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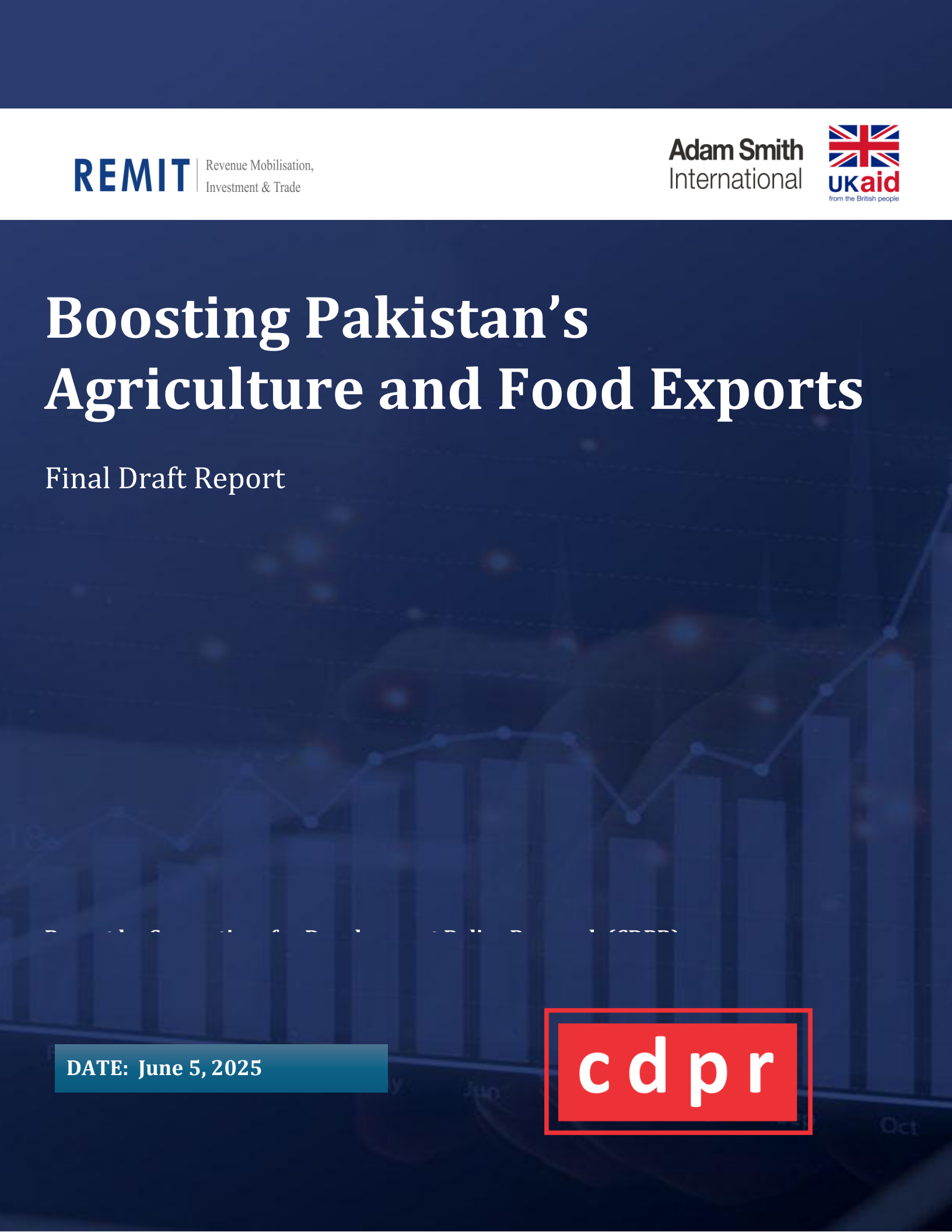
Final Draft Report



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REMIT Study on Agriculture and Food Export Potential of Pakistan

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Acronyms

ADB	Asian Development Bank
AEP	Agricultural Export Policy (India 2018)
AHDB	Agriculture and Horticulture Development Board (UK)
APEDA	Agricultural and Processed Food Products Export Development Authority (India)
APTA	Asia-Pacific Trade Agreement
APR	Annual Percentage Rate
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine (China)
ASEAN	Association of Southeast Asian Nations
AWD	Alternate Wetting and Drying (irrigation)
BARC	Bangladesh Agricultural Research Council
BIDA	Bangladesh Investment Development Authority
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical & Economic Co-operation
BOI	Board of Investment (Pakistan)
CAA	Civil Aviation Authority (Pakistan)
CEPA	Comprehensive Economic Partnership Agreement
CIHEAM	Centre International de Hautes Études Agronomiques Méditerranéennes
CPFTA / CPFTA-II	(Phase II) China-Pakistan Free Trade Agreement
CPEC	China-Pakistan Economic Corridor
CSA	Climate-Smart Agriculture
DLTL	Drawback of Local Taxes and Levies
DM	Dry Matter
DPP	Department of Plant Protection (Pakistan)
DTRE	Duty and Tax Remission for Exports
ECTA	Economic Co-operation and Trade Agreement
EDF	Export Development Fund
EFS	Export Finance Scheme
EPI	Export Potential Index
EU	European Union
Exim	Export-Import Bank (Pakistan)
FAO	Food and Agriculture Organization (UN)
FAOSTAT	FAO Statistical Database
FBR	Federal Board of Revenue (Pakistan)

FFA	Free Fatty Acid
FMD	Foot-and-Mouth Disease
FOB	Free on Board (Incoterm)
FPO	Farmer Producer Organization
FSC&RD	Federal Seed Certification & Registration Department
FTA / PTA	Free / Preferential Trade Agreement
GCC	Gulf Co-operation Council
GDP	Gross Domestic Product
GI	Geographical Indication
GIS	Geographic Information System
GSP+	Generalised Scheme of Preferences Plus (EU)
GST	Goods and Services Tax
GTAP	Global Trade Analysis Project
GVC	Global Value Chain
HACCP	Hazard Analysis and Critical Control Points
HS	Harmonized System (tariff codes)
ICAR	Indian Council of Agricultural Research
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRIER	Indian Council for Research on International Economic Relations
IOC	International Olive Council
IPM	Integrated Pest Management
IPO-Pakistan	Intellectual Property Organization of Pakistan
IPPC	International Plant Protection Convention
IRSA	Indus River System Authority
ISO	International Organization for Standardization
ITC	International Trade Centre
KPK	Khyber Pakhtunkhwa (province, Pakistan)
LSD	Lumpy Skin Disease
MAP	Modified Atmosphere Packaging
MFN	Most-Favoured-Nation (tariff)
MNFSR	Ministry of National Food Security & Research
MoC	Ministry of Commerce (Pakistan)
MoFA	Ministry of Foreign Affairs (Pakistan)
MoMA	Ministry of Maritime Affairs (Pakistan)
MoST	Ministry of Science & Technology (Pakistan)

MRL	Maximum Residue Limit
MSP	Minimum Support Price
NABL	National Accreditation Board for Testing & Calibration Laboratories (India)
NARC	National Agricultural Research Centre (Pakistan)
NDMA	National Disaster Management Authority (Pakistan)
NRCA	Normalized Revealed Comparative Advantage
NLC	National Logistics Cell
OIE	World Organisation for Animal Health
OECD	Organisation for Economic Co-operation & Development
PARC	Pakistan Agricultural Research Council
PCS	Port Community System
PDI	Product Diversification Index
PFVA	Pakistan Fruit & Vegetable Association
PHDEC	Pakistan Horticulture Development & Export Company
PIA	Pakistan International Airlines
PITB	Punjab Information Technology Board
PNAC	Pakistan National Accreditation Council
PPP	Public-Private Partnership
PR	Pakistan Railways
PRACS	Pakistan Railway Advisory & Consultancy Services
PSFTA	Pakistan-Sri Lanka Free Trade Agreement
PSQCA	Pakistan Standards & Quality Control Authority
QR	Quick Response (code)
RCA	Revealed Comparative Advantage
R&D	Research and Development
RASFF	Rapid Alert System for Food & Feed (EU)
REAP	Rice Exporters Association of Pakistan
RH	Relative Humidity
SAARC	South Asian Association for Regional Co-operation
SBP	State Bank of Pakistan
SEZ	Special Economic Zone
SPS	Sanitary and Phytosanitary (measures)
STPF	Strategic Trade Policy Framework (Pakistan)
STTA	Short-Term Technical Assistance
TAGEM	General Directorate of Agricultural Research & Policies (Turkey)

TDAP	Trade Development Authority of Pakistan
TIES	Trade Infrastructure for Export Scheme (India)
TMA	Transport & Marketing Assistance (India)
TR4	Tropical Race 4 (Panama disease in bananas)
TÜBİTAK	Scientific & Technological Research Council of Turkey
UAE	United Arab Emirates
ULD	Unit-Load Device (air-cargo pallet)
UN DESA	United Nations Department of Economic & Social Affairs
UN COMTRADE	United Nations Commodity Trade Statistics Database
USD / US$	United States dollar
USDA	United States Department of Agriculture
VAT	Value-Added Tax
WB	World Bank
WeBOC	Web-Based One Customs (Pakistan)
WHO	World Health Organization
WTO	World Trade Organization

Executive Summary

This study identifies agricultural and food products that have significant unrealized export potential for Pakistan. To do so, we use a combination of analysis from observable trade data and feedback from focus group discussions with relevant stakeholders. Table 1.1 below shows the final list of products identified as having significant unrealized export potential.

Table 1. 1 List of Products with Unrealized Export Potential

HS Code	Product Description	Actual Exports ($mn)	Unrealized Export Potential ($mn)	Pakistan production in 2023 (000' tons)
1006	Rice, semi milled, brown or husked, or broken	2506	1268	14803
020110	Bovine carcasses, fresh	250	97	4758
070190 071010/ 200520	Potatoes, fresh or frozen, prepared/preserved	156	120	8319
070310	Onions & shallots, fresh	87	71	1843
0803	Bananas & plantains	$23	$50	285
100590	Maize	$324	$126	10984
0809xx	Cherries, fresh	-	-	6
071320	Chickpeas, dried & shelled	-	-	263
200570 1509XX	Olives, prepared/preserved Olive oil, virgin, mechanically extracted	-	-	-
070200 2103320	Tomatoes; fresh & tomato ketchup/paste	-	-	760

These products have been filtered after a preliminary analysis of the international trade center (ITC) analysis, including the product diversification index (PDI) and export potential index (EPI) as well as extensive discussions with relevant stakeholders both with the public and private sector. For each of the products identified, we provide an analysis of the constraints impeding productivity and export growth and provide policy recommendations for each of the constraints. The set of constraints can be partitioned broadly into five types: *productivity constraints, high production costs, market access, low value chain integration,* and *regulatory barriers*. Table 1.2 below summarizes product specific constraints identified and brief policy prescriptions catering to each

type of constraint. While we list constraints and recommendations for each product, we make two overarching observations here; First, none of the export potential of any of these products can be realized without first focusing on improving productivity. Second, while several trade agreements are in place that lower tariff barriers, the government must enforce a strict regime of SPS compliance to effectively leverage existing market access through trade agreements.

Table 1. 2 - Summary of product specific constraints and recommendations

Product	**Constraints**					**Policy Recommendations**
	Productivity	***Production costs***	***Market access***	***Value chain***	***Regulatory barriers***	
Rice	Lack of mechanization inefficient water use	High due to seed quality	Branding limitations	No farm to mill traceability	SPS compliance	Focus on SPS enforcement; mechanization and water management
Bovine meat	Low due to failure to generate economies of scale	High due to inability to generate economies of scale	Limited to regional neighbors because of comparative advantage in fresh, not frozen meat	Very few firms are well integrated	No similar regulation on domestic industry; distortionary effects	Vaccination programs to improve productivity Digital traceability Cold storage transportation
Potatoes	Low yield indigenous variety post-harvest cold storage shortage	High due to imported inputs	Higher tariffs than competitors for ASEAN	Lack of industrial scale starch plants	SPS compliance	certified seed research acceleration SPS certification climate smart agronomy and finance to insure against climate shock
Onions	Low because of seed recycling; lack of forced air curing	High transport costs; lack of storage facilities at port	Mitigated by high domestic logistics costs	Lack of contract farming Only one dehydration plant	SPS standards; brown rot issue	Focus on certified seeds SPS clinics and rapid testing facilities Climate smart agronomy Dehydration and frying cluster Cold chain scale up
Tomatoes	Low hybrid seed and heat-resistant yield use Inefficient farming techniques	High unit costs due to inefficient techniques and low yield inputs	High logistics cost cancels FOB advantage;	Processing capacity for paste only caters to quarter of domestic demand	SPS standards. Prevalence of acetamiprid and dimethoate residues	Hybrid seed fast tracking Pack house mini grants SPS rapid testing Set up paste and ketchup cluster (medium term) Climate-smart finance

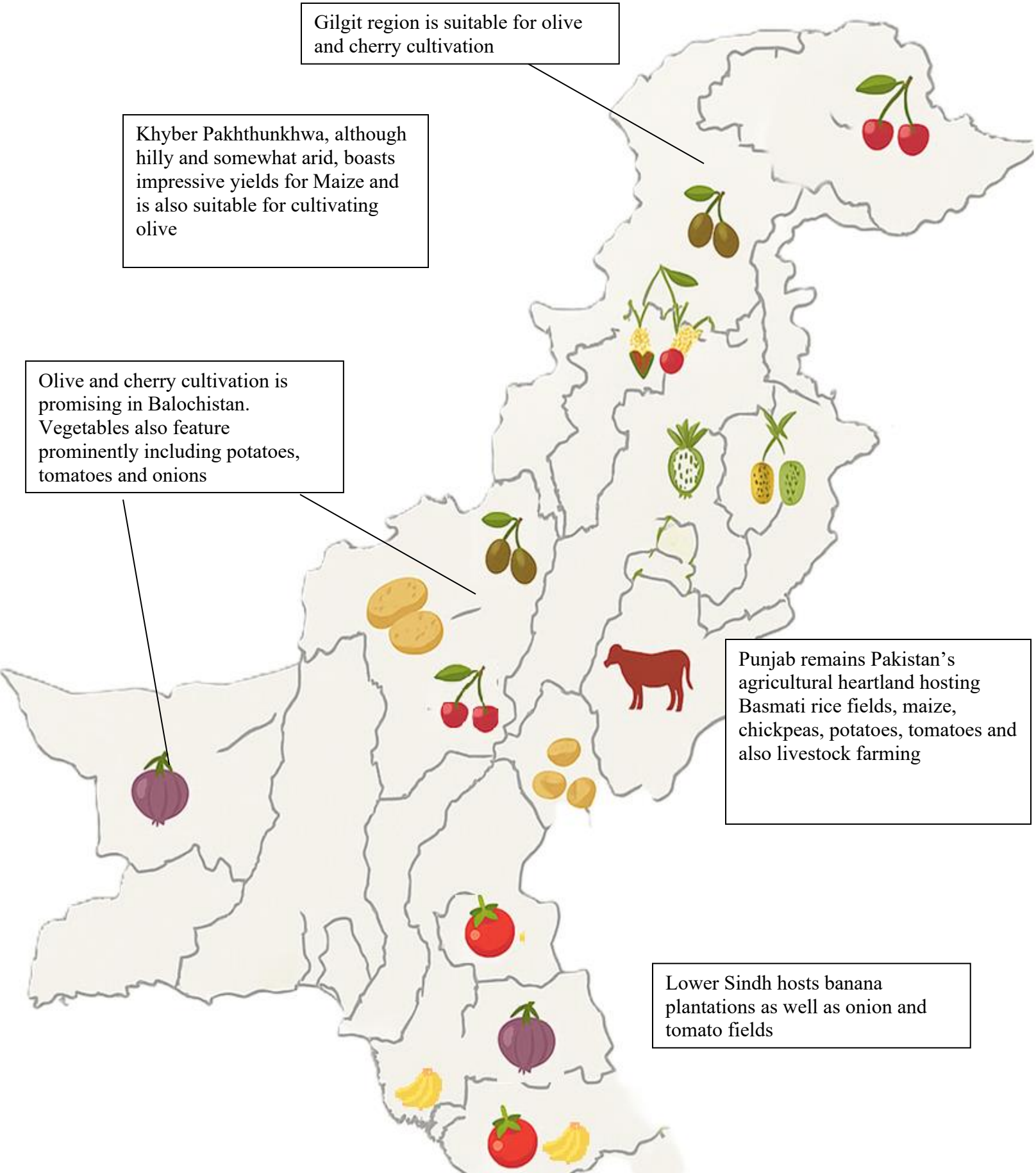
Chickpeas	Low yield seeds; little uptake of climate resistant variety	Lack of contract farming and high working capital cost	No significant market access barriers	Inefficiency in harvesting and cleaning stage;	SPS standards Bruchid infestation Pakistan still allows class II insecticides	Certified seed fast tracking Hermetic storage kits Pesticide phases out Mechanized harvesting and cleaning Contract farming plots Climate smart breeding	
Bananas	Low yield and disease	Unable to absorb costs by scaling ups	Perennial opportunity exists to central Asian markets	Small contract farming lease terms prevent scaling up	SPS standards Cypermethrin and chlorpyrifos residues	Tissue-culture seedling scales up Rapid ripening upgrade Climate smart irrigation Grower cooperatives with longer lease terms	
Maize	Public R&D on heat tolerant yields stalled	Foreign exchange volatility increases imported input costs	Mitigated by pest risk	Bulk handling Only 14 commercial tower dryers	SPS standards Aflatoxin residues	Aflatoxin action plan Seed cost offset China SPS access Silo and rail corridor for logistics Climate smart breeding	
Cherries	Lack of specialized knowledge and efficient farming practices Cold storage and logistics	Freight and cold logistics constraints lead to high production costs	Affected by poor infrastructure and logistics	Small scale farms; growers often forced to sell to middlemen	SPS standards	Orchard upgrade grants Mobile pre-cool and pack houses Digital orchard cluster Climate resilient cultivars breeding Producer owned cooperatives and organizations	
Olives/ Olive oil	Lack of certified plant use leading to low yields	High production costs due to low yields and value chain fragmentation	Branding gap	Value chain fragmented Lack of processing plants and farmer coops	SPS standards Organic certification	Grants for high density rapid ageing orchards Mobile olive presses OIC lab capacity development Green credit line China SPS access Climate smart varieties (long term)	

