5.5M), Uzbekistan ($404k), UAE ($4.09k), Tajikistan ($422)

Pakistan Current Fruit Export (World Wide, Product Wise)

Pakistan's horticultural exports are notably focused on a select few commodities, with citrus fruits, particularly kinnows, prominently leading the fruit segment and accounting for approximately half of the sector's revenues. When considering both fruits and vegetables, this share amounts to about 30%. Mangoes and dates are also significant contributors to Pakistan's fruit export portfolio, representing 24% and 14% of total fruit exports, respectively. While bananas and dried fruits contribute to exports, their volumes remain relatively limited according to national export data. In the period from July to January for the years 2022-23 and 2023-24, Pakistan's fruit exports showed an increase from 187.12 to 206.16 million USD in the grand total. Notable increases were observed in the export of dates, figs, pineapples, mangoes, avocadoes, and guavas, rising from 80.23 to 100.47 million USD. Among the top destinations for these exports, the United Arab Emirates witnessed a rise from 26.10 to 37.85 million USD, followed by the United Kingdom, Kazakhstan, Germany, Oman, and Saudi Arabia. Citrus fruits, fresh or dried, also saw an increase in exports from 60.89 to 62.03 million USD, with significant contributions from Afghanistan, the UAE, Russia, and the Philippines. Bananas and plantains, fresh or dried, surged from 20.99 to 30.02 million USD in exports, with substantial increases to Kazakhstan and Afghanistan. However, there were declines in exports of nuts nes, dried fruits, and various other categories during this period. (Source: Primary Data collected from M/o Commerce. Mr Babar Khan, DS Middle East, Africa, detail report at Annex-A)

Pakistan Export Potential

Pakistan is blessed with four seasons and favorable ecological environment for the production of numerous fruits and vegetables and it stands among top ten producers and exporters of mangoes, citrus fruits and dates (Ahmad, 2021). It's noteworthy that while Pakistan produces various horticultural commodities, its exports are limited to only a few globally traded items, namely citrus, Bananas, Mangoes and Dates. Sindri, Chaunsa, Anwar Rator, Mango varieties are exported to US and Europe. Sargodha Kinnu, Citru is exported to UAE and Saudi Arabia. Asil Date, Dhaki Date (KP & Baluchistan), Begum Jhangi, Karbalai (Sindh), Sharifa Date (Baluchistan) varieties of dates are majorly exported to Middle East (Mr. Qasim Ali, RO M/o Commerce, and Islamabad).

Pakistan, horticulturalists successfully experimented with the local cultivation of exotic fruits like olives, papayas, figs, lychee, strawberry, avocados, and kiwi that had earlier been imported from different countries for millions of dollars every year. Recently, a farmer Annas Bhatti, central

Punjab district of Sheikhupura developed the country's biggest-ever Papaya farm in the South Asian country. "However, if we are to cultivate them for export purposes, we will have to take care of their quality and standard before and after planting. The grading, packaging, and storage of fruits and vegetables would have to be aligned with international standards," (viewsnews & Luqman, 2024).

Dragon fruit, is now being successfully grown in Pakistan, particularly in Sindh's coastal areas like Karachi and Thatta. Pioneering farmers like Captain Rizwan Rehman have yielded promising results, selling dragon fruit at premium prices (between Rs2,000 and Rs3,000 per kg). Techniques like planting 8,000 plants per acre can generate significant revenue (estimated Rs2 billion annually). Experts see massive potential for dragon fruit exports, considering Vietnam's annual exports of $1.1 billion (Ali, 2024)

Pakistan has great potential to capture and capitalize on the global import market for Exotic and Wild Fruits like Dragon Fruit worth of 3.8 USD billion, Passion Fruit & Rambutan worth 3.8 USD billion and Avocado is leading Exotic Fruit category with the import worth of 7.9 USD billion.

Understanding of comparative advantage is helpful in identifying the effects of policy changes and describing economic welfare. Pakistan need an in-depth understanding of its comparative advantage for gaining benefits from the international trade.

Legal and Institutional Framework:

To accelerate export growth, the Ministry of Commerce (MoC) has devised the Strategic Trade Policy Framework (STPF) 2020–25, Pakistan Export Strategy Fruits and Vegetables 2023-27 and National Food Security Policy 2018 by M/o National Food Security & Research.

Major Stakeholder

Major Stakeholders in formulation of the policy framework and Export Strategy are Agriculture Policy Institute All Pakistan Fruit & Vegetable Exporters, Importers & Merchants Association , Federation of Pakistan Chambers of Commerce & Industry (FPCCI), Ministry of Commerce, Ministry of National Food Security & Research, Pakistan Horticulture Development and Export Company, Pakistan Agricultural Storage and Services Corporation (PASSCO), PCSIR Laboratories, Pakistan Standards & Quality Control Authority (PSQCA), Small and Medium Enterprises Development Authority (SMEDA), TDAP, University of Agriculture Faisalabad, Horticulture Research Institute of Ayub Research Faisalabad

Coverage and Involvement of Stakeholders

Analysis shows wide range of stakeholder's coverage across the fruits value chain including farmers, exporters, traders, processors, government agencies, research institutions. It has identified upstream stakeholders like input

suppliers and farmers, midstream actors like exporters, traders and processors are also mentioned. However, downstream stakeholders involved in distribution, marketing and retail are not covered in as much detail.

Private sector stakeholder's involvement like farmer's groups, exporters associations were actively involved in consultations to develop the strategy. Government ministries and departments related to agriculture, trade, and research played key roles in strategy formulation. Roles and responsibilities of different public and private stakeholders are delineated for implementation. However, involvement of downstream stakeholders is not clear. International organizations like ITC provided technical support for the strategy design but their ongoing involvement is not specified. Civil society organizations, educational institutions have been recognized but their engagement needs strengthening. Consumer preferences and needs are only briefly covered but not directly incorporated in the strategy.

In summary, policies have covered a wide array of national stakeholders in development and assigning roles in implementation. However, involvement of international partners and downstream stakeholders can be expanded. Direct integration of consumer insights is also an area for improvement.

Realistic vs Idealistic Objectives

Comparison of some of the realistic versus idealistic objectives in the Pakistan Export Strategy document:

- Increasing horticulture exports to $1 billion by 2025.

This objective seems idealistic keeping in view our last 05 years' trends of exports. It shows a decreasing trend from USD 492 million in 2021 to USD 370 million in 2022 (-$112 million variation in terms of loss). Various Natural factors such as floods, pests attack and changes in climate pattern coupled with absence of holistic export strategy, inefficient regulations, and underutilization of competitive advantage are the major contributing factors.

- Achieving 100% compliance with international standards.

Full compliance requires extensive reforms across the value chain and may be difficult to achieve in 5 years given the scale of changes required. A more gradual target would be more realistic.

- Diversifying export markets by targeting new regions like Africa, Central Asia, South America.

Expanding into new emerging markets presents good opportunities for market growth and diversification. With proper export promotion and trade facilitation, these targets seem within reach.

- Establishing 10 agro-economic zones.

Setting up new zones involves lengthy approval processes, land acquisition

and infrastructure development. The target may be too ambitious within the strategy timeframe and resources.

- Doubling farmers' incomes.

Income growth at this scale requires addressing structural issues like access to finance, markets, technology etc. It is an ideal long-term goal but may not materialize in the short-medium term envisioned.

Tonnage Growth Strategy:

To achieve sustained growth in fruit exports, Pakistan must adopt a comprehensive strategy aimed at increasing productivity per unit area and expanding cultivation areas. This strategy should focus on:

- Productivity Enhancement
- Technology Adoption:
- Expansion of Cultivation Areas:

Key areas in the above mentioned Framework are:

1. How to increase production per unit of area through Integrated Pest Management (IPM) particles by helping farmers to use effectively managing pests and disease outbreak through biological control agents, crop rotation and cultural practices to control pest population, Improving Soil Health through organic amendments and soil testing and nutrients management planning and Water Management though adopting water efficient technique such as drip irrigation, laser leveling, sprinkler irrigation.
2. Enhancing organizational capacitates to foster collaboration and synergy in fruit export sector by involving all stakeholders including Govt agencies, industries association, exporters, farmers and consumers.
3. Engaging stakeholders, famers awareness and Training program to enhance technical know who market intelligence and value added services
4. QA and Packaging for ensuring quality and safety of exported products throughout the supply chain including Certification by establishing testing labs and certification bodies as per international standards, traceability system to track the origin production process and distribution of fruits through labeling of product through Bar Code and risk based systems by audit of farms, packing houses and cold storage facilities

Comparative Analysis

Country	**Exported value (in USD billion)**				
	2018	**2019**	**2020**	**2021**	**2022**
Vietnam	5.99	5.71	5.08	5.50	4.51

Egypt	1.40	1.43	1.45	1.66	1.81
Germany	2.11	2.03	2.23	2.27	2.11
Iran	1.72	2.39	2.92	2.36	1.79
India	1.54	1.49	1.31	1.53	1.45
Pakistan	0.43	0.40	0.42	0.49	0.37

GAP Analysis

Current	Gaps	Desired
Pakistan fruit exports stands at a 0.37% of the global market.	• Low yields • Preservation of Arable Land • Quality of Seeds • Infrastructure and Logistics • Lack of protocols for certification of health and safety standards • Inadequate knowledge base and poor farm management • Intellectual Property rights • Lack of organic certification and Geographical Indication certification of fruits • Traditional Trade Market • Market Access and Trade Barriers • Product Diversification and Value Addition • Pest and Disease Management	1% within the next five years

SWOT Analysis

A SWOT analysis of the Ministry of Commerce for fruit exports would examine its internal strengths and weaknesses as well as external opportunities and threats. Here's how it might look:

A SWOT analysis of the Ministry of National Food Security Research (MNFSR) for fruit exports would assess its internal strengths and weaknesses as well as external opportunities and threats.