Pakistan's food and agricultural goods export basket

Gilgit region is suitable for olive and cherry cultivation

Khyber Pakhthunkhwa, although hilly and somewhat arid, boasts impressive yields for Maize and is also suitable for cultivating olive

Olive and cherry cultivation is promising in Balochistan. Vegetables also feature prominently including potatoes, tomatoes and onions



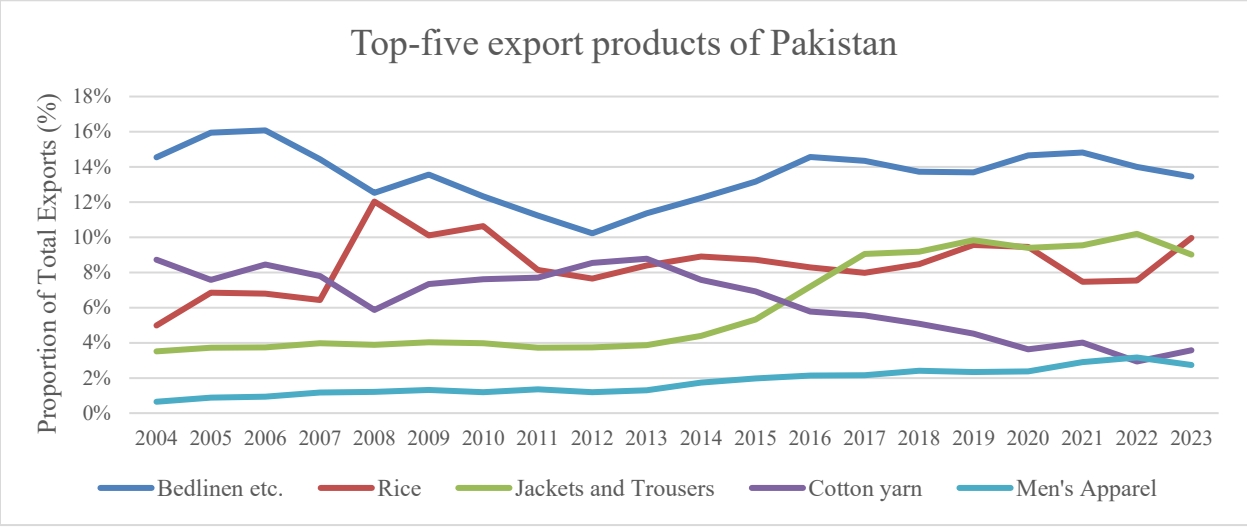
Punjab remains Pakistan's agricultural heartland hosting Basmati rice fields, maize, chickpeas, potatoes, tomatoes and also livestock farming

Lower Sindh hosts banana plantations as well as onion and tomato fields

Chapter 1: Introduction and Policy Context

Pakistan's agriculture sector contributes roughly 24 percent of GDP and 50 percent of employment, anchoring the country's export portfolio.[1] Yet the benefits of that endowment remain under-realized: exports are concentrated in a handful of low-value primary products and a narrow set of destinations, and overall growth has been volatile. This dominance of primary agriculture (Figure 1.1) is not translating into dynamic export performance. Over the past two decades, Pakistan's export growth has been on a downward trend, with pronounced boom-and-bust cycles (Figure 1.2). Consequently, Pakistan's export-to-GDP ratio was just 10.5 percent in 2023, with total goods exports hovering below USD 35 billion - a fraction of the economy's potential.[2]

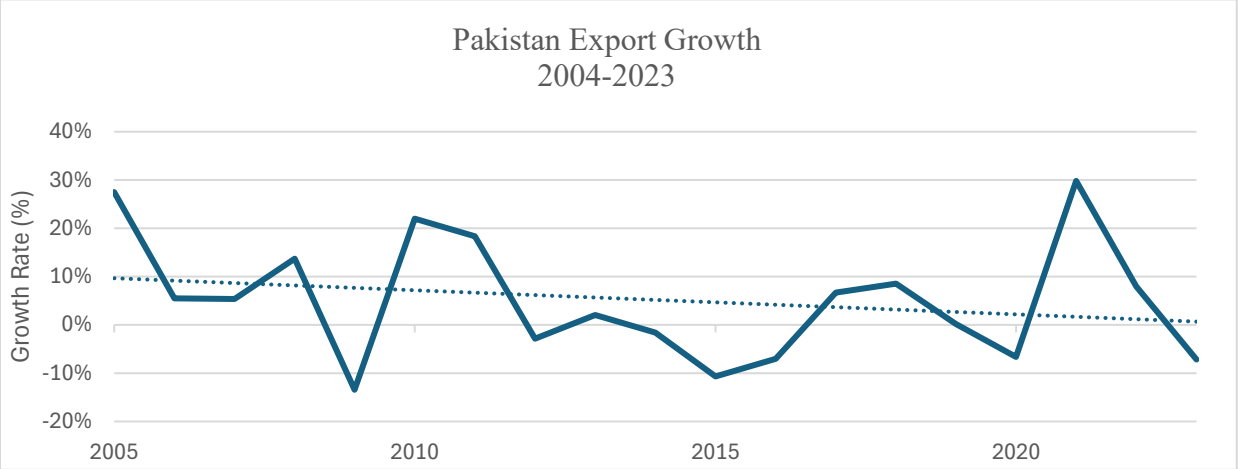
Figure 1.1 Top Five Export Products of Pakistan



Source: Authors' own calculations using ITC's data

[1] Source: PBS, Agriculture Statistics (online database), accessed 20 May 2025.
[2] Source: World Bank Indicators, 2023

Figure 1.2 Pakistan's Annual Export Growth Rate



Source: Authors' Own Calculations using ITC Data

This study responds to the need for a more strategic approach to agriculture and food exports by identifying which existing and new agricultural products hold significant unrealized export potential, the constraints that are holding back Pakistan's export growth and how Pakistan compares with comparable countries like India, Bangladesh and Türkiye in terms of export policy and performance.

The analysis focuses on exports to China, the Middle East, and ASEAN, all of which offer large and growing food import markets. China's food and agriculture imports exceed USD 74 billion annually; the Middle East and ASEAN follow closely, with imports of USD 65 billion and USD 82 billion, respectively. Yet Pakistan's agricultural exports to these regions remain limited and skewed toward unprocessed goods, reflecting missed opportunities in global value chains.

Against this backdrop, the objective of this study is twofold:

- To provide an evidence-based identification of export-ready and high-potential agricultural products.
- To offer targeted, feasible policy recommendations that can improve export competitiveness and encourage investment in downstream processing, certification, branding, and compliance.

Thus, the study aims to support Pakistan's broader export diversification strategy and facilitate its transition from an exporter of raw agricultural commodities to one that competes in higher-value global food markets.

Chapter 2: Methodology

This study combines quantitative trade analytics with qualitative evidence from stakeholders to rank export opportunities and diagnose binding constraints. The approach has three pillars as mentioned in Table 2.1.

Table 2.1 Summary of Methodology

Pillar	Purpose	Core tools / data	Output
A. Market-data analysis	Size the export gap; screen products	- International Trade Centre (ITC) Trade Map & Export Potential platform (2004-23) - FAOSTAT & MNFSR production statistics - UN Comtrade, UN DESA population & GDP data	- Export-Potential Index (EPI) - Product-Diversification Index (PDI) - Revealed Comparative Advantage (RCA) trends
B. Benchmarking & policy scan	Compare Pakistan with peers; identify good practice	- Secondary literature and WTO/OECD country reviews for India, Bangladesh, Turkey - Tariff schedules & FTA texts (CPFTA-II, PTA-Indonesia, etc.)	- Cross-country scorecard on productivity, logistics, SPS, incentives
C. Stakeholder consultation	Ground-truth constraints; refine recommendations	- 18 focus-group discussions and key-informant interviews (public agencies, exporters, farmer groups, logistics providers) - World Bank Enterprise Survey 2022 micro-data	- Constraint matrix (product-specific & systemic) - Feasibility checks on proposed measures

Quantitative market analysis

We began with the full list of agri-food items at the HS-4 level (about 530 codes) and used the International Trade Centre's online Export-Potential platform to measure, for each code, the gap between Pakistan's current exports and what could be achieved in China, the GCC, and ASEAN if tariffs, distance and partner-demand were the only frictions. [3] Products showing at least USD 30 million of untapped potential in one of those three markets were taken forward.

Because Pakistan must also diversify into lines it does not yet export, we overlaid the ITC Product-Diversification Index, which flags items that sit close in the global "product space", to what Pakistan already produces efficiently. A PDI score above 0.35 was used as the cut-off for new products.

The filtered list was tested against domestic supply realities. We retained only crops and livestock products that either exceed 25,000 tons of annual output or have registered average yield growth above five per cent a year since 2018 in FAOSTAT and MNFSR statistics. Finally, the provisional list was presented to producers, traders, and officials; items lacking commercial interest were dropped, and two products, bananas and maize, were re-inserted at the industry's insistence. This iterative process delivered ten focus products that reappear in Section 4.

Throughout, three indicators anchored the quantitative work. First, the Export-Potential Index (EPI) captured the near-term opportunity for existing products. Second, the Product-Diversification Index (PDI) measured suitability for entry into new lines. Third, a normalized revealed-comparative-advantage score traced twenty-year shifts in Pakistan's structural strengths.[4] Further details of these indices are presented in Annex A. Supplementary metrics - crop-yield growth, time-to-export data from the World Bank, and tariff wedges derived from FTA schedules - helped locate bottlenecks along the value chain.

Benchmarking and Policy Scan

To understand why Pakistan underperforms its peers, we reviewed WTO and OECD trade-policy examinations, national export strategies, and sector reports for India, Bangladesh, and Turkey

[3] www.intracen.org and www.trademap.org

[4] Examples of export potential identification relying on RCA analysis include (Riaz, Jansen, & Malik, 2010) For an example of gravity/ stochastic frontier models see (Khan, Ezad, & Atiq, 2022) and (Atif, Haiyun, & Mahmood, 2017).

along with recent developments in the theoretical and empirical literature on agriculture and trade. The result is a scorecard, presented later in the report, covering farm productivity, logistics quality, SPS enforcement, and policy incentives. The juxtaposition highlights reforms that have proved effective elsewhere and are institutionally feasible in Pakistan. The summary of literature review is presented in Annex C.

Stakeholder Consultations

Quantitative findings were ground-trothed through eighteen semi-structured discussions with exporters, producer groups, logistics companies, and regulators, supplemented by micro-data from the 2022 World Bank Enterprise Survey. Each interview explored five themes: on-farm productivity, compliance costs, finance, infrastructure, and policy coherence. Responses were coded and mapped onto a constraint matrix that feeds directly into the recommendations. The list of stakeholders consulted is presented in Annex B.

Limitations and Mitigation

The analysis reflects trade data through 2023; shocks unfolding after that point, including El Niño-related price spikes, are not yet captured. Crop-yield statistics rely on official surveys that may under-report very small farms, and exporter interviews naturally tilt toward more organised firms. Triangulating three evidence streams, the ITC analytics, the international policy scan, and the consultation feedback, helps to offset these blind spots, but they remain important caveats when interpreting individual product results.

Taken together, the three strands of evidence provide a coherent foundation for the product-by-product assessments and policy actions set out in the remaining sections.

Chapter 3: Product-Level Export Potential Analysis

This section converts the broad story told in the previous sections into product-specific evidence. Ten agricultural and food items pass the screening filters described in the Methodology and have been validated by producers, exporters, and regulators. Taken together, they account for almost USD 2.1 billion in near-term unrealized export revenue.

Table 3.1 Selected products and their export potential

	Product	Current Exports, 2023* (million USD)	Unrealised export potential** (million USD)
1	Rice (semi/wholly-milled, broken)	2,406	1,268
2	Bovine meat (fresh & frozen)	250	97
3	Potatoes (fresh, frozen, prepared)	153	120
4	Onions (fresh/dried)	87	71
5	Tomatoes (fresh & processed)	-	90
6	Chickpeas (dried)	-	260
7	Bananas	23	50
8	Maize	324	126
9	Cherries	-	60
10	Olives & olive oil	-	30

** ITC*
*** Derived from the ITC Export-Potential platform*

Upon the request of stakeholders at the MoC, we also conducted a preliminary analysis of the export potential of industrial hemp, medical cannabis and mushrooms.

The remainder of this section presents a short dossier on each product, using a common template so that readers can locate comparable information quickly.

3.1 Rice

Global Outlook and Competitive Landscape

International rice trade has been broadly stable at 44 – 52 million tons a year over the past decade,[5] equivalent to USD 24–30 billion, given average export prices of USD 480–550 per ton.[6] Three Asian suppliers dominate: India, Thailand, and Vietnam routinely account for about 70 percent of global shipments,[7] while Pakistan ranks fourth with a share that fluctuates around 10 percent.[8] On the demand side, import volumes continue to rise in China, the Philippines, and sub-Saharan Africa, and remain structurally high in the Gulf Cooperation Council (GCC), where local production is negligible. China alone purchased more than USD 2 billion of rice in 2023, and the GCC combined imported close to USD 1.4 billion.[9] Temporary policy shocks - such as India's 2023 export restrictions on non-basmati varieties[10] - reveal how quickly buyers switch among origins, underscoring the space for Pakistan to expand market share if it can guarantee consistent quality and timely delivery.

Pakistan's Supply Position

Pakistan harvested 14.8 million tons of paddy in 2023 on 3.6 million hectares.[11] Yields have stalled at 4.1 t/ha, below China (> 6 t/ha) and the world average (~4.9 t/ha).[12] The Kalar tract in Punjab still produces 70 percent of the export-quality basmati;[13] Sindh's lower Indus basin supplies IRRI and hybrid varieties for non-basmati markets. Milling capacity is ample, > 1,200 registered units, but 60 percent use antiquated sun-drying yards that leave grain moisture above Codex limits and foster aflatoxin.[14]

Current Export Footprint

Shipments reached USD 2.5 billion (4.5 million t) in 2023 - 10 percent of global trade - but remain concentrated: 58 percent to Iran, Kenya, Afghanistan, and the UAE.[15] In basmati, Pakistan's share

[5] USDA PS&D, 2014-23 trade volume
[6] ITC Trade Map, global value & price
[7] ITC Trade Map, exporter shares 2019-23
[8] Ibid.
[9] ITC Trade Map, China & GCC import values 2023
[10] DGFT Notification 20/2023, 20 Jul 2023
[11] MNFSR, Pakistan Economic Survey 2023-24
[12] FAOSTAT, crop yields 2023
[13] PARC, Basmati Varietal Adoption Survey 2024
[14] REAP, Mill Census & Tech Audit 2024
[15] ITC Trade Map, Pakistan exports 2023

of the lucrative GCC retail segment is barely one-third of India's because branded shelf space is dominated by Indian labels "India Gate", "Daawat" and "Tilda".[16]

Untapped Potential

ITC's Export-Potential Index (EPI) puts additional short-term potential at USD 1.27 billion, distributed as: China (USD 390 m), Saudi Arabia (USD 250 m), Malaysia (USD 130 m), Indonesia (USD 115 m), and Qatar & Oman (USD 90 m each).[17] Tariffs are already zero under CPFTA-II and the Pakistan-Indonesia PTA; the gap is explained by SPS detentions and weak brand pull.

Binding Constraints

Pakistan's USD 1.27 billion unrealized rice opportunity is blocked by a stack of mutually reinforcing frictions at every stage of the chain. Evidence from the ITC analytics, field visits in Sheikhupura and Larkana, and seventeen exporter- and regulator-interviews points to five binding constraint clusters.

Table 3.1.1 Binding Constraints - Rice

Constraint cluster	What the evidence shows	Why it bites hardest in export markets
1. On-farm productivity & crop quality	- Yields have stalled at 4.1 t/ha because 43 % of basmati area is still planted to 15-year-old seed. - Flood irrigation and late harvesting leave high grain moisture (18–22 %) and increase breakage. - Climate shocks: 2022 floods submerged 280 000 ha, wiping out 0.8 m t exportable surplus.[18]	Low yields keep unit costs high; variable grain size and chalkiness trigger downgrades in Chinese and GCC retail contracts.
2. Post-harvest handling & processing	- Only one-third of mills own mechanical dryers; sun-drying raises aflatoxin risk and delivers moisture >14 %, above EU limit. - Colour sorting and de-stoning are missing in ~55 % of Sindh mills,	Quality claims cost exporters USD 30–45 t^{-1}; buyers demand discounts or switch origin when shipments fail ISO 22000 random tests.

[16] NielsenIQ, GCC Modern-Trade Rice Audit 2023
[17] ITC, "Export Potential and Product Diversification Assessments" online database, accessed 14 April 2025, https://exportpotential.intracen.org.
[18] MNFSR, Post-Flood Crop Damage Assessment 2023

	leading to 5–7 % admixture on arrival at port. - Storage capacity is fragmented; paddy sits 2–3 months in jute bags, attracting insects and mycotoxins.	
3. SPS compliance & traceability	- 17 EU RASFF alerts (2021-23) for aflatoxin and tricyclazole residues; two Saudi temporary suspensions.[19] - No farm-to-mill traceability system; mills buy from open mandi, so they cannot prove protocol-compliant paddy to Chinese or EU inspectors. - Overlap between Provincial Food Authorities and the federal Department of Plant Protection causes duplicate inspections but patchy enforcement.	SPS failures block the highest-price channels (EU, Japan) and erode trust in the newer CPFTA-II quota with China.
4. Inland logistics and border processes	- Farm-gate-to-port freight averages PKR 11 kg (USD 38 t^{-1}), 70 % higher than India, because rice moves almost entirely by road; rail share < 4 %.[20] - Karachi Port has only 96 powered reefer plugs and no bulk-rice loader; peak-season dwell time exceeds 120 hours.[21] - Customs occasionally mandates 100 % container scanning after security alerts, adding 24 hours and demurrage.	Thin profit margins in West-African and ASEAN tenders are wiped out by the extra inland haulage and port delays; cost advantage disappears relative to Thailand.
5. Market power & branding gap	- Ninety percent of Pakistani basmati ships in 50-kg branded sacks owned by Indian and GCC packers;[22] FOB exporters capture none of the USD 250 t^{-1} retail premium. - The domestic GI for "Pakistan Basmati" was gazetted only in 2023	Without a protected GI and consumer-recognised brand, Pakistani rice competes mainly on price; buyers switch the moment India resumes exports.