Strengths:

1. Research Capabilities: MNFSR likely possesses strong research capabilities in agriculture and horticulture, enabling it to develop high-yielding fruit varieties suited for export markets.
2. Technical Expertise: The ministry likely employs experts in agronomy, plant breeding, and post-harvest handling, providing valuable technical support to fruit growers and exporters.
3. Policy Influence: MNFSR may have influence over agricultural policies and regulations related to fruit production, trade, and quality standards, allowing it to create a conducive environment for fruit exports.
4. Collaborative Networks: The ministry likely collaborates with research institutions, universities, and international organizations to access knowledge, technology, and best practices for fruit production and export.

Weaknesses:

1. Funding Constraints: MNFSR may face budgetary constraints and limited funding for research and development initiatives aimed at improving fruit production and export competitiveness.
2. Infrastructure Limitations: Inadequate infrastructure for research, extension services, and post-harvest facilities may hinder the ministry's efforts to support fruit growers and exporters effectively.
3. Coordination Challenges: Coordination and communication gaps between MNFSR and other relevant ministries or departments involved in fruit exports could lead to inefficiencies and disjointed efforts.
4. Skills Shortage: The ministry may experience a shortage of skilled personnel in specialized areas such as agricultural economics, market analysis, and value chain development, limiting its effectiveness in supporting fruit exports.

Opportunities:

5. Technology Adoption: Embracing modern agricultural technologies and practices, such as precision farming, drip irrigation, and integrated pest management, can enhance fruit productivity, quality, and export readiness.
6. Value Addition: MNFSR can promote value addition in fruit exports by supporting processing, packaging, and branding initiatives, which can increase export earnings and competitiveness.
7. Capacity Building: Investing in training and capacity building programs for fruit growers, exporters, and extension workers can improve their skills and knowledge, leading to better fruit quality and market access.
8. Market Diversification: Exploring new export markets and diversifying product offerings to meet the diverse preferences of international consumers can expand Pakistan's fruit export opportunities.

Threats:

9. Climate Change: Climate change-related risks, such as erratic weather patterns, water scarcity, and pest outbreaks, pose significant threats to fruit production and export volumes, requiring adaptive strategies.
10. Trade Barriers: Trade barriers, including tariffs, non-tariff measures, and sanitary and phytosanitary regulations imposed by importing countries, can hinder Pakistan's fruit exports and limit market access.
11. Global Competition: Intense competition from other fruit-exporting countries with established market presence, superior infrastructure, and competitive advantages may erode Pakistan's market share.
12. Resource Constraints: Limited access to resources, including land, water, and inputs, as well as inadequate investment in research and development, may impede efforts to enhance fruit production and export competitiveness.

ISHIKAWA Analysis

HEAT Analysis

Stakeholders Analysis

High Interest, High Power • Ministry of Commerce • Ministry of National Food Security & Research • Agriculture Policy Institute All Pakistan Fruit & Vegetable Exporters • Federation of Pakistan Chambers of Commerce & Industry (FPCCI) • Importers & Merchants Association	**Low Interest, High Power** • Pakistan Standards & Quality Control Authority (PSQCA) • TDAP
High Interest, Low Power • Farmers • Pakistan Horticulture Development and Export Company • University of Agriculture Faisalabad • Horticulture Research Institute of Ayub Research Faisalabad • Consumers	**Low Interest, Low Power** • PCSIR Laboratories • Small and Medium Enterprises Development Authority (SMEDA) • ITC • Civil Society Organizations • Educational Institutions

Issues & Challenges

There are a number of issues pertaining to the development of the horticulture sector. The most critical is to achieve higher per hectare productivity to lower the cost of production and produce surplus for exports.

- Low yields: Pakistan's yield of horticulture crops is lower than its peer countries; the average yield per hectare stands at 8.23 tons, significantly lower than that of advanced nations, which typically range from 20 to 25 tons per hectare. (M/o Commerce, 2023).
- Seed Quality: Pakistan needs to introduce high yielding varieties (HYV) of seeds. The present boot strapped allocation for both public and private sector investment in research and development (R&D) is inadequate to develop high yielding seed varieties in line with emerging demands by the processing industry.
- Formulation of Comprehensive Land Use Policy: Developing a national land use policy for rational use of land resources is the need of the day as valuable arable land is being converted for non-farming purposes at alarming rates. Add to it the declining fertility of our agricultural lands due to non-sustainable agricultural practices plus the degradation of our lands due to water logging and salinity going on for decades, a negative side effect of our irrigation practices. Lastly, we are misusing our scarce land resources as we are cultivating crops on lands extremely suitable for horticultural use. All these issues needed to be addressed by formulating a long-term comprehensive land use policy by the government.
- Inadequate knowledge base and poor farm management: Poor farm management results in inefficient use of resources, and significant wastage and harvest and postharvest losses.
- Weak contract enforcement: Weak contract enforcement for contract farming discourages domestic and international investors in the agricultural sector.
- Lack of protocols for certification of health and safety standards: Although the Plant Protection Department requires the exporters to procure their produce from SPS certified farms approved by them, the enforcement of health and safety protocols (such as HACCP, EuroGAP, Minimum Residue Level (MRL)) for pesticide, and its certification mechanism is almost non-existent. Pakistan's access to international markets are limited due to weak mechanisms to ascertain compliance with SPS standards. Furthermore, lack of protocols, traceability, prevalence of diseases, and unchecked use of pesticides prevents commodities to reach countries with higher standards' requirements.
- Infrastructure and Logistics: Inadequate infrastructure and logistics, including transportation, storage facilities, and cold chain management, can hinder the export of perishable fruits. Improvements in transportation networks, refrigeration facilities, and port infrastructure are essential to maintain the quality of fruits during transit and storage.

- Inadequate post-harvest physical infrastructure and Quality Degradation: Without proper cold chain facilities, fruits and vegetables are prone to quality degradation due to temperature fluctuations and improper storage conditions.
- Absence of assured supply of raw material to processors: One of the constraints faced by the processors is the lack of a mechanism for smooth and uninterrupted supply of raw material for processing. This could be achieved through introduction of contract farming which binds the farmers to supply and the processor to procure contracted quantities at a predetermined price.
- Other factors negatively impacting the farmer's decision to plant horticultural crops: The water requirement for horticulture crops is higher compared to the typical field crops such as wheat. Since the irrigation system is supply based rather than demand based, the system cannot allocate any additional water supplies for horticulture crops. Secondly, fruit trees require four to five years to mature and produce fruits. Only farmers with significant investment capacity prefer investment in fruits. Given the bootstrapped investment capacity of most farmers and the gestation time of the orchards, only financially sound farmers tend to invest in fruits and vegetables over field crops. Thirdly, uncertainty caused by weather patterns makes risk averse farmers prefer field crops. Untimely precipitations, hailstorms, windstorms, frost, and temperature variations can depress output. Furthermore, erratic market prices due to over or undersupply of commodities in the market influence farmer preferences towards non-perishable field crops. (Council, 2023)
- Lack of organic certification and Geographical Indication certification of fruits: The lack of organic certification and Geographical Indication (GI) certification of fruits in Pakistan presents significant challenges and missed opportunities for the country's fruit export industry. Organic certification is crucial in today's global market, where consumers are increasingly demanding organic produce due to health and environmental concerns. However, the lack of a robust organic certification system in Pakistan hampers the ability of Pakistani fruit producers to access lucrative international markets that prioritize organic products. Without organic certification, Pakistani fruit exporters may face barriers to entry or receive lower prices in markets where organic certification is a prerequisite. Similarly, Geographical Indication (GI) certification is essential for protecting the unique quality, reputation, and characteristics of fruits originating from specific geographical regions.
- Traditional Trade Market: Most trade happens with Far East Asia, East Asia, South Asia, GCC, Europe, and North America. Regions like Central Asia, Northern & Southern Africa, and South America are

underutilized. Trade concentration with major limited partners include UAE, China, USA, KSA, and Kuwait.

- Underutilization of Regional trade blocs: Trade within OIC, D-8, and ECO is low compared to potential, requiring policy attention.
- Market Access and Trade Barriers: Accessing international markets are challenging due to trade barriers, tariffs, and non-tariff barriers imposed by importing countries. Negotiating favorable trade agreements and resolving phytosanitary and sanitary issues are main hurdles to expand market access for Pakistani fruit exporters.
- Inadequate use of Competitive advantages: Although Pakistan has clear advantages in agriculture (vs. Middle East/North Africa) and low-cost goods (due to cheap materials and labor) however, unfortunately Pakistan is unable to utilize its young and skilled workforce potential.
- Product Diversification and Value Addition: Overreliance on a few fruit varieties limits the export potential of Pakistan's fruit sector. Diversification into high-value and niche markets, as well as value-added products such as exotic fruits, wild fruits, processed fruits, juices, and dried fruits, can enhance export opportunities and increase competitiveness.
- Pest and Disease Management: Pest and disease outbreaks can significantly impact fruit production and export quality. Implementing effective pest management strategies, investing in research and development for disease-resistant varieties, and promoting good agricultural practices are crucial to mitigate these risks.

Conclusions

Pakistan's horticulture sector faces a myriad of challenges that impede its potential for growth and hinder its ability to compete effectively in the global market. From low yields and seed quality issues to inadequate infrastructure and logistics, the sector requires comprehensive reforms and strategic interventions to overcome these obstacles. Additionally, addressing issues related to market diversification, intellectual property rights, contract enforcement, and the lack of organic certification and Geographical Indication (GI) certification for fruits poses significant challenges, limiting Pakistan's access to lucrative international markets. Furthermore, implementation of Trade Policy holds the key to enhance the export share in World Trade. To address these challenges, concerted efforts are needed from both the public and private sectors, including investment in research and development, infrastructure development, and capacity building. Moreover, fostering partnerships with international stakeholders and leveraging competitive

advantages can help Pakistan diversify its export markets and enhance the value proposition of its horticulture products. By addressing these issues and implementing targeted strategies, Pakistan can position itself as a leading exporter of high-quality fruits, driving economic growth and prosperity in the country.