[19] EU RASFF portal search, Apr 2025
[20] World Bank, Pakistan Logistics Cost Study 2024
[21] Karachi Port Trust, Master Plan 2024
[22] REAP, Packaging & Branding DB 2023

	and is still unregistered in the EU, UK and GCC patent offices.[23] - Small mills lack working capital to hold inventory until price spikes; they "sell-short" into the mandi, reinforcing the commodity trap.	

Low farm productivity feeds into poor post-harvest quality; without dryers and rapid storage, the grain is already borderline on aflatoxin before it reaches the mill. That, in turn, triggers SPS problems that shut the door to high-margin destinations. Even when consignments pass, high inland freight and weak branding strip out most of the profit. Isolated interventions—dryers without traceability, or a branding campaign without GI protection—therefore fail. The next sub-section lays out an integrated action package that tackles each cluster in sequence, beginning with moisture control and SPS enforcement and ending with brand capture.

Policy Action Levers

Unlocking Pakistan's USD 1.27 billion rice opportunity demands an end-to-end response that fixes quality failures first, lowers logistics costs next, and locks in long-run competitiveness through climate resilience, traceability, and branding. The matrix below arranges those measures in the order they can be rolled out, links each to a clearly accountable institution, and shows how on-farm, post-harvest, and market-access reforms knit together into a single, export-ready value chain.

Table 3.1.2 Policy Action Levers - Rice

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0 – 18 mo)	SPS enforcement	Tighten aflatoxin / pesticide-residue limits at seaports; modernize food-safety laboratories and mandate risk-based inspection	Department of Plant Protection (DPP), Ministry of Commerce
	Post-harvest technology	Open a cost-sharing window for export-oriented mills to install mechanical dryers, colour sorters and modern storage	Export Development Fund (EDF), REAP
	Seed-renewal & agronomy	Fast-track multiplication of newly released higher-yield flood-/lodging-tolerant basmati lines; launch "Moisture-Smart Harvest"	PARC, Federal Seed Certification Dept., Punjab & Sindh

[23] IPO-Pakistan, S.R.O. 1468(I)/2023

		demonstrations and SMS advisories across the Kalar tract	Agriculture Depts., REAP
	Branding & GI	Roll out a unified "Pakistan Basmati" quality seal and finance first-round certification audits for early movers into branded retail packs	TDAP, IPO-Pakistan, REAP
Medium term (2 – 4 yr)	Climate-resilience finance & early warning	Bundle weather-index crop insurance with SBP green-credit facilities for dryers & on-farm storage; deploy satellite flood-risk maps and SMS alerts before kharif sowing	State Bank of Pakistan, ZTBL, Provincial Disaster-Management Authorities, NDMA, private insurers
	Contract farming & traceability	Amend Contract Act to recognize buy-back agreements; pilot digital trace-back clusters (farm–mill–exporter) in Punjab & Sindh	MNFSR, Provincial Agriculture Depts., REAP
	Logistics relief	Introduce a temporary rail-freight rebate to shift up-country rice from road to rail until the planned double-stack container service is operational	Ministry of Railways, Pakistan Railways
Long term (5 + yr)	Water-efficient production	Extend Punjab micro-irrigation support scheme to basmati; mainstream alternate-wetting-and-drying (AWD) and drip systems	Punjab Irrigation Dept., MNFSR
	End-to-end traceability	Build a national digital platform linking seed source, pesticide logs and lab tests; oversee implementation through the forthcoming National Food-Safety Authority	National Food-Safety Authority, PITB, PSQCA

Taken on their own, none of these interventions will move the needle; taken together, they form a mutually reinforcing bundle that can lift Pakistan's rice offer all the way from farm to retail shelf. Better seed and climate-smart agronomy raise yields and grain integrity; modern drying, storage, and traceability lock in quality; upgraded labs and risk-based inspections translate that quality into SPS credibility abroad; rail incentives trim logistics costs; and a protected "Pakistan Basmati" seal converts compliance into a price premium.

3.2 Bovine Meat

Global Outlook and Competitive Landscape

World bovine-meat trade has expanded from 8.5 million t in 2010 to just over 12 million t in 2024,[24] a market worth USD 60–62 billion at average FOB prices of USD 4.9–5.2 kg.[25] Two structural forces underpin demand: the steady rise of middle-class consumption in East and South-east Asia, and the GCC's complete dependence on imported red-meat proteins. China is now the undisputed price-setter, absorbing more than 3 million tons a year—about one-quarter of global trade—while the six-member GCC bloc purchases a further 1.1 million tons.[26] On the supply side, four exporters dominate: Brazil, the United States, Australia, and India, together providing about 70 percent of world shipments, followed by New Zealand, Argentina, and Uruguay. Pakistan is a fringe player, shipping 65–80 thousand tons annually (less than 1 percent of global trade), but it enjoys a built-in halal advantage and logistical proximity to the Gulf and West Asia—two market attributes that none of the Big-Four suppliers can replicate at once.

Pakistan's Supply Position

National inventories stand at roughly 54 million head (43 million buffalo, 11 million cattle).[27] Carcass yields average 120 kg for buffalo and 140 kg for cattle—only two-thirds of the Brazilian or Australian benchmark—because animals are dual-purpose (milk first, meat later) and are slaughtered at 8–10 years of age. Still, the sector is large: the country produced just under 4.8 million t of bovine meat (carcass-weight equivalent) in 2023, fourth highest in Asia after China, India, and Pakistan's near neighbor, Bangladesh.[28] Commercial capacity is emerging: 43 export-approved abattoirs operate under REAP's meat section, and five modern feedlots each finish 20,000–35,000 head per cycle. Yet the national value chain remains fragmented, with no disease-free zones, rudimentary cold logistics beyond the plant gate, and minimal traceability, so most products stay at home.

Current Export Footprint

Official exports reached USD 333 million in 2022 (≈ 72,000 tons), 85 percent of it frozen bone-in buffalo meat trucked or shipped to the UAE, Saudi Arabia, Kuwait, and Oman.[29] A thin flow of

[24] USDA-FAS, Livestock and Poultry: World Markets and Trade, April 2024.
[25] Author's calculation from ITC Trade-Map unit-value series (HS 0201 & 0202), 2023–24 average.
[26] UN Comtrade (mirror imports under HS 0201/0202), 2023 provisional release.
[27] MNFSR, Pakistan Economic Survey 2023-24, Livestock chapter.
[28] FAOSTAT Production Domain, download April 2024.
[29] State Bank of Pakistan, Export Receipts FY 2023; Pakistan Customs PRAL extract, HS 0201/0202.

heat-treated (boiled) beef has begun moving to China under a special protocol, while Afghanistan and Uzbekistan purchase chilled carcasses by road. Average unit values are low—USD 4.5 kg FOB versus > USD 6.0 kg for Australian or US grain-fed beef—because buyers treat Pakistani product as a bulk halal filler, not a branded premium line.

Untapped Potential

ITC's Export-Potential Index suggests that an additional USD 510 million of bovine-meat sales is feasible within five years if Pakistan meets baseline SPS and logistics standards.[30] Two-thirds of that potential lies in Asia: China (USD 230 m), Malaysia and Indonesia together (USD 90 m), and Vietnam (USD 25 m). The balance sits in the GCC—Saudi Arabia (USD 70 m), the UAE and Qatar (USD 45 m combined), and niche markets in the Levant. Tariffs are generally low: China levies 0 percent on frozen halal buffalo meat, while Malaysia and the GCC apply 0–5 percent MFN duty. The gap is therefore explained by SPS exclusions (no OIE-recognised FMD-free zone), weak cold-chain integrity, and inconsistent carcass grading.

Binding Constraints

Table 3.2.1 Binding Constraints - Bovine Meat

Constraint cluster	What the evidence shows	Why it bites hardest in export markets
1. Animal health & bio-security	- No FMD-free or compartmentalized zones; only heat-treated meat accepted by China. - Sporadic outbreaks of LSD and hemorrhagic septicemia trigger importing-country alerts.	High-value markets (China raw beef, premium GCC retail) require OIE certification; absence of zones blocks access or forces costly heat treatment.
2. Feedlot efficiency & on-farm productivity	- Average daily weight-gain in feedlots 0.8 kg vs 1.3 kg in Brazil; feed conversion ratio > 9 kg DM kg^{-1} gain. - Smallholders sell culled dairy buffalo at low live-weights; little use of terminal beef breeds.	Low carcass weights inflate unit cost; prevents supply of uniform primal cuts demanded by food-service chains in the Gulf and ASEAN.
3. Slaughter & cold chain	- 60 percent of export abattoirs lack blast-freezers; only 15 have ISO 22000 or HACCP.	Temperature abuse during the first 24 hours accelerates drip-loss and microbiological load, leading to

[30] ITC, Export Potential Map query run March 2024 (product HS 0201/0202; partner list China, GCC, ASEAN).

	- Inland reefer penetration < 3 percent; rail offers no refrigerated wagons.	retail-level discoloration and short shelf-life.
4. SPS compliance & traceability	- No national animal-ID system; paper health certificates can be forged. - Eight EU Rapid-Alert interceptions (2019-24) for antibiotics residues.[31]	Importers demand farm-to-plant traceability and validated residue tests; lack of digital ID undermines credibility, caps prices.
5. Market structure & finance	- Working-capital cycle > 120 days; feedlots borrow at 18 percent p.a. - Exporters settle in AED/USD 60 days after dispatch; few have forfaiting lines.	High finance cost erodes margin; firms cannot hold chilled inventory to target higher-price windows or develop own brands.

Poor biosecurity and cold-chain gaps cascade through the system: without zonal freedom, exporters must cook meat for China; without true cold logistics, they cannot switch into higher-margin chilled cuts for GCC modern retail. Fragmented animal sourcing and scant finance lock the sector into a low-value commodity corner.

Policy Action Levers

Table 3.2.2 Policy Action Levers - Bovine Meat

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0–18 mo)	FMD-control blitz	Launch ring-vaccination and submit OIE dossier for compartment approval	MNFSR, Provincial Livestock Depts. FAO
	Rapid-cold-chain fix	Subsidize modular blast-freezers and 20-foot reefers for export abattoirs under the Export Development Fund (EDF) window	EDF REAP (Meat Chapter)
	Lab & residue protocol	Upgrade veterinary labs to ISO 17025 and publish a mandatory antibiotic-residue testing regime before shipment	DPP PSQCA
Medium term (2–4 yr)	Feedlot productivity & finance	Extend SBP livestock credit line to cover feeding cycles; co-finance	SBP ZTBL

[31] EU RASFF portal, search terms “Pakistan + bovine meat”, retrieved May 2024.

		silage preparation units and performance-recording software	Pakistan Banks Association
	Digital traceability	Roll out RFID-based animal-ID from birth to slaughter; link to e-health-certificate module	National Food-Safety Authority
	Rail-reefers & corridor access	Retrofit refrigerated wagons and schedule tri-weekly Karachi–Lahore and Karachi–Multan meat services	Ministry Railways, Pakistan Railways, PRACS
Long term (5 + yr)	Zonal freedom & exports	Achieve OIE endorsement for at least one FMD-free (vaccination-controlled) zone; renegotiate raw-beef protocol with China and Malaysia	MNFSR, MoC, DPP
	Breed improvement & climate resilience	Import beef-bull semen (Brangus, Charolais) and scale crossbreeding in feedlot catchments; integrate shade-net and water-spray cooling to cut heat stress	PARC, Provincial Livestock Depts.
	Brand & market development	Establish a "Pakistan Halal Prime" certification mark; support exporters to launch branded chilled and portion-cut lines in GCC modern-trade chains	TDAP, Halal Development Council, Chambers of Commerce

Dairy Products including yogurt, milk and cheese

Another sector related to the bovine livestock industry is the dairy product sector which includes milk (HS code 040120), yogurt and cheese. The ITC ranks milk low for Pakistan While total exports in 2024 stood at $4.3 million and an unrealized export potential of a further $3.4 million, there continues to be several constraints that limit the export potential of milk, as well as other related food products such as cheese and yogurt. Since the dairy product industry is downstream from the bovine livestock sector, any of the productivity constraints that affect the bovine industry subsequently affect the milk and processed dairy food sector as well; low productivity, poor animal husbandry, limited research and technical knowledge of productivity enhancing measures limit the production base of the dairy sector. Similar to the bovine meat industry, non-uniformity of quality control and SPS standards for the export and domestic sector means the domestic dairy industry is not currently equipped to increase production to cater to both domestic demand and export growth.

Because of the strong complementarity between the two sectors and the fact that the dairy sector is further downstream relative to the bovine meat sector, the former can only have export growth with improved productivity and economies of scale in the bovine industry, along with regulatory oversight of the domestic market. We therefore recommend focusing on improving productivity in the bovine livestock sector which should subsequently help the dairy sector.

By bundling bio-security zoning, cold-chain upgrades, and digital traceability, Pakistan can unlock direct access to China's raw-beef market and lift unit values in the GCC. Feedlot finance and breed improvements convert those new market signals into heavier, more uniform carcasses, while a halal-prime branding push captures the downstream retail premium. None of the levers alone are decisive; together, they shift the sector from an opportunistic commodity supplier to a credible, high-value protein exporter.

3.3 Potatoes

Global Outlook and Competitive Landscape

World potato production has climbed to approximately 376 million tons in 2023,[32] but the international market remains modest, about USD 4–5 billion a year,[33] because most output is consumed domestically. China and India supply nearly half of the global volume, followed by a second tier of exporters led by the Netherlands, France, and Canada, whose competitive edge rests on specialized seed tubers and low-loss cold chains. Demand growth is strongest in Southeast Asia and the Middle East, where shifting diets favor French fries, dehydrated flakes, and other convenience formats. Malaysia, Vietnam, and the GCC together imported USD 900 million of fresh, frozen, and prepared potatoes in 2023, and their purchases have been expanding at 6-8 percent a year despite recent price volatility.[34]

Pakistan's Supply Position

Pakistan harvested 8.3 million tons of potatoes in 2023, eighth in the world, drawn from 340,000 ha concentrated in Punjab's districts of Okara, Pakpattan, and Kasur. Average yield has inched up to 24 tons per ha, on par with India but well below the 40-plus tons achieved in north-west Europe.[35] Roughly 60 percent of the national crop is grown from imported Dutch seed varieties (Asterix, Lady Rosetta, Santana), whose landed cost has soared after recent rupee devaluations. Cold-store capacity of ~1.1 million tons of cushions seasonal gluts,[36] yet only a fraction meets export-grade hygiene and temperature standards.

Current Export Footprint

Official shipments totaled USD 147 million of fresh potatoes in 2023, plus a token USD 6 million in frozen and prepared forms.[37] The trade is narrowly focused: Afghanistan, Malaysia, and the UAE absorbed more than two-thirds of the volume, and almost all consignments left Pakistan between December and March, when domestic prices are low. Higher-value European and East-Asian niches remain untapped because buyers demand uniform tuber size, low reducing sugars (for fry color), and containerized cold-chain certification.

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[32] FAOSTAT Production Domain, "Potatoes", download April 2024.
[33] ITC Trade Map, HS 0701/0710/2004/2005 world exports, 2023 US-dollar values.
[34] Author's calculation from ITC partner-country import data, 2018-23 CAGR.
[35] MNFSR, Pakistan Economic Survey 2023-24, Table 2.8; FAOSTAT yields series.
[36] Pakistan Cold Storage & Seed Potato Growers Association, 2023 industry census.
[37] Pakistan Customs PRAL export database, HS 0701/0710/2004/2005, calendar 2023.

Untapped Potential

ITC's Export-Potential Index indicates an additional USD 120 million in near-term opportunity. The single biggest gap is Malaysia (USD 12 million), followed by Vietnam (USD 14 million), Uzbekistan (USD 8 million), Saudi Arabia (USD 7 million), and a cluster of EU markets that together represent USD 45 million if Pakistan can lift quality to GlobalG.A.P. and EU MRL standards.[38] No tariff obstacles stand in the way - the hurdles are agronomic, technological, and compliance-related.

Binding Constraints

Table 3.3.1 Binding Constraints - Potatoes

Constraint cluster	What the evidence shows	Why it bites hardest in export markets
1 On-farm productivity & input cost	– Yield plateau at 24 t/ha; Dutch seed costs ≈ PKR 45,000 per 50 kg bag (12 bags acre-¹). – Limited local R&D on virus-free Mini tubers; farmers recycle seed for 4–5 seasons, raising disease load.	High unit cost erodes Pakistan's price edge once freight is added; uneven tuber size pushes consignments into lower-priced 'table' rather than 'processing' category.
2 Post-harvest handling & cold chain	– Only 30 % of stores maintain < 8 °C and forced-air ventilation; sprouting and sugar-rise turn tubers dark on frying. – Field heat removal (hydro-cooling) almost absent; bruising losses run 10-12 %.	Color defects trigger re-grading or rejection in Malaysian and EU supermarkets; bruising undermines processed-chip conversion yields.
3 SPS compliance & certification	– Six EU RASFF notifications since 2020 for brown-rot and excess chlorpropham.[39] – No nationally recognized certification body for GlobalG.A.P. or ISO 22000 in tuber crops.	Without farm-to-container traceability, buyers apply 100 % inspection or shift to Dutch suppliers whose chain of custody is documented.
4 Logistics & tariff disadvantages	– Reefer export relies on private 20-ft plug-in units trucked from Punjab to Karachi (1 000 km); road freight ≈ USD 55 t-¹.[40]	High inland cost cancels farm-gate savings; ad-hoc audits introduce clearance risk that buyers price into lower bids.

[38] ITC Export-Potential Map query (HS 0701 + 0710 + 2004), run March 2024.
[39] EU Rapid-Alert System for Food & Feed portal, search: "Pakistan + potatoes", retrieved May 2024.
[40] National Logistics Cell tariff schedule, 40-ft refrigerated container, May 2024.