Recommendations

Increasing fruit yield

Yields can be improved by a number of methods, mainly by using Ultra-High Density Plantation and better seeds.

Ultra-High Density Plantation

Ultra high density plantation (UHDP) is an intensive orchard management technique that involves densely packing trees much closer together compared to traditional methods and is in practice in developed countries like Israel, India and some private sector farmers, producers and exporters are using this UHD plantation in Multan for mangoes and in etc. The gestation period for UHDP is a disincentive to farmers because there is: 1. An Opportunity Cost (loss of income) for five years before high-productivity harvest. 2. No domestic model farms to validate effectiveness of switch-over to UHDP. 3. Fear of excess supply in domestic market resulting in low prices, unless surplus is processed or exported to maintain profitability.

Better Seeds

The seed varieties available in Pakistan are of low and inconsistent quality and do not meet international consumer preferences. Most varieties currently grown domestically are not the most successful on international markets in terms of taste and quality standards, in particular for commodities such as citrus, potatoes and bananas. Increasing yields by introducing pure seeds of high yielding varieties (HYV) is the most effective method to increase output. At present, there are a limited number of domestic seed companies. In Pakistan, the major entities for seed production and certification includes public sector seed corporations (mainly Punjab and Sindh Seed Corporations), regulatory organizations like Federal Seed Certification & Registration Board (FSC&RD), National Biosafety Committee (NBC), research institutions including Pakistan Agriculture Search Council (PARC) and Pakistan Central Cotton Committee (PCCC), private seed companies, and input dealers.

Establishment of model processing facilities in the main production clusters

The government should create modern, shared facilities equipped with advanced technology for both domestic and international markets. These facilities would enable private companies to enhance value addition through food processing, contributing to fruit export. For instance, the government-built Agro Food Processing (AFP) plant in Multan has stimulated the development of a fruit processing supply chain in southern Punjab districts,

yielding positive outcomes. The AFP plant operates at full capacity during harvest seasons, indicating significant demand for such facilities.

Establishment of Cold Chain Infrastructure

Pakistan faces challenges with a shortage of cold storage facilities and affordable reefer trucks, which are costly to construct, operate, rent, and buy. In addition to this Government should invest in establishment of Cold Chain infrastructure at different production hubs to transit fruits from farms to market.

Fast tracking of Quality and Health Safety Standards Protocols with Importing Countries

The current system for issuing SPS certifications for orchards in Pakistan, managed by the Department of Plant Protection (DPP), faces challenges due to staff shortages and logistical constraints. Leveraging technology and involving certified private laboratories could streamline the certification process. Additionally, stringent quality standards imposed by importing countries hinder horticulture exports. The Pakistan Horticulture Development & Export Company (PHDEC), under the Ministry of Commerce (MoC), should collaborate with foreign governments and stakeholders to address these barriers, particularly in key export destinations such as the USA, China, and European countries.

Organic and Geographical Indication certification of fruits:

Efforts to obtain organic and Geographical Indication (GI) certifications for Pakistani fruits require collaboration among government bodies, industry stakeholders, and international organizations. Key actions include establishing robust certification systems, providing technical support to farmers, and raising consumer awareness about the benefits of certified products. Notably, there is potential for GI certification of fruits like the Shoghori Pear from Chitral and Kalash Walnuts. To protect intellectual property rights, measures such as penalizing unauthorized activities and enforcing the Plant Breeder Rights Act are crucial. Strengthening enforcement mechanisms and providing recourse for infringements are essential to safeguard the interests of seed producers and maintain access to high-quality seeds.

Public-Private Partnerships: A PPP model for enhancing fruit exports involves collaboration between government agencies and private firms to upgrade infrastructure, provide technical support to farmers, access new markets, ensure quality standards, and drive innovation. Public private partnership (PPP) mechanisms could also be envisaged to develop model farms in the main production areas

Market & Product Diversification:

Invest in marketing, branding, and promotion initiatives to raise awareness about Pakistani fruits, highlight their quality, uniqueness, and health benefits,

and position them competitively in international market. To expand export opportunities and diversify beyond traditional markets, it is essential to conduct market research to identify emerging trends and consumer preferences. Tailoring products to meet the specific requirements of target markets is crucial. Despite Pakistan's substantial mango production, there's a focus on varieties popular in the local market rather than Alphonso mangoes, which are in high demand internationally. Similarly, while Pakistan produces various horticulture commodities, such as citrus, bananas, apples, grapes, among others, these products often do not meet the quality standards and characteristics desired by international consumers. For instance, Pakistani bananas, predominantly Williams variety, lack the quality demanded by most importing countries, which prefer Cavendish or G9 bananas. Additionally, Pakistan's citrus production, dominated by kinnow, does not align with the demand for seedless, sweet citrus varieties in international markets. Similarly, the apple and grape plantations in Pakistan fall short in quality and variety required for export, remaining suitable only for domestic consumption. Therefore, to capitalize on Pakistan's export potential in fruits, there is a need to focus research efforts on developing indigenous and non-hybrid seed varieties that cater to international consumer preferences.

Export Incentives

Specific incentives should be given to exporters such as tax rebates to companies that exports fruits over a certain threshold, and invest in R&D. Moreover, intensify businesses to help upgrade and install cold chain and high-end processing facilities. Short-terms action, involving policy decisions to increase fruits exports include; Decrease the excise duty and sales tax on domestic fruits. Provide subsidy for participants and companies in international trade fairs and exhibitions

Attract Investments by International Market Leaders

Multinational companies have the capacity, resources, and technology to improve yields of crops used in food processing and they already have access to various international fruit markets. The government and the private sector should work to attract large international companies which produce fruit products from, citrus, bananas, dates and mangoes. Board of Investment (BoI), as a part of its Foreign Direct Investment Strategy must take into consideration input from international companies which have the potential to invest in Pakistan’s horticulture sector.

Credit Line for Processing Units

The State Bank of Pakistan has established credit lines at concessional rates for establishment of new medium size pack houses, processing units, cold storages, reefer trucks, etc., and for replacing obsolete and inefficient processing machinery with efficient processing lines. However, due to lack of public awareness farmers are not utilizing this credit facility.

Capacity Building, Training and Technical Support

The primary challenge facing the horticulture sector is the declining productivity at the farm level due to farmers' inadequate technical knowledge and reluctance to adopt Good Agricultural Practices (GAP). Although, Provincial agriculture extension departments provide general technical support, but there's a critical need to establish specialized one window units with expertise in horticulture production and postharvest handling and utilization of export opportunities. These units would serve as intermediaries between farmers, research institutes, processors, and exporters, offering GAP training to bridge the knowledge gap and improve agricultural practices.

Market Access to China

China's imports of fruits and vegetables from Pakistan was USD 14.5 million in 2018, while its total imports of horticulture were USD 10.7 billion. China has imported roughly USD 1.8 billion worth of mangos, oranges, and bananas in 2018. Pakistan should work with China to improve market access for its traditional and exotic fruits which can significantly boost Pakistan's exports. Currently, China does not allow imports of most fruits due to its stringent SPS requirements. Quality Assurance Certifications could help overcome this barrier. Under the China Pakistan Free Trade Agreement-II:

- Citrus falls under A-0 (tariff immediately reduced to 0) with base tariff rate of 0%
- Mangos fall under A-0 (tariff immediately reduced to 0) with base tariff rate of 0%
- Bananas fall under category A-10 (tariff reduced to 0 in ten years) with base tariff rate of 5%.

The export duty structure for sending fruits to China from Pakistan is advantageous, but there are obstacles such as non-tariff barriers hindering the entry of Pakistani horticulture goods into China. These issues need joint efforts from the government and private sector to resolve. Currently, citrus trade faces restrictions via land and air routes to China, forcing Pakistan to ship mandarins to eastern Chinese ports, increasing costs and time. It would be more cost-effective and convenient to export through the host border crossing by land or to Urumqi by air, but pending quarantine agreements between Pakistan and China prevent this. Additionally, China's strict quarantine requirements act as non-tariff barriers, requiring oranges to undergo specific cold storage periods and continuous cold treatment during shipping. Failure to meet these requirements is hampering our export with China.

Action plan to increase Pakistan share of fruit export

Objective	**Strategy**	**Action Steps**	**Responsible Department/Agency**	**Timeline**	**Resources Required**	**KPIs**
Investment in Infrastructure	Develop cold storage facilities and refrigerated transport systems	1. Identify suitable locations for cold storage facilities across fruit-growing regions. 2. Partner with private sector (PPP) entities for the construction and management of cold storage facilities.	Ministry of Agriculture FAO-UN Pakistan Pakistan Horticultural Board	6-12 months	Funding, partnerships	• No of cold storage facilities established • No of refrigerated transport (reefer track etc) • No of PPP Initiatives
	Establish quality assurance systems at packing and processing facilities	1. Conduct assessments of existing packing and processing facilities. 2. Implement quality assurance protocols and train staff. 3. Regularly monitor and evaluate compliance.	Ministry of Agriculture /NARC and PARC Islamabad All Pakistan exporters association	Ongoing	Training, monitoring equipment	• No of assessment audits of available QA and packing processing facilities • No of Advisories/ Warnings issued • No of facilities sealed due to non-compliance of QA protocols
	Fast Tracking of Quality and Health safety protocols	1. Establishment of value chain and tracking of Quality and	Ministry of NFSR	Ongoing	Funding and MIS	• MIS established (Yes/No)