	– Indonesian and Vietnamese bound tariffs are zero on Dutch and Canadian origin under ASEAN agreements, but Pakistani potatoes still face ad-hoc SPS audits.	
5 Market structure & value addition	– Processing-grade potatoes (< 0.5 % reducing sugars) account for < 8 % of volume; PepsiCo's local crisp plant imports most of its requirement. – No starch or flake plant of industrial scale.	Exports remain bulk fresh tubers, missing the 70-150 % value-addition captured by European dehydrators and fry plants.

Policy Action Levers

Table 3.3.2 Policy Action Levers - Potatoes

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0 – 18 mo)	Certified-seed acceleration	Register & fast-track multiplication of virus-free Dutch and locally screened chip-grade varieties; subsidize first-round Mini tuber purchase for export-registered growers.	PARC, Federal Seed Certification Dept., Punjab Agri Dept.
	Cold-chain upgrade	Matching-grant window for forced-air, low-temp retrofits in existing stores plus pilot field hydro-coolers.	Export Development Fund, TDAP, Cold-store association
	SPS & certification	Authorise domestic GlobalG.A.P./ISO 22000 auditors; run joint DPP-TDAP clinics on soil-borne pest sampling and EU MRL compliance.	DPP, PNAC, TDAP
Medium term (2 – 4 yr)	Climate-smart agronomy & finance	Launch weather-indexed cover for heat-shock; bundle with SBP green-credit line for drip irrigation and precision fertilizer applicators.	SBP, ZTBL, private insurers
	Rail-based reefer pilot	Introduce concessional rail-freight service (Lahore-Port Qasim) for palletised fresh potatoes; integrate with PR chilled-wagon refurbishment plan.	Ministry of Railways, PR Freight
	Processed-potato cluster	Facilitate one export-oriented flake/fry plant through SEZ plot allocation and duty-free machinery import; link to contract-farming scheme.	BOI, Punjab Industrial Estates, private investors

Long term (5 + yr)	Domestic seed autonomy	Establish nucleus & breeder-seed farm for pathogen-free Mini tubers; target 60 % import-replacement by 2030.	PARC, private seed firms
	End-to-end traceability	Roll out QR-coded crate tags linking farm practices, cold-store logs and phytosanitary certificates to container seals.	National Food-Safety Authority, PITB

Taken together, these levers could convert Pakistan's basic volume advantage into a quality-secured, climate-resilient, and market-diverse potato chain. Clean seed and climate-smart agronomy lift yields; modern cooling and traceability lock in tuber integrity; logistics relief and a first mover in flakes/fry capture additional margin, turning a bulk-commodity export into a branded, higher-value offer for fast-growing Asian food markets.

3.4 Onions

Global Outlook and Competitive Landscape

World trade in bulb onions (fresh, chilled, or dried) hovers around 7–8 million tons a year, worth USD 4.0–4.5 billion at average FOB prices of USD 520–560 per ton.[41] Supply is geographically concentrated: the Netherlands, China, Mexico, and Egypt together ship almost 60 percent of global exports, while India is normally the swing supplier but has twice imposed export bans since 2020, sending buyers scrambling for alternatives. Demand is rising fastest in the Gulf Cooperation Council (GCC) and ASEAN, where per-capita use is high and local output is limited; Malaysia, Indonesia, and the United Arab Emirates imported a combined USD 940 million of onions in 2023, posting 7 percent compound growth since 2018.[42] These policy and demand shocks open a clear lane for Pakistani exports, provided quality and year-round availability can be guaranteed.

Pakistan's Supply Position

Pakistan produced ≈ 1.84 million tons of onions in 2023 from 135,000 ha, ranking ninth globally.[43] Output is concentrated in Balochistan (Khuzdar, Lasbela), Sindh (Mirpurkhas, Umerkot, Hyderabad), and Khyber Pakhtunkhwa's Swat valley. Average yield—13.6 tons per ha—lags both the world mean (19 tons) and regional leaders such as Egypt (> 35 t) because most growers recycle seed for 3–4 seasons, use flood irrigation, and cure bulbs in the open.[44] Commercial cold-store space is scarce (< 120,000 tons)[45] and limited to Punjab's potato belt, so half the crop is sold within four weeks of harvest, driving steep price swings.

Current Export Footprint

Fresh-onion exports reached USD 87 million (≈ 215,000 tons) in 2023—roughly 3 percent of world trade—and are heavily clustered: Malaysia (USD 32 m), the UAE (USD 14 m), and Sri Lanka (USD 18 m) absorbed 74 percent of shipments.[46] Exports of dried, frozen, or pickled onions remain negligible (< USD 5 m). Seasonality is acute: outbound volume peaks in April–June (Sindh

[41] FAOSTAT Trade Domain and ITC Trade-Map (HS 0703, 0712), world export totals, calendar 2023.
[42] Author's calculation from ITC partner-country import series, 2018-23.
[43] MNFSR, Pakistan Economic Survey 2023-24, Table 2.8; FAOSTAT Production Domain, download Apr 2024.
[44] FAOSTAT yield series, 'Onions and shallots, dry', 2023 estimates.
[45] Pakistan Cold Storage & Horticulture Association, 2023 capacity census.
[46] Pakistan Customs PRAL extract & ITC Trade-Map, HS 070310, calendar 2023.

harvest) and September–November (Balochistan crop) and collapses in the monsoon gap, prompting buyers to default to Egypt or China.

Untapped Potential

ITC's Export-Potential Index puts Pakistan's short-term upside at USD 71 million, led by Vietnam (USD 10 m), Indonesia (USD 9 m), Saudi Arabia (USD 8 m), the Netherlands (re-export hub; USD 7 m), and Bangladesh (USD 6 m).[47] Tariffs are not the barrier; ASEAN MFN duty is 5 percent, and GCC is zero, but SPS conformity and grade consistency are.

Binding Constraints

Table 3.4.1 Binding Constraints - Onions

Constraint cluster	Evidence from analytics & fieldwork	Impact on export markets
1 On-farm productivity & seed quality	– National yield 13.6 t ha^{-1} vs > 35 t ha^{-1} in Egypt. – Farmers recycle seed; certified hybrid seed share < 12 %. – Heatwaves in 2022 cut bulb size by 18 %.	Small bulbs (< 45 mm) are downgraded in Malaysian wholesale markets; unit costs remain high when freight is added.
2 Curing, grading & storage	– only 15 % of growers use forced-air curing racks; the rest sun-cure, leading to excess neck moisture and rot. – No pack-houses in main onion belts; mixed sizes and soil residue raise rejection risk.	GCC retailers demand ≤ 6 % moisture loss and uniform 45-65 mm calibres; failure triggers price discounts or diversion to low-value wholesale channels.
3 SPS compliance & pest pressure	– Six EU RASFF alerts (2021-23) for *Pseudomonas* brown-rot and carbendazim residues; Indonesia now requires 100 % phytoinspection.[48] – No farm-to-packhouse traceability.	SPS-sensitive markets impose mandatory lab tests, delaying clearance and raising demurrage.
4 Logistics & port infrastructure	– Farm-gate-to-Karachi reefer haulage ≈ USD 50 t^{-1}; rail share < 3 %.[49] – Karachi Port lacks forced-ventilation sheds; peak dwell > 96 h.	High inland cost wipes out margin in ASEAN tenders; extended dwell time accelerates sprouting and weight loss.

[47] ITC Export Potential Map query (HS 070310/071220), run Mar 2024.
[48] EU Rapid-Alert System for Food & Feed portal, search "Pakistan + onions", retrieved May 2024.
[49] National Logistics Cell tariff schedule, 40-ft refrigerated container, May 2024.

5 Value addition & market structure	– Only one dehydration plant (capacity 3,000 t yr^{-1}) is export-certified; reliance on raw-bulb sales leaves 80-140 % value-addition untapped. – Growers sell via commission agents; no contract farming.	Buyers source dehydrated flakes and fried onions from India/China; Pakistan remains a price-taking bulk supplier.

Policy Action Levers

Table 3.4.2 Policy Action Levers - Onions

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0 – 18 mo)	Certified-seed boost	Fast-track registration/import of heat-tolerant hybrid varieties; matching grant for seed purchase by export-registered growers.	PARC, Federal Seed Certification Dept., Provincial Agri Depts.
	Pack-house retrofits	Cost-share forced-air curing racks, sizing belts and plastic crates in pack-houses.	EDF, TDAP, cluster associations
	SPS clinics & rapid testing	Mobile labs to screen for brown-rot and pesticide residues pre-shipment; training for inspectors on ASEAN/EU protocols.	DPP, PNAC-accredited labs
Medium term (2 – 4 yr)	Climate-smart agronomy	Pilot drip-irrigated summer onions and reflective mulch to reduce sun-scald; bundle with weather-index insurance.	MNFSR, SBP green credit, private insurers
	Rail-reefer service	Launch ventilated-wagon service; freight rebate for export consignments.	Ministry Railways, PR Freight
	Dehydration & fry cluster	Facilitate export-oriented dehydration plants via SEZ land and duty-free dryers; link to buy-back contracts with growers.	BOI, Private investors
Long term (5 + yr)	National traceability	QR-coded field bins linking farm GPS, pesticide logs and lab certificates to container seals; mandatory for EU/GCC lanes by 2030.	National Food-Safety Authority, PITB
	Cold-chain scale-up	Zero-duty on high-efficiency ventilation chillers; concessional	SBP, EDF, Cold-store association

		finance for 50,000 t MAP (modified-atmosphere) stores.	

Taken together, these measures convert Pakistan's seasonal onion surplus into a calibrated, compliance-ready export offer. Hybrids and drip irrigation lift bulb size and heat resilience; cluster pack-houses, curing racks, and traceability lock in quality; rail incentives trim inland freight; and a first wave of dehydration plants captures the margin that now accrues to third-country processors.

3.5 Tomatoes

Global Outlook and Competitive Landscape

Global tomato output reached ≈ 192 million tons in 2023,[50] yet only a thin slice enters formal trade because the crop is perishable. World exports of fresh, frozen, canned, and ketchup products together run at USD 11–12 billion a year.[51] Mexico, the Netherlands, Spain, and Morocco dominate fresh-tomato flows to high-value retail markets in North America and the EU, while Italy and China lead in paste and ketchup. Import growth is strongest in the Gulf, ASEAN, and East Asia, where rising disposable income and a shift toward quick-service meals are pushing up demand for sauces, diced, and purée. China alone bought USD 46 million of ketchup/paste and USD 42 million of fresh tomatoes in 2023;[52] the GCC imported more than USD 650 million of the full range, and ASEAN nearly USD 450 million.[53] These fast-growing, geographically close markets are natural targets for Pakistan, once quality and year-round supply bottlenecks are solved.

Pakistan's Supply Position

Pakistan harvested ≈ 760,000 tons of tomatoes in 2023 from 68,000 ha spread across Balochistan (Lasbela, Barkhan), Sindh (Thatta, Badin), and Punjab's riverine belts.[54] Average yield, 11 tons per ha, is only one-third of the world average because most growers rely on open-pollinated seed, flood irrigation, and ad-hoc pest control.[55] Hybrid adoption is below 10 percent. Nearly 40 percent of the crops are lost to bruising, heat, and disease owing to field heat retention, rough handling, and the absence of pre-coolers.[56] Processing capacity is tiny: a single ketchup line in Lahore and a few cottage-scale drying units, forcing snack and fast-food companies to import paste.

Current Export Footprint

Official exports are negligible relative to production:[57]

- Fresh tomatoes (HS 070200) – ≈ USD 8,000 in 2023, all to Afghanistan.
- Ketchup & sauces (HS 210320) – USD 0.6 million in 2023, led by the UK and USA.

[50] FAOSTAT Production Domain, "Tomatoes," download April 2024.
[51] ITC Trade Map, combined HS 0702, 2002, 2009, 210320 export values, 2023.
[52] ITC Trade Map partner-country import data, HS 2002 & 0702, calendar 2023.
[53] Author's aggregation of ITC import series for GCC-6 and ASEAN-10, 2023.
[54] MNFSR, Pakistan Economic Survey 2023-24 Table 2.8; FAOSTAT area series.
[55] FAOSTAT yield data, 'Tomatoes', 2023 estimates.
[56] Pakistan Horticulture Development & Export Company (PHDEC) rapid post-harvest assessment, 2023.
[57] Pakistan Customs (PRAL) export database & ITC Trade Map, HS 0702/210320/2002, 2023.

- Canned/preserved (HS 200210/200290) – USD 0.5 million in 2023, shipped mainly to the Netherlands and the USA.

Exporters report intermittent sales to the UAE and Qatar during Pakistan's winter-crop window (December–February), but consistency is poor and price discounts steep because color and acidity vary.

Untapped Potential

ITC's Export-Potential platform signals a USD 95 million near-term opportunity across three product families:[58]

- Fresh or chilled tomatoes (HS 070200)
    - Priority markets: UAE, Saudi Arabia, Malaysia, Vietnam, Qatar
    - Indicative short-term gap: USD 55 million
- Ketchup and other tomato sauces (HS 210320)
    - Priority markets: China, Philippines, Oman, Kuwait
    - Indicative short-term gap: USD 18 million
- Preserved, diced, or puréed tomatoes (HS 200210 / 200290)
    - Priority markets: Bahrain, Singapore, Maldives
    - Indicative short-term gap: USD 22 million

While tariffs are not a binding constraint, exporters face hurdles in meeting consistent quality standards, addressing SPS concerns (notably mold counts and pesticide residues), and securing reliable cold-chain logistics.

Binding Constraints

Table 3.5.1 - Binding Constraints: Tomatoes

Constraint cluster	What the evidence shows	Export-market impact
1 Low yield & varietal mismatch	– National yield 11 t ha^{-1} vs > 55 t ha^{-1} in Mexico. – Only 9 % hybrid seed; farmers reuse seed 3–4 seasons. – Lack of heat-tolerant processing varieties raises colour-defect rate.	High unit cost and inconsistent lycopene content push buyers toward Moroccan or Dutch product despite higher freight.
2 Field heat, bruising & shelf life	– < 5 % of crop is pre-cooled; field temperature 32 °C triggers > 10 % weight loss in 48 h.	Soft, wrinkled fruit fails GCC supermarket QC, rerouted to wholesale at a 20 % discount.

[58] ITC Export Potential Map query (HS 0702, 2002, 210320), run March 2024.

	– Wooden crates and bulk sacks cause 8–12 % mechanical bruising.	
3 SPS & chemical residues	– Four EU RASFF alerts (2021-23) for acetamiprid and dimethoate residues; GCC buyers now ask for third-party MRL tests.	Clearance delays and extra lab costs erode slim margins; some importers blacklist Pakistani origin.
4 Processing gap & value addition	– Installed ketchup/paste capacity < 40,000 t raw-fruit eq.; estimated domestic demand 150,000 t. – No continuous evaporator line for export-grade 28-30 °Brix paste.	Pakistan ships bulk fresh commodity; Italy and China capture 80-150 % added value in paste/pouches.
5 Cold-chain & logistics cost	– Reefers run road-only from farm belts to Karachi (1 000 km; USD 60 t^{-1}). – No forced-cool air-cargo dock; urgent consignments pay +30 % tariff on Emirates / Qatar Airways freighters.	Inland cost cancels FOB advantage; shelf life on arrival < 8 days, limiting retail options.

Policy Action Levers

Table 3.5.2 – Policy Action Levers: Tomatoes

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0 – 18 mo)	Hybrid-seed fast track	Register hot-set hybrids and high-lycopene processing varieties; seed-voucher for export-registered farmers.	PARC, Federal Seed Certification Dept., Provincial Agri Depts.
	Pack-house mini grants	Matching grants for pre-cool tunnels, plastic crates and grading belts.	EDF, TDAP, cluster associations
	SPS rapid tests & IPM training	Deploy mobile residue labs; roll out Integrated Pest Mgmt. field schools with acetamiprid phase-out timetable.	DPP, PNAC labs, MNFSR
Medium term (2 – 4 yr)	Paste & ketchup cluster	Facilitate paste plant in Special Economic Zones with duty-free evaporators & cryogenic drum-coolers; contract farming for color-spec varieties.	BOI, Punjab Industrial Estates, private investors
	Cold-chain corridor	rail-freight rebate on reefer containers; refurbish PR chilled	Ministry Railways, PR Freight, CAA

		wagons; establish forced-air cargo dock.	
	Climate-smart finance	Bundle SBP green-credit line for drip irrigation with weather-index insurance for heat-wave losses.	SBP, ZTBL, private insurers
Long term (5 + yr)	National traceability	QR-coded crate tags linking field GPS, pesticide logs, pack-house test results to export containers; mandatory for GCC/EU lanes by 2030.	National Food-Safety Authority, PITB
	Yield-improvement R&D	Public-private breeding programme for virus-resistant dwarf hybrids; target 35 t ha^{-1} national mean by 2032.	PARC, Seed companies, Universities

Collectively, these levers can reposition tomatoes from a volatile surplus crop to a branded, climate-resilient, and higher-value export. Hybrids and drip irrigation treble yields; pre-cooling and traceability lock in quality; a modern paste line captures value now ceded to foreign processors; and a rail-based cold corridor trims inland freight, opening the GCC and ASEAN ready-to-eat market for Pakistani tomato products.

3.6 Chickpeas

Global Outlook and Competitive Landscape

World output of chickpeas (Cicer arietinum) reached ≈ 17 million tons in 2023, driven by India, Australia, Türkiye, Russia, and Ethiopia.[59] Only about 2 million tons, valued at USD 1.8–2.0 billion, enter formal trade, because India both dominates production and intermittently restricts exports.[60] When Indian supply tightens (drought, minimum-support-price hikes), importers diversify quickly toward Australia and Mexico, underlining the scope for new entrants. Demand is structurally high in South Asia and the Mediterranean, where chickpeas underpin staple dishes, and is rising in the Gulf and Europe on the back of plant-protein and vegan foods. Bangladesh alone purchased ≈ USD 480 million of dried and processed chickpeas in 2023; the UK, Spain, and Italy each imported USD 100–160 million.[61]

Pakistan's Supply Position

Pakistan harvested ≈ 263,000 t of chickpeas in 2023 from 842,000 ha, ranking seventh globally but with yields of just 0.29 tons per ha,[62] one-fifth of Australia's.[63] Production is highly concentrated in rain-fed Punjab (Bhakkar, Layyah, Khushab) and arid Balochistan (Jaffarabad, Nasirabad). Growers rely on tall, low-density desi landraces, broadcast sowing, and single deep ploughing; seed replacement is below 8 percent, and fertilizer use is negligible. Drought episodes in 2018 and 2022 cut output by 15–20 percent, exposing the sector's climate sensitivity. On-farm storage is rudimentary (jute sacks), so bruchid beetle infestation is common and quality downgrades frequently.