		Health of fruit.				
Market Diversification and Access	Conduct market research to identify potential export markets with high demand	1. Hire market research firms or engage consultants to conduct thorough market analysis. 2. Identify target markets based on demand, competition, and market trends.	Ministry of Commerce Trade development authority Pakistan	3-6 months	Research funds, consultants	• Market Need Assessment for ○ Exotic Fruits ○ Wild Fruits ○ Existing fruit varieties • Value in million earned through diversified market
	Engage in trade negotiations to reduce trade barriers and improve market access	1. Formulate negotiation strategies based on identified trade barriers. 2. Participate in bilateral and multilateral trade talks. 3. Advocate for favorable trade terms for Pakistani fruits.	Ministry of Foreign Affairs	Ongoing	Negotiation team, diplomatic support	• Consultations with relevant stakeholders • Strategies adopted to reduce/remove trade barriers • No of bilateral agreements concluded with new partners • No of multi-lateral agreements concluded • No of agreements concluded with different stakeholders for favorable trade agreements
Product Diversification and Value Addition	Encourage investment in value-added	1. Provide incentives or subsidies for investment	Ministry of Industries	Ongoing	Financial incentives, financin	• No of incentives provided to processing

	processing facilities	s in processing facilities. 2. Facilitate access to financing for entrepreneurs in the fruit processing industry.			g options	(details if any) • No of subsidies offered • Facilities / One window established to facilitate entrepreneurs/SMEs
	Promote the development of new fruit varieties that cater to specific market preferences	1. Collaborate with research institutions to identify market preferences. 2. Fund research and development projects for new fruit varieties. 3. Pilot test new varieties in target markets.	Ministry of Science and Technology	12-24 months	Research funding, collaboration	• No of new fruit varieties introduced • Funds allocated for R&D • No of new developmental projects included • Revenue generated through pilot testing of new varieties in targeted markets
Government Support and Policy Implementation	Formulate policies to incentivize investments in fruit export infrastructure	1. Assess existing policies and identify gaps related to fruit export infrastructure. 2. Develop new policies or amend existing ones to provide incentives for infrastructure	Economic affairs division Islamabad	6-12 months	Policy analysis, drafting	• Analysis of existing policies and no of amendments /strategies proposed and its economic impact on fruit trade •

		investments.				
	Allocate budget for promotional campaigns to raise awareness about Pakistani fruits	1. Allocate funds for marketing and promotional campaigns targeting export markets. 2. Design and implement advertising and branding initiatives.	Ministry of Information and Broadcasting/PTV (national and international), M/o of Commerce, TDAP	Ongoing	Budget allocation, marketing expertise	• No of new export markets identified • No of Expo conducted • No of MoU / agreements signed as a result of Expo • Allocation of Funds for Marketing
	Develop Credit Line for farmers, exporters etc.	1. Allocate funds	SBP, NBP, ZTB	Ongoing	Budget Allocation	• Total credit allocated to farmers • Total credit allocated to exporters
Implement organic and Geographical Indication (GI) certification for Pakistani fruits	Establishing Organic Certification Program	1. Develop standards and criteria for organic certification in consultation with stakeholders. 2. Establish certification procedures and protocols.	Ministry of Commerce Ministry of Agriculture	6-12 months	Regulatory framework, training resources	• No of GI and Organic Certifications issued • No of One window facilities established
	Conducting Training Workshops for Farmers	1. Design training modules on organic farming practices and certification requirements. 2. Organize workshops in collaboration with agricultural	Ministry of Agriculture, Agricultural Extension Services UN FAO Pakistan	Ongoing	Training materials, workshop facilities	• No of training modules designed for organic farming • No of training modules designed for certification • No of training modules designed for

		extension services to educate farmers.				growth increase • Total No of trainings conducted
	Developing GI Certification Criteria	1. Formulate criteria for GI certification based on geographical uniqueness and product characteristics. 2. Establish procedures for GI certification application and approval.	Ministry of Commerce, Intellectual Property Organization	6-12 months	Legal expertise, consultation	• Establishment of GI certification criteria (Yes/No) • Procedure established for GI application approval (Yes/No)
	Conducting Awareness Campaigns	1. Develop promotional materials to raise awareness about the benefits of organic and GI-certified fruits. 2. Organize campaigns targeting farmers, exporters, and consumers.	Ministry of Commerce, Ministry of Agriculture	Ongoing	Marketing materials, outreach activities	• No of Awareness campaign launched
	Pilot Implementation of Certification Programs	1. Conduct pilot programs for organic and GI certification in select regions. 2. Evaluate effectiveness and	Ministry of Agriculture, Ministry of Commerce	12-18 months	Pilot resources, evaluation tools	• No of pilot initiatives taken

		address challenges.				
	Scaling Up Certification Programs Nationwide	1. Expand certification programs to cover all fruit-growing regions across the country. 2. Establish regional offices or centers for certification processing and approval.	Ministry of Agriculture, Ministry of Commerce	Ongoing	Expansion resources, administrative support	• No of regional offices established
	Continuous Monitoring and Evaluation	1. Establish mechanisms for ongoing monitoring and evaluation of certification processes and outcomes. 2. Collect feedback from stakeholders and make necessary improvements.	Government-appointed body, Ministry of Agriculture, Ministry of Commerce	Ongoing	Monitoring tools, feedback m	• Development of Centralized Database for M&E