Current Export Footprint

Official chickpea exports are marginal, USD 7–9 million a year,[64] and are usually trucked to Afghanistan when domestic prices fall. Small lots of roasted or coated "chana" snacks go to Gulf ethnic markets (< USD 2 million). Despite zero MFN duty in most target markets, Pakistan holds a < 0.4 percent share of the world chickpea trade.

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[59] FAOSTAT Production Domain, "Chick peas, dry," download April 2024.
[60] ITC Trade-Map, global exports of HS 071320 (dried) & HS 19059010 (roasted), calendar 2023.
[61] ITC Trade-Map partner-country import data, HS 071320, 2023.
[62] MNFSR, Pakistan Economic Survey 2023-24, Table 2.8; FAOSTAT area series, 2023.
[63] FAOSTAT yield series, Pakistan vs Australia, 2023 (Australia = 1.43 t ha^{-1}).
[64] Pakistan Customs PRAL export database & ITC Trade-Map, HS 071320, 2021-23 average.

Untapped Potential

ITC's Export-Potential Index indicates an immediate USD 263 million opportunity, mainly in:[65]

Target market	Indicative gap	Tariff status
Bangladesh	USD 115 m	MFN 0 %
Sri Lanka	USD 38 m	MFN 0 % under PSFTA
Spain & Italy (EU)	USD 52 m	GSP+ zero duty
United Kingdom	USD 28 m	Developing-Countries Scheme zero duty
GCC (UAE, Saudi, Qatar)	USD 30 m	MFN 0 %

Realization hinges on competitive yields, insect-free storage, and uniform 8–10 mm grain caliber preferred by Mediterranean packers.

Binding Constraints

Table 3.6.1 – Binding Constraints: Chickpeas

Constraint cluster	What the evidence shows	Export-market impact
1 Low yield & seed degeneration	– National mean 0.29 t ha^{-1} vs > 1.4 t ha^{-1} in Australia. – 92 % seed is farmer-saved; no uptake of climate-resilient kabuli or semi-dwarf desi lines.	High unit cost; small, shriveled grain outside EU sieve grades; fails Spanish 8 mm spec.
2 Moisture & insect management	– Bruchid infestation > 15 % after 3 months in jute sacks.[66] – On-farm RH > 65 % during Rabi harvest; no hermetic storage.	Live-insect detections at GCC ports trigger fumigation cost or re-export.
3 Harvest & cleaning	– Manual uprooting causes high pod shatter; admixture of soil and stones 1–2 %. – No gravity separators in major markets.	EU processors apply USD 30–40 t^{-1} cleaning discount; color variation reduces sorting yield.
4 SPS compliance	– Four EU RASFF notifications (2021-23) for chlorpyrifos;[67] Pakistan has not banned WHO Class-II insecticides on pulses.	Extra lab tests delay clearance; premium retailers avoid Pakistani origin.

[65] ITC Export Potential Map query for Pakistan, HS 071320, run March 2024.
[66] Pakistan Pulse Research Institute, Post-Harvest Loss Baseline Survey – Chickpeas, 2022.
[67] EU Rapid-Alert System for Food & Feed (RASFF) portal, search "Pakistan + chickpeas," retrieved May 2024.

5 Aggregation & finance	– Farm lots average 1.2 t; no contract farming; millers procure via commission agents. – Working-capital cost > 20 % APR; exporters cannot hold inventory for seasonal spikes.	Inconsistent volumes disappoint large GCC roasters; price volatility undermines forward contracts.

Policy Action Levers

Table 3.6.2 - Policy Action: Chickpeas

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0–18 mo)	Certified seed fast-track	Register climate-resilient kabuli/desi varieties; seed voucher for export-registered clusters.	PARC, Federal Seed Cert. Dept., Punjab & Balochistan Agri Depts.
	Hermetic storage kits	Grant on hermetic cocoons & metal bins.	EDF, Provincial Agri Ext.
	Pesticide phase-out & residue labs	Ban chlorpyrifos & class-II insecticides on pulses; accredit two ISO 17025 labs for rapid residue testing.	DPP, PNAC
Medium term (2–4 yr)	Mechanised harvest & cleaning	Duty-free import of low-cost axial threshers & gravity separators; matching grants to cleaning hubs.	FBR, EDF, cluster farmers
	Warehouse receipt finance	SBP-backed 12-month receipt scheme for graded chickpeas stored in accredited silos.	SBP, ZTBL, Karachi Mercantile Exchange
	Contract farming pilots	Legalise forward buy-back clauses; exporter–grower pacts for kabuli in Layyah and D.G. Khan.	MNFSR, REAP-Pulses Segment
Long term (5 + yr)	Climate-smart breeding	Public-private breeding platform targeting heat & drought tolerance, pod-borer resistance; 0.8 t ha^{-1} yield goal by 2032.	PARC, Int'l Crops Res. Inst., seed firms
	Export-grade processing zone	Incentivize polishing/colour-sorting plants in SEZs; linked to EU/GCC HACCP certification.	BOI, TDAP, private investors

Together, these measures move chickpeas from a low-yield, domestically absorbed staple to a graded, insect-free export able to penetrate Bangladeshi, GCC, and Mediterranean demand spikes. Improved seed and mechanized harvest raise yields and caliber; hermetic storage and residue-free

protocols secure SPS access; warehouse receipts smooth seasonal liquidity; and export-grade sorting captures the premium now earned by rival suppliers.

3.7 Bananas

Global Outlook and Competitive Landscape

Bananas are the world's most-traded fresh fruit. Global production reached ≈ 127 million tons in 2023,[68] while formal exports of Cavendish and other dessert varieties averaged 24 million tons, worth USD 13–14 billion.[69] Ecuador, the Philippines, Guatemala, Costa Rica, and Colombia together supply almost 80 percent of cross-border flows; India, the largest grower, ships little because most fruit is consumed at home. Demand is rising fastest in Central Asia, the Gulf, and East Africa, regions without tropical climates. Kazakhstan, Uzbekistan, and Turkmenistan now import a combined ≈ USD 210 million a year,[70] the GCC ≈ USD 690 million, and Iraq/Iran nearly USD 900 million.[71] Those land-locked or geographically close markets give Pakistan a freight advantage, if it can deliver consistent size, ripeness, and residue compliance.

Pakistan's Supply Position

Pakistan harvested ≈ 285,000 t of bananas in 2023 from 39,000 ha, almost entirely in lower Sindh (Thatta, Tando Allah Yar, Matiari) and parts of Lasbela in Balochistan.[72] Average yield is only 7.3 tons per ha, one-third of the world mean and less than a fifth of Philippine plantations.[73] The reasons are well-known:

- Old Cavendish clones propagated through suckers, leading to viral load and Panama disease susceptibility.
- Short-term land leases (2–3 y) encourage cash-flow farming rather than long-horizon husbandry.
- Flood-irrigation and water-logging cause root rot; fertiliser use is low and unbalanced.

Post-harvest capacity is rudimentary: out of 275 registered orchards, only 12 own forced-air pre-coolers and six operate modern ethylene ripening chambers, so most fruit arrives over-green or patch-ripe.[74]

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[68] FAOSTAT Production Domain, "Bananas," download April 2024.
[69] ITC Trade Map, global exports of HS 0803, calendar 2023.
[70] ITC Trade Map partner-country import data (Kazakhstan, Uzbekistan, Turkmenistan, HS 0803), 2023.
[71] ITC Trade Map, cumulative GCC-6 and Iraq+Iran imports of HS 0803, 2023.
[72] MNFSR, Pakistan Economic Survey 2023-24 Table 2.8; FAOSTAT area series.
[73] FAOSTAT yield series, Pakistan vs global average, 2023.
[74] Pakistan Horticulture Development & Export Company (PHDEC), Sindh Banana Value-Chain Audit, 2023.

Current Export Footprint

Official exports were USD 23 million in 2023 (≈ 48,000 t), 85 percent trucked to Afghanistan and Iran, and the rest by reefer container to Oman and the UAE.[75] Pakistan's fruit sells at 8–12 percent below Ecuadorian landed CIF because of variable finger length (18–19 cm vs supermarket spec ≥ 20 cm) and inconsistent color stage on arrival.

Untapped Potential

ITC's Export-Potential platform shows an additional USD 50 million gap, chiefly in:[76]

Target market	Indicative gap	Tariff status
Iran / Iraq corridor	USD 18 m	MFN 0 % (imports by barter licence)
UAE / Oman / Qatar	USD 14 m	MFN 0 %
Kazakhstan / Uzbekistan	USD 10 m	MFN 0 %
Turkmenistan / Kyrgyz Rep.	USD 8 m	MFN 0 %

No import duty hurdle exists; the gap is explained by quality volatility, absence of certified quarantine protocols and weak year-round supply.

Binding Constraints

Table 3.7.1 – Binding Constraints: Bananas

Constraint cluster	What the evidence shows	Export-market impact
1 Low yield & disease pressure	– Yield 7.3 t ha^{-1} vs > 45 t ha^{-1} in Ecuador. – Fusarium oxysporum TR4 confirmed in Thatta (2022); suckers spread infection.	High unit cost; small finger size, variable hands reduce carton utilisation.
2 Fragmented, short-lease farming	– > 70 % of orchards on 36-month leases; no incentive to invest in drip, tissue-culture or soil health.	Inconsistent volumes; buyers cannot secure annual supply contracts.
3 Post-harvest & ripening gap	– 94 % fruit moves unrefrigerated to Karachi in wooden crates; scuffing/sap burn 8–10 %. – Limited forced-air pre-cool; ripening often relies on calcium-carbide.	Color stage uneven; GCC retailers reject or downgrade, forcing wholesale re-sale.
4 SPS & MRL compliance	– Cypermethrin and chlorpyrifos residues exceed EU/GCC limits in random tests (2021–23).	Additional lab checks and detentions add USD 450–500 per container.

[75] Pakistan Customs PRAL export database & ITC Trade Map, HS 0803, 2023.
[76] ITC Export Potential Map query for Pakistan, HS 0803, run March 2024.

5 Logistics & cold chain	– Reefer back-haul imbalance: northbound containers return empty, raising Karachi-Tashkent cost to USD 0.17 kg. – No cross-dock at Torkham.	Freight wipes out FOB margin; shelf life < 8 days on arrival in Central Asia.

Policy Action Levers

Table 3.7.2 – Policy Action - Bananas

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0–18 mo)	Tissue-culture seedling scale-up	Certify disease-free Cavendish (G-9) labs; subsidy for plugs to lease-holder groups.	PARC, Sindh Agriculture Dept., private labs
	Rapid-ripening upgrade	Matching grants for forced-air pre-coolers and food-grade ethylene chambers.	EDF, TDAP, PHDEC
	SPS quick-response	Ban calcium-carbide ripening; register TR4 surveillance zones and issue pest-free area certificates for export orchards.	DPP, Sindh Plant Quarantine
Medium term (2–4 yr)	Climate-smart irrigation	SBP Green-Agri credit line for drip and raised-bed drainage; bundle weather-index insurance for cyclone damage.	SBP, ZTBL, private insurers
	Grower cooperatives & 5-yr leases	Model Growers-Company Act provisions allowing pooled land blocks and minimum 5-year orchard leases	MNFSR, Sindh & Balochistan Boards of Revenue
	Cold corridor to Central Asia	Concessionary rail tariff on refrigerated containers Karachi–Chaman–Termez; cross-dock tunnel at Chaman Dry Port.	Ministry Railways, PR Freight, private logistics
Long term (5 + yr)	Panama-disease R-and-D	Public-private breeding programme for TR4-tolerant cultivars; on-farm biocontrol trials.	PARC, Int'l Tropical Agric. Centre
	Export-grade branding	Develop "Sindh Sweet Gold" carton spec (21 cm fingers, color 4) with QR traceability; trademark registered in GCC & Central Asia.	TDAP, IPO-Pakistan, PHDEC

Acting on this bundle converts bananas from a domestic surplus crop into a climate-resilient, branded export to Central Asian and Gulf consumers. Disease-free tissue culture and drip irrigation treble yields; pre-cooling and certified ethylene ripening secure colour and shelf life; TR4 surveillance and residue management open high-margin retail channels; and a rail-enabled cold corridor restores Pakistan’s freight advantage north of the Hindu Kush.

3.8 Maize

Global Outlook and Competitive Landscape

Maize is the planet's single-largest cereal crop. World output touched ≈ 1.2 billion tons in 2023,[77] of which, 180–190 million tons (≈ USD 55 billion), entered formal trade.[78] Four exporters—the United States, Brazil, Argentina and Ukraine—ship more than 85 percent of that volume, but Asia's import pull is re-shaping routes: China routinely buys 20–25 million t a year, Vietnam 10 million, and the combined Malaysia–Philippines–Thailand market another 8–9 million.[79] Most big Asian buyers accept non-GMO and approved GMO hybrids so long as aflatoxin is < 20 ppb and moisture < 14 percent.

Pakistan's Supply Position

Domestic maize has shifted from a subsistence Rabi crop to a commercial Kharif hybrid within two decades. Output reached ≈ 9.8 million t in 2023—triple the 2000 level—on 1.54 million ha, driving average yields to 6.4 tons per ha,[80] now higher than India and equal to the world mean.[81] Growth is concentrated in:

- Central Punjab (Vehari, Pakpattan, Okara): spring maize with imported single-cross hybrids, pivot irrigation.
- Khyber Pakhtunkhwa (Mardan, Swat): summer maize on rain-fed slopes, still open-pollinated in places.

About 65 percent of the crop is processed by three wet-millers into starch, glucose, sorbitol and ethanol; the balance feeds poultry. Grain drying is the weak link: > 60 percent of kernels are sun-dried on brick-floors, leaving moisture 16-18 percent and aflatoxin above EU limits in wet years.

Current Export Footprint

Exports climbed to USD 324 million (≈ 0.9 million t) in 2023, almost all shipped in bulk to Vietnam (USD 104 m), Malaysia (USD 34 m), and Sri Lanka (USD 20 m) under zero-duty ASEAN quotas.[82] Out-turn weight losses and sporadic aflatoxin detentions keep Pakistani maize discounted USD 8–10 t^{-1} under Argentine levels.

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[77] FAOSTAT Production Domain, "Maize," data download April 2024.
[78] ITC Trade Map, global exports of HS 1005, calendar 2023.
[79] USDA-FAS Grain: World Markets and Trade, April 2024.
[80] MNFSR, Pakistan Economic Survey 2023-24, Table 2.8.
[81] FAOSTAT Yield series, Pakistan vs world & India, 2023.
[82] Pakistan Customs PRAL export database & ITC Trade Map, HS 100590, 2023.

Untapped Potential

The ITC Export-Potential Index assigns USD 126 million in additional near-term opportunity:[83]

Target market	Indicative gap	Tariff status
China	USD 30 m	10 % MFN; favourable quota under CPFTA but SPS pending
Spain & Benelux (EU)	USD 24 m	GSP+ zero duty; strict aflatoxin ≤ 10 ppb
Bangladesh	USD 15 m	MFN 0 %
Egypt / Morocco	USD 20 m	MFN 0 %
ASEAN (incremental)	USD 37 m	0 % under PTAs

Binding Constraints

Table 3.8.1 - Binding Constraints: Maize

Constraint cluster	Evidence	Export-market impact
1 Seed & yield ceiling	– 92 % hybrids are imported; dollar volatility lifts seed cost 18–22 %. – Public R&D on heat-tolerant single-cross lines stalled.	High cost per tonne; margins vanish when peso-linked Brazil floods Vietnam market.
2 Grain drying & aflatoxin	– Only 14 commercial tower-dryers nationally; sun-dry losses 3 %.[84] – 2022 monsoon pushed aflatoxin > 20 ppb in 42 % of export lots.[85]	EU and China require ≤ 10 ppb; shipments diverted to feed or rejected.
3 Bulk-handling & silos	– < 6 % of harvest stored in metal silos; balance in 100-kg jute. – Rail share to port < 5 %; road freight PKR 9.2 kg vs Brazil's USD 0.04 kg.	Broken kernels, insect damage cut premium buyers; freight wipes out FOB edge.
4 SPS & GMO protocols	– China has not yet completed pest-risk analysis; CPFTA quota unused. – EU tolerates only approved GMO events; Pakistan lacks event-tracking system.	Locks Pakistani maize out of the two highest-value markets.

[83] ITC Export Potential Map query for Pakistan, HS 100590, run March 2024.
[84] Pakistan Maize Association & PHDEC, Maize Value-Chain Audit, 2023.
[85] Department of Plant Protection, Annual Mycotoxin Surveillance Bulletin 2023, Table 4.

5 Finance & aggregation	– 70 % of grain moves through beopari on cash-advance terms; farmers liquidate at harvest. – Working-capital rates > 20 % APR deter exporters from carry-over.	Inconsistent year-round availability; cannot service long-term supply contracts.

Policy Action Levers

Table 3.8.2 - Policy Action: Maize

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0–18 mo)	Aflatoxin action plan	Fast-track mobile grain-dryer units; mandatory lot-testing (ISO 17025).	DPP, EDF, REAP-Maize
	Seed-cost offset	Temporary duty drawback on hybrid-seed imports tied to exporter-contracted clusters.	FBR, MNFSR
	China SPS access	Conclude pest-risk analysis; pilot quarantine-registered silos for CPFTA quota shipments.	DPP, MoC, Customs
Medium term (2–4 yr)	Silo & rail corridor	Matching grant for galvanized silos at; concessional rail tariff.	Ministry Railways, Private grain traders
	Warehouse-receipt finance	SBP revolving facility against graded maize receipts in accredited silos.	SBP, Commercial banks
	Non-GMO traceability	Digital field-to-silo tracking (QR tags, pesticide logs) for EU-bound cargo	PITB, REAP-Maize, EU IPPC
Long term (5 + yr)	Climate-smart breeding	Public–private platform targeting sub-tropical heat tolerance, drought resilience; goal 8 t ha^{-1} by 2032.	PARC, Intl Maize & Wheat Centre
	Value-added downstream	SEZ incentive (10-year tax holiday) for starch, dextrose and ethanol plants drawing 0.5 m t maize.	BOI, TDAP, Private investors

In combination, these levers push maize from a domestic feed grain into a residue-safe, rail-delivered, value-added export crop. Hybrid-seed affordability and new R&D lift yields; mobile dryers, silo storage and traceability clear the SPS gate; rail and silo finance cut logistics cost; and targeted SEZ incentives capture starch-and-ethanol premiums now lost to imports.

3.9 Cherries

Global Outlook and Competitive Landscape

Sweet- and sour-cherries together account for only ≈ 3.6 million t of world output (2023), tiny compared with apples or citrus, but the crop occupies a lucrative niche.[86] Global trade has doubled in a decade to ≈ USD 4.1 billion (460,000 t), driven almost entirely by China's off-season demand and the rise of premium supermarket channels in the Gulf and South-East Asia.[87] Turkey, the United States, and Chile alternate as the top three suppliers; Uzbekistan and Iran are emerging challengers. The Chinese market alone absorbed USD 2.5 billion in 2023, paying CIF prices of USD 7–11 kg for counter-seasonal Chilean fruit,[88] while GCC importers paid USD 6–8 kg for air-freighted U.S. and Turkish shipments.[89] Retailers and quarantine authorities enforce strict color (score > 4), firmness (> 0.35 lb/in²), and pesticide-residue ≤ 0.01 ppm requirements, together with rapid cool-chain transfer (< 4 h from harvest).

Pakistan's Supply Position

Cherries are grown in two distinct mountain belts:

- Gilgit-Baltistan (GB): 1,650 ha in Hunza, Nagar, Ghizer, and Skardu
- Northern Balochistan: ≈ 850 ha around Ziarat, Pishin, and Kalat

Total production is small, ≈ 6,000 t in 2023, and yields average 2.4 t ha¹, barely two-thirds of the global mean.[90] Field surveys show three structural weaknesses:[91]

- Seedling-based orchards: 70 % of trees originate from seedlings rather than clonal grafted rootstock; varietal mix is unknown, and maturity is uneven.
- Low-tech husbandry: Pruning, calcium sprays, and bird-netting are rarely practiced; up to up-to-25 % fruit cracks after pre-monsoon showers.
- Cool-chain gaps: orchards sit four to nine hours from the nearest forced-air pre-cooler; fruit typically cools down only on day 2 at a Karachi consolidator.

On-farm trials by PARC/GB Agriculture Extension using certified Canadian cultivars ('Lapins', 'Santina') and high-density spindle systems indicate a potential 8–9 tons per ha under drip

[86] FAOSTAT Production Domain, "Cherries (sweet & sour)," data download April 2024.
[87] ITC Trade Map, global exports of HS 0809, calendar 2023.
[88] USDA-GAIN Report CH2024-0001, "China Stone-Fruit Annual," Table 4 (average CIF prices, 2023).
[89] UN Comtrade (China import mirror) & GACC customs bulletin No. 437/2024, HS 0809.
[90] MNFSR, Pakistan Economic Survey 2023-24 Table 2.8; PARC Orchard Census 2022.
[91] Izhar H. et al., Cherry Cluster Feasibility & Transformation Study, Planning Commission, 2020, pp. 18-22.

irrigation, but take-up is slow because orchardists operate three-to-five-kanal plots on informal leases.

Current Export Footprint

Official exports are negligible, < USD 0.5 million, and move informally by road to Xinjiang or by air luggage to Dubai.[92] In 2022, a single Karachi forwarder shipped four test pallets (2.2 t) to Kuala Lumpur; half were downgraded on arrival for soft shoulders and stem browning. Pakistan, therefore, has no price benchmark and no presence in China's tariff-quota window (1 July–15 August).

Untapped Potential

ITC's Export-Potential model identifies USD 60 million of short-term gaps once SPS and logistics frictions are solved:[93]

Market	Indicative gap	Tariff position
China	USD 28 m	30 % MFN; zero under CPFTA once pest protocol signed
UAE + Qatar	USD 14 m	MFN 0 %
Malaysia + Singapore	USD 9 m	MFN 0 %
Saudi Arabia	USD 6 m	MFN 5 %

Current tariffs are not the binding factor; the binding constraints lie in quality and speed.

Binding Constraints

Table 3.9.1 – Binding Constraints – Cherries

Constraint cluster	What the evidence shows	Why it bites in export markets
1 Orchard genetics & husbandry	– 72 % seedling trees; peak maturity spread over 10–12 days. – No large-scale bird-netting; 5–8 % peck damage. – Pre-monsoon rain causes 15 % cracking.	Mixed maturity breaks cool-chain planning; European & GCC buyers demand single-lot uniformity (color 4+).

[92] Pakistan Customs PRAL export database & ITC Trade Map, HS 0809, 2023.
[93] ITC Export Potential Map query for Pakistan, HS 0809, run March 2024.

2 Post-harvest cooling & grading	– Only two forced-air pre-coolers in GB (combined 6 t cycle).[94] – Hydro-coolers absent; manual grading yields 8–10 % soft fruit. – Transit Hunza→Islamabad 15 h at 25 °C.	Core pulp temp > 10 °C on palletisation; mould sets in within 72 h, triggering retail rejects.
3 SPS & pest-risk protocol (PRP)	– China requires PRP for *Cydia pomonella*; dossier pending since 2021. – No accredited MRL lab in GB/Balochistan.	Without PRP, China admits only heat-treated purée; GCC tighten on cypermethrin.
4 Freight & cold logistics	– Air cargo GB→DXB costs USD 2.90 kg vs Turkish exporters' USD 1.50 kg IST→DXB. – Lack of guaranteed ULD positions during Hajj season.	Delivered-Dubai price lands above Chilean late-season fruit; buyers switch origin.
5 Finance & aggregation	– Orchards 3–8 kanal; no FPO/co-op licence. – Working-capital rates 22 % APR; growers forced to pre-sell to middlemen at PKR 250 kg (ex-farm).	Exporters cannot secure volume nor apply GlobalG.A.P.; brand development impossible.

Policy Action Levers

Table 3.9.2 – Policy Action: Cherries

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0 – 18 mo)	Orchard upgrade grants	Matching for clonal rootstock and bird-net packages (Hunza, Ziarat).	PARC, GB & Balochistan Agri Depts.
	Mobile pre-cool & pack-house	Containerised forced-air units (2 t each) leased via PHDEC; linked to quality-bonus contracts.	EDF, PHDEC, private exporters
	China PRP fast-track	Submit pest-risk dossier; designate pest-free production zone, install pheromone traps.	DPP, MoC, AQSIQ (China)
Medium (2 – 4 yr)	High-mountain cool-chain	Build multi-commodity cold hub at Gilgit Airport; SBP concessionary loan window for reefer trucks (GB→ISB).	Civil Aviation, NLC, SBP

[94] PHDEC, Northern Areas Cherry Value-Chain Audit, 2023, Annex B.

	Digital orchard cluster	Tab-based traceability (GPS, spray log, residue checks) piloted on 200 ha; ties into exporter QR.	PITB, Exporter consortium
	Air-cargo slot guarantee	Seasonal MoU with PIA / Emirates for GB→DXB/KUL, capped freight.	Aviation Division, TDAP
Long (5 + yr)	Climate-resilient cultivars	Joint breeding with ICARDA for rain-crack-resistant 'Lapins/Garnet' types; target 9 t ha^{-1}.	PARC, ICARDA
	Producer-owned FPOs	Amend Cooperative Societies Act to allow cross-district cherry FPOs; link to warehouse-receipt finance.	MNFSR, GB/Bal. Cooperatives

Together, these interventions convert cherries from a cottage orchard crop into a high-altitude, QR-tracked export to China and the Gulf. Clonal rootstocks and bird control lift pack-out; mobile pre-coolers and a Gilgit hub lock in pulp temperature; a China pest-protocol, MRL labs, and digital traceability secure market entry; and pooled air-cargo plus FPO finance sustain volumes and brand premiums.

3.10 Olives & olive oil

Global Outlook and Competitive Landscape

The world olive crop reached ≈ 20 million tons in 2023,[95] generating about 3.4 million tons of olive oil[96] and an export trade of ≈ USD 11 billion (USD 8 billion oil; USD 3 billion table olives)[97]. Spain, Italy, and Türkiye still supply > 55 percent of all exports, but demand is spreading fast across the Gulf, East Asia, and health-conscious middle-class markets in ASEAN. GCC retail shelves now carry > 150 brands[98], and China's olive-oil imports have quadrupled since 2015[99], with extra-virgin prices in Tier-1 cities averaging USD 5.8 kg. Importing governments increasingly enforce IOC purity grades and peroxide/FFA ceilings; large retailers require ISO 22000-certified mills and farm-to-bottle traceability.

Pakistan's Supply Position

Commercial olive cultivation began only in 2012 under the Italian-funded Poverty Alleviation through Olive Cultivation programme. By 2024:

- ≈ 20,000 ha are planted (≈ 5 million trees) across two belts:[100]
    - Potohar plateau (Punjab/KPK): rain-fed, rocky loam—50 percent of plantings.
    - South-western Balochistan: irrigated pockets in Khuzdar, Wadh, Mastung.
- Yields are highly variable, 1.5 tons per ha on smallholder blocks vs Spain's 6 tons per ha, because 70 percent of orchards are < 6 years old; only 15 percent use drip or fertigation.[101]
- On-farm varietal mix: 'Arbequina', 'Coratina', 'Arbequino', 'Koroneiki'.
- Processing: 40 mini-mills (0.5–1 tons per ha), three industrial lines (5 tons per ha).[102] Laboratory capacity is limited to one IOC-accredited panel in Lahore; no accredited residue lab near the main orchards.

Farm-gate prices exceeded PKR 330 kg in 2023, but growers lose up to 18 percent oil because fruit travels > 200 km to mills and arrives above 28 °C.

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[95] FAOSTAT Production Domain, "Olives," download April 2024.
[96] International Olive Council (IOC), World Olive Oil Figures 2024, Table 1.
[97] ITC Trade Map, combined exports HS 1509 (olive oil) + HS 200570 (prepared olives), calendar 2023.
[98] NielsenIQ, GCC Edible-Oil Retail Audit 2023, p. 17.
[99] UN Comtrade, China imports HS 1509, 2015 vs 2023.
[100] MNFSR, National Olive Project Progress Report, Jan 2024, Annex 2.
[101] PARC / CIHEAM, Olive Baseline Survey Pakistan, 2023, Table 4.
[102] Olive Culture, State-of-the-Art of Olive Sector in Pakistan, 2023, p. 9.

Current Trade Footprint

Pakistan is still a net importer: in 2023, the country bought ≈ USD 390 million of olive oil (mainly Spanish and Turkish) and exported only USD 2 million of virgin oil and pickled olives, largely to niche ethnic stores in the UAE, UK, and Qatar.[103]

Untapped Potential

ITC's Export-Potential tool assigns ≈ USD 52 million of near-term opportunity, USD 40 million in extra-virgin oil, and USD 12 million in prepared olives, mostly in:[104]

Market	Indicative gap	Tariff status
UAE + Saudi Arabia	USD 22 m	MFN 0 %
China	USD 11 m	10 % MFN; CPFTA line for virgin oil unused
Malaysia + Singapore	USD 9 m	MFN 0 %
Qatar + Kuwait	USD 6 m	MFN 0 %
EU niche ethnic stores	USD 4 m	GSP+ zero duty; strict IOC grade test

Binding Constraints

Table 3.10.1 – Binding Constraints: Olive/Olive Oil

Constraint cluster	Evidence	Export-market impact
1 Orchard maturity & husbandry	– 67 % trees pre-bearing; seedling vs grafted mix unclear. – Only 28 % orchards on drip; alternate-bearing & low oil content (≤ 14 %).	Low yields keep cost > USD 5 kg; oil grade often "virgin" not "extra-virgin," losing top GCC shelf.
2 Milling & quality control	– 70 % fruit travels > 3 h unrefrigerated; FFA > 0.8 %. – Mini-mills lack nitrogen blanketing; peroxide values exceed IOC extra-virgin cut-off in 35 % samples.	GCC/China buyers reject oil > 0.8 % FFA; Pakistan stuck in bulk food-service segment.
3 Lab & residue testing	– Single IOC sensory panel in Lahore; 2-week turnaround. – No accredited pesticides lab in Potohar; growers use non-label copper sprays.	Inability to supply COI/T.20/Doc. no. 15 panel report delays export lots; higher detention risk in China.

[103] Pakistan Customs (PRAL) & ITC Trade Map, HS 1509, 2023.
[104] ITC Export Potential Map query for Pakistan, HS 1509 & 200570, run March 2024.

4 Value-chain fragmentation	– Orchardists < 8 ha; mills unlinked to farms; no cold extraction cooperatives. – Finance: commercial term-loans > 18 % APR; pay-back > 8 yrs for a 2-t mill.	Inconsistent volumes and grades; exporters cannot negotiate supermarket supply contracts.
5 Branding & GI gap	– No registered GI; "Potohar Olio" brand still pending at IPO-Pakistan. – Domestic labelling rules permit "olive-pomace blend," confusing consumers.	GCC retailers demand recognised origin seal; Pakistan oil competes only on price.

Policy Action Levers

Table 3.10.2 - Policy Action: Olive/Olive Oil

Horizon	Instrument	Core measure	Lead agency / partners
Immediate (0 – 18 mo)	Rapid-ageing orchards	Grants for high-density, grafted 'Arbequina/Koroneiki' blocks.	PARC, Punjab/Bal. Agri Depts.
	Mobile olive presses	Lease containerised cold-extract units.	EDF, PHDEC
	IOC lab capacity	Upgrade NARC Islamabad lab; train second accredited sensory panel in Quetta.	MNFSR, IOC
Medium (2 – 4 yr)	Cooperative milling & traceability	Register "Potohar Olive Producers Organisation"; digital ledger logs orchard, spray, temperature.	IPO-Pakistan, PITB, Growers
	Green-credit line	SBP concessionary finance for continuous-decanter mills.	SBP, Commercial banks
	China SPS access	Conclude residue-protocol; pilot virgin-oil tranche under CPFTA quota.	DPP, MoC, AQSIQ
Long (5 + yr)	Climate-smart varieties	Joint breeding with ICARDA for drought-tolerant, high-oleic cultivars.	PARC, ICARDA
	Protected GI & branding	Finalise "Pak-Olive" GI across GCC/EU; launch joint retail pack (250 ml & 500 ml) with PDO seal.	IPO-Pakistan, TDAP, Retailers

Why the bundle matters. Young, high-density orchards and mobile cold-presses raise oil yield and quality; accredited labs and a CPFTA residue protocol unlock China; co-op milling and SBP green-finance aggregate volumes at lower cost; a protected GI converts compliance into shelf-space

premiums. Taken together, the levers can shift Pakistan from a USD 390 million olive oil importer to a credible regional supplier within a decade.

Box 3.1. Mushrooms

Mushrooms

Mushrooms and truffles (HS code 0712XX) have somewhat limited export potential in the short run. The ITC reports exports of $1.8 million with an unrealized export potential of $770,000. There are several reasons why the export potential of mushrooms may be limited. First, mushrooms are not a popular domestically consumed vegetable: The FAO does not report production statistics for mushrooms in Pakistan. Given its low production base, and the fact there is limited domestic demand for mushrooms, the prospects of developing an export industry in mushrooms is limited in the short run. Additionally, there are regulatory issues related to mushroom cultivation, since some varieties of mushrooms can be poisonous or have hallucinogenic effects. There is at present no existing regulatory or legal rules related to mushroom cultivation, which would be a prerequisite for development of the sector.

Box 3.2. Industrial Hemp

Industrial hemp/ medical cannabis

The cannabis plant grows naturally in northwestern Pakistan and Afghanistan. It is used as a primary ingredient in the manufacture of raw hemp (HS code 530210) and Tetrahyrdocannbinol (HS code 293295). Although recreational cannabis use is illegal in Pakistan, its use for the manufacture of hemp was permitted in Pakistan in 2020 and a regulatory body to oversee its production through the Cannabis Control and Regulatory Authority in 2024. More recently in 2025, the Khyber Pakhthunkhwa government legalized cannabis cultivation for hemp production.

The hemp industry in Pakistan is in its nascent stage, with no clear estimates for its export potential, while the largest exporters currently being the Netherlands, Germany and the U.S. Since the majority of cannabis use is for recreational use, there exist presently high regulatory barriers as well as supply constraints that limit the export potential of hemp. Given the lack of clear regulatory oversight over legal cannabis use as an input for industrial hemp manufacture, the export potential for hemp remains limited.

Chapter 4: Cross-Cutting Constraints

The ten product dossiers converge on a common story: Pakistan's agri-food exports are held back less by tariff barriers than by a knot of system-wide frictions that recur, sometimes in different guises, along every value chain. Seven constraint clusters stand out. Each is summarized below in Table 4.1, illustrated with the most telling examples from the product dossiers. The following takeaways emerge:

- Inter-linkages matter. Low farm productivity feeds directly into SPS failures (higher mycotoxin risk), which then discourages investment in branding; port delays compound the problem by pushing moisture or temperature above tolerance levels.
- No single silver bullet. Fixing laboratories without dryers, or launching a brand campaign without a GI, cannot unlock the USD 4 bn export prize quantified in Section 6.
- Sequencing by constraint logic, not commodity silos. The action plan, therefore, bundles solutions: quality labs are paired with traceability; rail incentives with cooperative pack-houses; insurance with climate-smart irrigation.

This holistic diagnosis sets the stage for the Integrated Policy Recommendations (Section 6), which maps each constraint cluster to a coherent set of policy and investment levers.