Logical Framework

Components	**Objectives**	**Activities**	**Outputs**	**Outcomes**	**Indicators**	**Means of Verification**
Ultra-High Density Plantation (UHDP) Implementation & Enhancing Seed Quality	Demonstrate benefits of UHDP to farmers	- Establish demonstration farms	- Increased awareness of UHDP benefits	- Increased adoption of UHDP by farmers	- Number of demonstration farms set up	- Reports from agricultural extension services, farmer surveys

and Availability						
	Transition farmers to UHDP practices	- Provide subsidies and incentives for transition	- Number of farmers transitioning to UHDP	- Increased yield and efficiency	- Number of subsidies/incentives provided	- Government records, farmer testimonials
	Training programs on UHDP techniques	- Conduct farmer training programs	- Number of farmers trained in UHDP	- Improved knowledge and skills	- Number of training sessions conducted	- Attendance registers, training materials
	Develop high-yielding seed varieties	- Research and development of new seed varieties	- New high-yielding seed varieties developed	- Increased availability of quality seeds	- Number of new seed varieties developed	- Research publications, seed catalogs
	Establish seed certification programs	- Collaborate with seed companies and regulatory bodies	- Establishment of seed certification system	- Assurance of seed quality and consistency	- Number of seed certification programs	- Government reports, certification records
	Facilitate technology transfer for seed production	- Form partnerships with international seed companies	- Access to advanced seed production technology	- Improved seed production methods	- Number of technology transfer agreements	- Partnership agreements, technology transfer records
Establishment of Modern Processing Facilities	Identify strategic locations for processing facilities	- Conduct feasibility studies	- Identification of suitable locations	- Efficient processing and value addition	- Number of feasibility studies conducted	- Feasibility study reports
	Collaborate with private investors for facility development	- Form partnerships with private investors	- Establishment of processing facilities	- Increased private sector investment	- Number of partnerships established	- Partnership agreements

	Equip facilities with state-of-the-art technology	- Procure and install processing equipment	- State-of-the-art processing technology	- Enhanced processing efficiency	- Equipment procurement records	- Inventory records, equipment manuals
Cold Chain Infrastructure Development	Identify locations for cold storage facilities	- Conduct market assessments	- Identification of key locations for cold storage	- Improved product preservation	- Number of locations identified	- Market assessment reports
	Facilitate private sector investment in cold chain	- Offer financial incentives and tax breaks	- Private sector investment in cold chain	- Increased cold storage capacity	- Amount of incentives provided	- Financial records, investment reports
	Implement quality control measures for cold chain	- Develop standards and protocols for product handling	- Implementation of quality control measures	- Maintained product integrity	- Adoption of quality control measures	- Compliance reports, quality audits

Citrus Fruits

Current citrus fruit cultivation in Pakistan spans approximately 200,461 hectares, producing 2,247,956 tonnes with an average yield of 11.21 tonnes per hectare. However, adopting HDP techniques can significantly enhance yields to 20-40 tonnes per hectare. Implementing HDP requires careful consideration of cultivar selection, spacing, pruning, irrigation, and nutrient management.

Banana

The average yield of bananas in Pakistan stands at 4 tons per hectare, as per the Pakistan Agricultural Research Council (PARC). By transitioning to high-density plantation methods, the potential yield could double to 8 tons per hectare. Effective management practices such as regular monitoring for pests and diseases, appropriate fertilization, and optimized irrigation can further enhance banana yields.

Grapes

Current grape yields in Pakistan, recorded by the Ministry of Commerce, are approximately 10.38 tonnes per hectare. However, by applying HDP and proper vineyards management in Baluchistan, Gilgit-Balistan, and Chitral can yield from 15 to 25 metric tonnes per hectare.

Mangoes

Pakistan's mango production averages around 9.98 tonnes per hectare, with Punjab leading at 12.3 tons per hectare followed by Sindh. By implementing HDP techniques and adopting best management practices, mango yields in Punjab and Sindh could reach 14 to 15 tons per hectare. Key considerations include selecting high-yielding varieties, proper pruning, pest and disease management, and optimizing orchard nutrition.

Fruit Crop	**Pakistan Current (tonnes/ha)**	**Global Average (tonnes/ha)**	**Pakistan Potential (tonnes/ha)**
Citrus Fruits	11.21	13.4 (approx.)	20-40
Banana	4	10 (approx.)	8
Grapes	10.38	7.5 (approx.)	15-25
Mangoes	9.98	10.7 (approx.)	14-15

Fruits	**Current Situation**			**UHD-Plantation**		
	Current (tonnes/ha)	**Export (M Tonnes)**	**Revenue (million USD)**	**Potential (tonnes/ha)**	**Potential Export (M Tonnes)**	**Potential Revenue (M USD)**
Citrus	11.21	0.5	220	20-40	0.92	470
Mangoes	9.98	0.065	100	14-15	1.02	150
Banana	4	0.069	12	8	0.22	18

Estimated additional yield through UHD-Plantation can be used for:

- Supply to current export destinations; enhanced export revenue
- New Export Markets; additional revenue generation

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