Table 4.1 Cross-Cutting Constraints

Constraint cluster	What we observe across products	Why it is binding
1 Stagnant farm productivity & seed renewal lag	• Rice, potatoes and tomatoes all show multi-year yield plateaus well below regional leaders. • 15-year-old basmati seed still covers 40 %+ of Punjab area; 70 % of olive trees are pre-bearing seedlings.	Low farmgate yields keep unit costs high, eroding any price advantage created by tariff preferences (e.g. zero duty into China or GCC).
2 Climate-risk exposure & water inefficiency	• 2022 floods cut 0.8 m t of exportable rice and destroyed 14 % of Sindh onion acreage. • Basmati uses flood irrigation; olives lack drip/fertigation; drought risk rising.	Volatility deters buyers who prize consistency; rising irrigation costs erode competitiveness.
3 Fragmented post-harvest & processing infrastructure	• Only one-third of rice mills own mechanical dryers; 55 % of Sindh potato stores lack forced-air cooling. • Cherries and bananas lose ≥ 18 % of volume in field-to-pack-house transit.	Quality defects accumulate before products even reach the lab—triggering SPS rejections or heavy price discounts.
4 Weak SPS compliance, testing & traceability	• 17 EU RASFF alerts for rice (2021-23). • Live cattle exporters still confined to cooked-beef shipments because Pakistan lacks an OIE-recognized FMD-free zone. • Only one IOC-accredited olive-oil panel in the country.	High-margin markets (EU, Japan, premium GCC retailers) demand documented compliance; without it, exporters are locked out or forced into bulk commodity channels.
5 Logistics, cold-chain & port bottlenecks	• Farm-gate-to-Karachi freight for rice ≈ USD 38 t (70 % > India). • Karachi Port has only 96 powered reefer plugs; no bulk-rice loader; cherry exporters queue up to 48 h in peak weeks. • Rail carries < 4 % of agri cargo.	The extra USD 20–40 t logistics bill wipes out price margins in competitive ASEAN and West-African tenders.
6 High cost & limited tenure of finance	• Commercial term loans > 18 % APR; pay-back period > 8 yr for olive mills or cold rooms. • SBP Export Finance Scheme uptake in agri is just 4 %.	Small and medium processors cannot fund dryers, cold-rooms or branding campaigns; they sell raw product and exit the value ladder.
7 Governance fragmentation & branding gap	• Overlapping mandates: Provincial Food Authorities vs federal DPP on plant health; four agencies inspect the same rice consignment. • GI for "Pakistan Basmati" gazetted but still unregistered in EU/GCC; no umbrella brand for halal red-meat or Potohar olive oil.	Duplication raises transaction costs; without a recognised origin seal, Pakistan competes mainly on price and loses shelf-space to branded rivals.

Chapter 5: Regulatory and Policy Landscape

Pakistan's institutional framework for regulating and supporting agricultural and food exports is distributed across multiple federal and provincial agencies, each with distinct responsibilities along the value chain—from input provision and certification to trade facilitation and export promotion. This section provides a brief overview of the key institutions, policy instruments, and associated challenges at each stage of the agricultural export value chain: production and pre-harvest, post-harvest and market access, and export facilitation and trade. A summary of these elements is presented in Table 5.1, which outlines the main policy instruments, institutional roles, and constraints across each stage.

Production and Pre-Harvest

The production and pre-harvest stage forms the backbone of Pakistan's agricultural export value chain. A wide range of institutions and policy instruments govern land access, input availability, technology adoption, irrigation, research, and farmer support. However, fragmented governance, under-resourced public services, and misaligned incentives continue to constrain productivity, quality, and export readiness at the farm level.

Land Tenure and Access: Land tenure and leasing are governed by Provincial Boards of Revenue, which oversee land records, tenancy registration, and land-use classifications.[105] However, most tenancy arrangements remain informal and undocumented, limiting access to formal credit, crop insurance, and government support programs.[106] The absence of a clear legal framework for land leasing discourages long-term investments by tenant farmers and agribusinesses seeking to contract land for export-oriented cultivation.

Water and Irrigation Management: Water allocation is governed by the Indus River System Authority (IRSA) at the federal level, with canal irrigation systems managed by provincial Irrigation Departments.[107] While water charges are nominal, over-extraction—especially through unregulated solar-powered tube wells—has led to declining groundwater levels.[108] There is little policy support for efficient irrigation technologies such as drip or sprinkler systems.[109] Efforts by

[105] Government of Pakistan, Land Revenue Acts & Manuals (all provinces consolidated edition, 2023).
[106] World Bank, Pakistan – Land Governance Assessment Framework (LGAF) Report, 2022, pp. 12-15.
[107] IRSA Act (Act No.XXII of 1992), Section 4
[108] Pakistan Council of Research in Water Resources (PCRWR), National Water Quality Status Report, 2023, Table 5.
[109] MNFSR & FAO, Irrigation Technology Adoption Survey, 2021, p. 8.

provincial agriculture departments and public-private partnerships to pilot micro-irrigation remain scattered and unfunded at scale.

Seeds and Fertilizers: Seed regulation is overseen by the Federal Seed Certification and Registration Department (FSC&RD) under MNFSR, while seed multiplication and distribution are often managed by provincial agriculture departments. Despite a regulatory framework under the Seed Act (1976, amended 2015),[110] access to high-quality, pest-resistant, and export-grade varieties remains limited, especially for non-staple crops like fruits, vegetables, and pulses. Fertilizer subsidies are administered at the federal level (for urea, via MNFSR and the Ministry of Industries and Production) and implemented through provincial channels.[111] Imbalanced fertilization practices persist due to price distortions, limited soil testing services, and a lack of targeted nutrient management extension.

Mechanization and Farm Technology: Machinery imports fall under the jurisdiction of the Federal Board of Revenue (FBR) and the Ministry of Industries and Production, which determine duties and GST exemptions. While import tariffs are often reduced or waived for farm equipment, high general sales tax on machinery and spare parts[112] make modern tools unaffordable for many farmers. Provincial agriculture engineering departments run mechanization support schemes[113] (e.g. tractor subsidies), but these are limited in coverage and rarely target the needs of horticulture or high-value crop producers.

Research, Development, and Innovation: The Pakistan Agricultural Research Council (PARC) leads national agricultural research and varietal development,[114] while provincial research institutes conduct adaptive trials and region-specific research. Despite this institutional presence, varietal development pipelines are slow, public–private linkages are weak, and farm-level adoption remains low. The disconnect between research institutions and exporters means that new technologies rarely align with international quality and phytosanitary requirements.

Extension and Advisory Services: Agricultural extension is the responsibility of provincial agriculture departments, supported in some regions by digital innovation units[115] (e.g. Punjab IT Board). These services are underfunded and lack specialization in export compliance, particularly with GlobalG.A.P., HACCP, or traceability standards. Pilot digital tools (e.g., SMS-based alerts, mobile apps, helplines) show promise but are not institutionalized or integrated into public

[110] Seed (Amendment) Act, 2015, Government of Pakistan Gazette, 23 Mar 2015.
[111] Ministry of Industries & Production, Fertiliser Subsidy Notification FY 2023-24 (SRO 267/2023).
[112] Federal Board of Revenue, Eighth Schedule to Sales-Tax Act (as amended by Finance Act 2024), Item (28).
[113] Punjab Agriculture Department, Green Tractor Scheme Progress Report, 2022.
[114] PARC Act, 1981 (updated 2022), Sections 6-7.
[115] PITB, e-Agriculture Portfolio Brief, 2023.

extension systems. Coordination with certification bodies like PSQCA or PNAC is virtually nonexistent at the field level.

Risk Management and Insurance: The State Bank of Pakistan (SBP) and Zarai Taraqiati Bank Limited (ZTBL) administer schemes like the Crop Loan Insurance Scheme (CLIS) and pilots for Index-Based Crop Insurance (IBCI).[116] These programs primarily benefit formal borrowers and exclude the majority of smallholders, who remain uninsured. No crop insurance product exists for climate or market risks specific to perishables or high-value crops. Provincial agriculture departments have limited engagement in promoting or facilitating these schemes.

Climate Adaptation and Resilience: Policy direction comes from the Ministry of Climate Change, which issued the National Climate Change Policy (2012) and agro-ecological zoning guidelines.[117] Implementation is weak, however, and provincial agriculture departments have not developed actionable plans or incentives for climate-smart farming. Programs to promote drought-tolerant seed varieties, integrated pest management, or low-emission technologies are virtually absent.

While a wide institutional architecture exists for supporting production and pre-harvest functions, it is marked by fragmentation, capacity gaps, and poor coordination. Land tenure insecurity, inefficient water use, and input market distortions hamper productivity. The slow transfer of research to farms, lack of export-oriented extension, and near-total absence of risk protection leave farmers ill-equipped to meet the standards of global markets. Without an integrated and strategic reform agenda—one that aligns land, technology, advisory, and insurance systems with export goals—Pakistan will struggle to build the reliable, quality-assured supply base needed for high-value agricultural exports.

Post-Harvest and Market Access

The post-harvest and market access stage bridges farm production with international markets through a set of activities including grading, packaging, storage, transport, quality assurance, traceability, and branding. While various institutions play roles across these domains, weak coordination, infrastructure gaps, and regulatory shortcomings continue to limit the ability of exporters to meet the quality, safety, and consistency standards required in global markets.

Post-Harvest Handling and Infrastructure: Pakistan lacks a coherent regulatory or investment strategy for post-harvest infrastructure. Facilities such as packhouses, grading units, and ripening chambers are limited in number and unevenly distributed across provinces.[118] Most are located in Punjab and were established through donor-funded or project-based initiatives supported by the

[116] State Bank of Pakistan, BPD Circular 5 of 2008.
[117] Ministry of Climate Change, NCCP 2012, Islamabad.
[118] TDAP & FAO, Post-Harvest Infrastructure Mapping, 2023, Map 2.

provincial agriculture departments and the Trade Development Authority of Pakistan (TDAP). However, these efforts remain fragmented, poorly maintained, and disconnected from international certification requirements. In most districts, farmers and exporters must rely on informal or ad hoc arrangements, resulting in product losses and inconsistent quality.

Cold Chain Development: Although cold chain development is identified as a priority in the Strategic Trade Policy Framework (2020–25),[119] implementation is uneven. The Ministry of Commerce, along with port authorities under the Ministry of Maritime Affairs, has initiated efforts such as the installation of reefer container plugs and plans for cold storage facilities at ports. Yet exporters continue to cite a lack of temperature-controlled infrastructure at critical points in the value chain. The absence of a lead regulatory agency or cold chain legislation has resulted in a fragmented approach, with provincial agriculture departments, TDAP, and various donor-funded initiatives working in silos. Inadequate electricity supply, lack of cold transport standards, and high investment costs remain persistent barriers.

Transport and Logistics: Fresh produce is typically transported using unrefrigerated and unregulated vehicles, contributing to high spoilage and inconsistent product quality. While the National Transport Policy (2018)—led by the Ministry of Communications—aims to improve logistics efficiency, it does not include provisions specific to agricultural perishables.[120] The National Logistics Cell (NLC), a major player in bulk freight, operates without sector-specific protocols for fresh food logistics. Compounding the issue are frequent delays at border crossings and ports due to inadequate scanner infrastructure and manual inspection procedures overseen by Pakistan Customs, which negatively affect shelf life and export timelines.

Quality and Safety Standards: Quality assurance for agri-products is the responsibility of multiple institutions. The Pakistan Standards and Quality Control Authority (PSQCA) regulates standards, while the Pakistan National Accreditation Council (PNAC) accredits labs. The Department of Plant Protection (DPP) issues phytosanitary certificates for plant-based exports. However, coordination among these agencies is weak, and their capacity remains constrained. Most domestic laboratories lack international accreditation, making their test results invalid in many key export markets. Exporters frequently rely on costly foreign testing services, delaying shipments and raising transaction costs. Although a new National Food Safety, Animal and Plant Health Authority was approved in 2025 to streamline SPS and food safety enforcement,[121] it is not yet operational.

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[119] Ministry of Commerce, STPF 2020-25, Notification SRO 902(I)/2020.

[120] Ministry of Communications, National Transport Policy Pakistan 2018, p. 17.

[121] Cabinet Committee on Legislative Cases, Decision CCLC-04/2025; draft Bill text, MoNFS&R, Feb 2025.

Certification and Traceability: Access to high-value markets often requires compliance with standards like GlobalG.A.P., HACCP, ISO 22000, and halal certification. However, exporters report that certification bodies operating within Pakistan are few and often not internationally recognized. PSQCA and PNAC have taken steps to accredit domestic certifiers, but the coverage remains limited, particularly for small and mid-sized exporters. Moreover, Pakistan lacks a national traceability system. The absence of digital or paper-based farm-to-market tracking prevents exporters from meeting traceability requirements in markets such as the EU, Gulf, or Japan. Efforts to introduce QR-code-based traceability systems remain in pilot stages and are not supported by regulatory mandates or market-wide incentives.

Branding and Geographical Indications: Pakistan passed the Geographical Indications (Registration and Protection) Act in 2020,[122] with IPO Pakistan serving as the lead agency. While a few iconic products, such as Basmati rice and Sindhri mango, have been registered, GI implementation is slow, and most regional products lack legal protection. This limits Pakistan's ability to defend its exports abroad or capitalize on premium branding opportunities. Furthermore, there is no national umbrella branding strategy for agricultural exports. Although TDAP conducts product-specific promotions and sponsors trade participation, these efforts are sporadic, uncoordinated, and underfunded relative to competitor countries with strong national branding (e.g., India, Morocco).

Market Infrastructure and Agricultural Marketing: Wholesale market regulation is the domain of provincial agriculture marketing departments, which oversee licensing, trading practices, and infrastructure development. However, most public markets are overcrowded, unhygienic, and lack facilities for grading, cooling, or transparent price discovery. Provincial laws now allow the establishment of private markets and direct supply chains, but implementation has been slow due to regulatory bottlenecks and resistance from existing market committees. As a result, smallholder farmers remain tied to fragmented supply chains dominated by informal middlemen and lack feedback mechanisms to align their production with export market standards.

In summary, Pakistan's post-harvest and market access landscape is marred by underinvestment, institutional fragmentation, and outdated infrastructure. The lack of enforceable quality and logistics standards, coupled with an absence of traceability systems and international certification capacity, continues to impede access to premium markets. Inadequate cold chain coverage, poor testing capabilities, and slow GI implementation further erode competitiveness. Without targeted reforms to upgrade infrastructure, streamline regulatory oversight, and support compliance, Pakistan risks remaining trapped in low-margin export segments despite its high agricultural potential.

[122] GI Act 2020, Act No.XVIII of 2020.

Export Facilitation and Trade

The final stage of the agricultural export value chain involves cross-border movement, trade policy, customs clearance, and export promotion. This stage is critical for translating production and compliance efforts into actual market access. In Pakistan, however, this part of the chain remains fragmented across multiple institutions, with weak coordination, limited capacity, and regulatory frictions that undercut exporters' ability to compete in global markets.

Trade Policy and Market-Access Agreements: The Ministry of Commerce sits at the center of a patchwork of deals that, on paper, give Pakistani agri-food exporters tariff preferences across most major markets. Zero-duty entry is already locked in under CPFTA Phase II (313 priority lines, including rice, seafood, meat, and fruit/vegetables) and the Pakistan-Sri Lanka FTA, while stand-alone PTAs with Indonesia and Malaysia waive duty on staples such as rice, potatoes, onions, and a range of processed foods. Pakistan also draws on SAFTA preferences in South Asia, GSP+ for the EU, and a cluster of limited-scope arrangements - transit with Afghanistan, barter with Iran, and MFN-based trade backed by MoUs on SPS cooperation with the GCC. Yet utilization remains thin: most exporters still default to MFN rates in ASEAN, the GCC, and even China because SPS protocols are not fully operational, documentary requirements are poorly understood, and logistical bottlenecks erase the tariff edge. TDAP and Embassy Commercial Wings lack the resources to coach firms through the compliance maze or to press partners when border checks go beyond agreed rules, so the headline concessions have yet to translate into a broader, higher-value export footprint.[123]

Customs and Border Procedures: Customs administration is led by Pakistan Customs under the Federal Board of Revenue (FBR). The Web-Based One Customs (WeBOC) system has improved automation and transparency,[124] but border processes still suffer from manual checks, limited use of risk-based inspection,[125] and a lack of scanner infrastructure at key ports. For perishable agri-food products, such delays often result in quality deterioration and lost sales. The absence of pre-arrival clearance, poor inter-agency coordination (especially with the Department of Plant Protection and Food Safety authorities), and limited integration with exporters' internal systems continue to raise transaction costs and reduce efficiency.

Export Incentive Schemes: Pakistan offers two key instruments for duty and tax relief on inputs used in exported products: the Duty and Tax Remission for Exports (DTRE) and the Drawback of Local Taxes and Levies (DLTL) scheme.[126] Both are managed by FBR in coordination with SBP and the Ministry of Commerce. However, uptake of these schemes remains low in the agriculture

[123] Ministry of Commerce, External Trade Representation Performance Audit, 2023.
[124] FBR, WeBOC Performance Review, 2023, Exec. Summary.
[125] World Bank, Pakistan Time-Release Study – Karachi Port, 2022, Figure 6.
[126] FBR Customs Rules (Chapter XII) on DTRE; ECC Notification DLTL-2021/22.

and food sectors due to complicated procedures, long delays in reimbursements, and limited outreach or facilitation for small exporters. There is also no dedicated export facilitation scheme for perishable or high-value agricultural products.

Export Financing and Insurance: Export financing in agriculture is limited. While the Export Finance Scheme (EFS), administered by the State Bank of Pakistan (SBP),[127] offers concessional credit, it has historically been utilized mostly by textile and large-scale industrial exporters. The newly operationalized Exim Bank of Pakistan has yet to roll out sector-specific products for agriculture,[128] such as export credit guarantees, working capital facilities, or insurance for perishables. The lack of export credit insurance or loss coverage deters small exporters from entering high-value, high-risk markets. ZTBL and commercial banks have no tailored export lending lines for agri-exporters.

Export Logistics and Infrastructure: Pakistan's border and port infrastructure remain underdeveloped for high-frequency, temperature-sensitive trade. While dry ports, container terminals, and a few bonded warehousing facilities exist, these are not optimized for fresh and processed food exports. Port authorities, under the Ministry of Maritime Affairs, have made modest investments in cold storage and reefer plug-in capacity,[129] but scaling has lagged behind the needs of exporters. Delays in cargo handling, limited 24/7 operations, and inefficient inland connectivity further constrain timely deliveries.

Export Promotion and Trade Diplomacy: Export promotion is the formal responsibility of the Trade Development Authority of Pakistan (TDAP), which provides trade intelligence,[130] training, and subsidies for participation in international trade fairs. However, services are heavily concentrated among established exporters and lack product-specific promotion strategies or buyer targeting for agriculture. Commercial wings in Pakistani embassies are underutilized due to staffing limitations and the absence of coordinated export campaigns. There is no unified messaging or "Pakistan brand" for agri-food exports, nor are there dedicated promotional budgets for key markets such as the GCC, ASEAN, or China.

Trade Facilitation Coordination and Governance: Cross-border trade in agricultural products involves multiple federal agencies—FBR (Customs), Ministry of Commerce, DPP, PSQCA, Ministry of Maritime Affairs, and others. However, coordination across these agencies is limited, and exporters often navigate conflicting documentation, redundant inspections, and unclear

[127] SBP, EFS Master Circular, Jan 2024.
[128] Exim Bank of Pakistan, Board Minutes (public brief), 12 Dec 2023.
[129] Karachi Port Trust, Port Qasim & Gwadar Port combined statistics, Cold-Chain Facilities Inventory 2023.
[130] TDAP Act, 2013, Section 7.

institutional mandates. The absence of a dedicated inter-agency trade facilitation mechanism for perishable or high-risk goods impairs efficiency and drives up costs.[131]

Overall, Pakistan's export facilitation architecture remains ill-suited to the demands of modern, value-added agri-food trade. A fragmented institutional setup, weak uptake of export incentives, lack of agri-specific financial products, and underdeveloped border infrastructure prevent exporters from accessing or competing in high-value international markets. Without targeted reforms—including streamlined customs procedures, expanded insurance and financing tools, better trade diplomacy, and cohesive inter-agency coordination—Pakistan will remain underrepresented in dynamic agri-food value chains despite preferential market access and strong underlying production potential.

[131] National Trade & Transport Facilitation Committee (NTTFC), Meeting Minutes #54, Oct 2023.

Table 5.1 Policy and Regulatory Landscape

Stage	Area	Existing Policy Instruments	Challenges	Relevant Institutions
Production and Pre-Harvest	Land Tenure and Access	Land revenue acts, provincial tenancy laws (often outdated or weakly enforced)	Lack of formal leasing arrangements limits credit access and long-term investment by tenant farmers.	Provincial Boards of Revenue
	Water and Irrigation Management	Water Apportionment Accord; canal operations by provinces; unregulated solar tube wells	Unregulated groundwater extraction and weak promotion of efficient irrigation methods.	IRSA, Provincial Irrigation Departments, Provincial Agriculture Departments
	Seeds and Fertilizers	Seed Act (1976, amended 2015); urea subsidies; provincial seed distribution systems	Limited access to export-grade seed varieties; inefficient fertilizer uses due to price distortions and weak extension.	FSC&RD, MNFSR, Ministry of Industries, Provincial Agriculture Departments
	Mechanization and Farm Technology	GST exemptions/SROs on some machinery imports; tractor subsidy schemes	High GST on machinery deters adoption; limited targeting of horticultural technologies.	FBR, Ministry of Industries, Provincial Agriculture Engineering Departments
	Research, Development, and Innovation	Public research programs by PARC and provincial R&D institutes	Weak link between R&D and farm adoption; slow varietal approval process.	PARC, Provincial Research Institutes
	Extension and Advisory Services	Conventional provincial extension systems; digital tools (SMS, helplines) in Punjab	Underfunded systems with limited export-related technical support.	Provincial Agriculture Departments, PITB
	Risk Management and Insurance	Crop Loan Insurance Scheme (CLIS); Index-Based Crop Insurance pilots	Low smallholder insurance penetration; lack of products for perishables.	SBP, ZTBL, Provincial Agriculture Departments
	Climate Adaptation and Resilience	National Climate Change Policy (2012); agro-ecological zoning	No funded or scaled programs for climate-smart agriculture.	Ministry of Climate Change, Provincial Agriculture Departments
Post-Harvest and Market Access	Post-Harvest Handling and Infrastructure	Donor-driven packhouse development; STPF 2020–25 mentions cold chain	Limited availability of modern packhouses; donor-dependent investments are fragmented.	Provincial Agriculture Departments, TDAP
	Cold Chain Development	STPF 2020–25; port upgrades (reefer plugs); no unified regulation	Absence of national standards; inadequate coverage at farms and ports.	Ministry of Commerce, Ministry of Maritime Affairs, Provincial Agriculture Departments

	Transport and Logistics	National Transport Policy (2018)	Lack of regulated cold transport; delays at ports and borders hurt product shelf life.	Ministry of Communications, NLC, Pakistan Customs
	Quality and Safety Standards	PSQCA product standards; DPP SPS certification; PNAC lab accreditation	Domestic labs lack international accreditation; fragmented enforcement of SPS rules.	PSQCA, PNAC, DPP
	Certification and Traceability	GlobalG.A.P., HACCP (voluntary); PNAC accreditation; no national traceability law	Limited local capacity for certifications; no national traceability framework.	PSQCA, PNAC, TDAP
	Branding and Geographical Indications	Geographical Indications Act (2020)	Slow GI registration; no national branding strategy for agriculture.	IPO Pakistan, TDAP
	Market Infrastructure and Agricultural Marketing	Provincial agriculture market laws; limited reforms enabling private markets	Wholesale markets lack grading and hygiene; limited private market development.	Provincial Agriculture Marketing Departments
Export Facilitation and Trade	Trade Policy and Market Access Agreements	CPFTA, PTAs (Indonesia, Malaysia); GSP+; WTO commitments	Underutilization of trade preferences due to weak follow-up and exporter support.	Ministry of Commerce, TDAP, Commercial Wings in Embassies
	Customs and Border Procedures	WeBOC, risk-based inspection pilots	Manual checks, scanner gaps, and poor agency coordination raise costs.	Pakistan Customs, FBR, DPP
	Export Incentive Schemes	DTRE, DLTL	Low uptake due to complex procedures and long delays.	FBR, SBP, Ministry of Commerce
	Export Financing and Insurance	Export Finance Scheme (EFS); Exim Bank mandate	No agri-specific credit or insurance products; Exim Bank underutilized.	SBP, Exim Bank, ZTBL
	Export Logistics and Infrastructure	Dry ports; bonded warehouses; limited port cold chain	Insufficient infrastructure for temperature-sensitive and fast-moving goods.	Ministry of Maritime Affairs, Port Authorities
	Export Promotion and Trade Diplomacy	TDAP trade fairs; embassy outreach	Weak buyer targeting; no consistent product or market strategy.	TDAP, Commercial Wings in Embassies

	Trade Facilitation Coordination and Governance	No dedicated mechanism; ad hoc inter-agency processes	No cross-agency platform for resolving logistics or SPS issues.	FBR, Ministry of Commerce, PSQCA, Ministry of Maritime Affairs

Chapter 6: International Benchmarking

Pakistan's agri-export constraints are not unique; they have been solved, at least in part, by neighbors competing in the same product lines. This section distils how three comparator economies (India, Bangladesh, and Türkiye) have combined macro-level policy packages with micro-level productivity levers to lift agricultural exports. It then positions Pakistan's current baseline against that yardstick to highlight capability gaps to be closed in the recommendation section.

India

Policy Architecture

- Agricultural Export Policy (AEP, 2018) shifts federal support from open-ended subsidies to export clusters: dedicated districts for basmati, fresh fruit, or marine products with joint federal–state governance.[132]
- Incentive Stack—Transport & Marketing Assistance (TMA) rebates inland freight for perishables;[133] Trade-Infrastructure for Export Scheme (TIES) co-finances packhouses and pre-coolers;[134] APEDA reimburses 50 % of brand-promotion spend abroad.[135]
- Trade Access—New CEPA/FTAs with the UAE and Australia[136] secure zero duty on rice, bovine meat, and processed foods and mutually recognize India's SPS certificates.

Productivity Levers

- Seed-Replacement Regime: Certified seed use in the Punjab & Haryana basmati belt now exceeds 80 %;[137] varieties are replaced after three to four seasons.

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[132] Government of India, Ministry of Commerce & Industry, Agriculture Export Policy 2018 (Cabinet approval note, 6 Dec 2018).
[133] DGFT (India), Notification No. 17/2018-20, "Operational Guidelines for TMA for Specified Agriculture Products", 27 Mar 2019.
[134] Department of Commerce (India), TIES Scheme Guidelines, 2020, para 3.2.
[135] Agricultural & Processed Food Products Export Development Authority (APEDA), Market Development Assistance Circular, Ref. MDA/2022-23, Annex II.
[136] UAE-India CEPA, Ch. 2, Annex 2-A (entered into force 1 May 2022); Australia-India Economic Cooperation & Trade Agreement, Art. 2.10, Schedule I (entered into force 29 Dec 2022).
[137] Government of Haryana, Department of Agriculture, Seed Replacement Ratio Survey, 2023, Table 4.

- Custom-Hiring Centres: farmer cooperatives rent laser levelers, precision seeders and harvesters—raising rice yields 6-8 % and cutting water use by one-third.[138]
- Digital Agronomy: e-NAM and Kisan apps push daily mandi prices, pest alerts, and AWD irrigation advisories to 60 million phones.[139]

Export Pay-off: India's rice shipments exceeded 22 million tons in 2022 (~40 % of world trade);[140] fresh fruit exports grew 12 % a year (2015-23) despite modest on-farm subsidies.[141]

Bangladesh

Policy Architecture

- Heavy R&D outlays in the 1990s (BRRI hybrids, stress-tolerant lines[142]).
- Rural Infrastructure Push: 40,000 km of feeder roads and 1,400 growth-center markets between 2006-18; average tomato-to-port time fell 25 %.[143]
- Climate-Smart Finance: index-based flood insurance and diesel subsidies for irrigation pumps cushion smallholders against shocks.[144]

Productivity Levers

- Hybrid Diffusion: 45 % of rice and 70 % of maize area now under hybrid seed,[145] driving 3.3 % annual yield growth.[146]
- Community Seedbeds + Mobile Advisory: enable rapid re-sowing after floods; pilots show fish production up 19% and incomes up 128%.[147]

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[138] Indian Council of Agricultural Research (ICAR), Impact Assessment of Custom Hiring Centres in North-West India, Policy Paper 35, 2022, pp. 7-9.
[139] Ministry of Agriculture & Farmers' Welfare (India), Digital Agriculture Progress Report FY 2023, Section 2.
[140] FAO, Rice Market Monitor, Vol 26 No 3 (Dec 2023), p. 9.
[141] UN Comtrade, India HS 08 exports, CAGR calculation 2015-2023.
[142] Bangladesh Rice Research Institute (BRRI), 50 Years of Variety Release, 2022, pp. 18-21.
[143] World Bank, Integrated Rural Infrastructure Renewal Project I-III (ICR), Report WB/BD/2019/274, Annex 1.
[144] Bangladesh Bank & Sadharan Bima, "Crop Weather Index Insurance Pilot—Summary Results", 2021; Ministry of Agriculture (BD), Diesel Subsidy Gazette, 15 Nov 2022.
[145] Bangladesh Bureau of Statistics & CIMMYT, Agricultural Input Survey 2021, Table 7.
[146] FAOSTAT, Bangladesh rice & maize yield series 2010-2022 (author calculation).
[147] World Bank, Climate-Smart Agriculture & Aquaculture Pilot (Grant TF 0B7742) Impact Note, 2020, p. 5.

- Low-Cost Poly-Tunnels: off-season tomato and chili yields up 30 %.

Export Pay-off: Although dominated by garments, agri-exports still rose from USD 0.4 bn (2000) to USD 1.6 bn (2023);[148] rice self-sufficiency was retained even as farm labor left agriculture.

Türkiye

Policy Architecture

- 26 Regional Trade Agreements covering 63 partners;[149] a continuous schedule to upgrade goods RTAs to services and investment chapters.
- EXIM Tool-Kit: Turk Eximbank deploys USD 22 bn in credit and USD 23 bn in insurance/re-insurance each year.[150]
- Paperless Borders: port single-window (2018),[151] e-certificate of origin, fully digital SPS, and a national "one-window" customs portal.

Productivity Levers

- e-TARIM Portal: pushes field-level pest and weather alerts; >1m growers registered.[152]
- Seed Turnover Schemes: Potatoes and chickpeas must renew certified seed every three years;[153] public matching funds cover 40 % of seed cost.
- Micro-Irrigation Grants: Drip and sprinkler now exceed 400,000 ha,[154] sustaining yield growth with falling water withdrawals.

[148] UN Comtrade, Bangladesh total HS 01-24 exports; author's inflation-adjusted extract.
[149] WTO RTA Database, Türkiye profile (consulted Feb 2025).
[150] Turk Eximbank, Annual Report 2023, p. 17.
[151] Republic of Türkiye Ministry of Trade, Single Window for Trade Facilitation—Milestones, 2023.
[152] Ministry of Agriculture & Forestry (TR), e-TARIM Usage Dashboard, 1 Jan 2024 snapshot.
[153] Turkish Seed Law No. 5553 (amended 2021), Art. 14 & Implementing Regulation 28/02/2022.
[154] OECD-FAO, Agricultural Policy Monitoring & Evaluation – Türkiye 2023, Annex B.

Export Pay-off: Agri-exports reached USD 24.2 bn in 2023;[155] potatoes and onions post-harvest loss fell by 11 percentage points after the on-farm storage grant programme.[156]

Synthesis and Pakistan's Position

Table 6.1 synthesizes the policy stack + productivity levers for each comparator and juxtaposes Pakistan's current initiatives. Three cross-cutting insights emerge:

- Bundled interventions matter—Each country layers trade access, logistics, finance, and on-farm technology; isolated fixes (e.g., subsidies without market access, or free trade without SPS capacity) yield only transient gains.
- Productivity is policy-enabled, not a by-product—Seed-replacement rules, custom-hiring centres, and micro-irrigation grants are deliberate instruments, not side-effects.
- Digital public goods scale quickly—From India's e-NAM to Türkiye's e-Tarim, mobile advisories and paperless trade windows cut transaction costs faster than brick-and-mortar projects.

Pakistan pilots many of these tools, laser levelling, AWD irrigation, digital pest alerts, but at a fraction of the comparator scale and without a unifying export cluster strategy.[157] Bridging that gap is therefore less about inventing new schemes and more about scaling, sequencing, and integrating instruments that already work somewhere in the system.

[155] TurkStat, Foreign Trade by Broad Economic Categories, Dec 2023 release.
[156] Turkish Ministry of Agriculture, Evaluation of On-Farm Storage Grant Scheme, 2022, Fig. 3.
[157] MNFSR & World Bank, Pakistan Digital & Climate-Smart Agriculture Stock-take, 2024, p. 11.

Table 6.1 Policy and Productivity Benchmarking

Lever / Pillar	India	Bangladesh	Türkiye	Pakistan – gap
1. Seed & varietal turnover	Basmati & hybrid paddy seed renewed every 3-4 yrs; variety-specific MSPs	70 % maize under hybrids; BRRI climate-proof rice lines	Certified seed replacement rules (3-year cycle) for potatoes, pulses	43 % basmati on 15-year-old seed; weak breeder-multiplication chain
2. Water & climate resilience	Alternate-Wetting-Drying (AWD) mandatory in Haryana; solar pump-linked micro-irrigation	Solar pumps with flood insurance; raised seedbeds for rice	Drip & sprinkler grants; basin-level water-pricing pilots	AWD still experimental; micro-irrigation limited to horticulture
3. R&D & extension	ICAR & SAU network; 60% budget to breeder seed, IPM, digital agronomy	BRRI & BARC climate-ready varieties; demonstration ponds raise fish yields	TÜBİTAK & TAGEM fund export-oriented research, e.g., low-acrylamide potato	PARC under-funded; adaptive trials thin
4. Mechanisation & custom hiring	18,000 Custom-Hiring Centers; 60 % laser levelling in Punjab	Power tillers + micro-credit for smallholders	40% drip/fertigation area subsidized; precision seeders for pulses	Laser levelling & CHC pilots cover <10 % area
5. Finance & risk-sharing	TMA freight rebate; 3 % interest subvention; compulsory crop insurance in 15 states	Index-based flood insurance; refinancing line for hybrid seed firms	USD 22 bn credit, USD 23 bn insurance via Turk Eximbank	SBP export finance mostly captured by textiles; Exim Bank nascent
6. Digital public goods	e-NAM (1,440 markets); Kisan apps (pest, AWD alerts)	Digital agro-extension & “Krishi Call Centre”; satellite flood alerts	e-Tarım: weather warnings, fertiliser advice to 1 m users	Multiple pilots but no national roll-out
7. Logistics & trade facilitation	141 cold-chain parks; e-permit for perishables; 40 ft reefer rail service	40 000 km feeder roads; port shed upgrades for chilled fish	Port single-window, e-CoO, paperless SPS; 22 bulk agri silos	Roads dominant, rail share < 4%; manual SPS at ports
8. SPS / standards / traceability	246 NABL-accredited food labs; mandatory basmati trace-back; residue testing on e-platform	Food Safety Act (2013) plus district labs; pilot QR-code fish traceability	EU-aligned food code; mandatory e-traceability for fresh produce	Only 4 ISO-17025 agri labs; no digital trace-back
9. Branding & GI capture	“India Gate”, “Daawat”, 11 registered spice & basmati GIs	“Hilsa” & “Dhaka Mango” GI pilots; export-ready trademark fund	33 agri GIs; mandatory Turkish flag on retail packs	“Pakistan Basmati” gazetted 2023 but

				unregistered abroad; no umbrella brand
10. Trade access & agreements	CEPA-UAE, ECTA-Australia, FTA upgrades (duty-free rice, meat, processed foods)	SAFTA, APTA, BIMSTEC; MFN everywhere else	26 RTAs covering 63 partners; regular goods-to-services upgrades	One full FTA (China), two mini-FTAs (Sri Lanka, Malaysia) and scattered PTAs
11. National export strategy / institutions	*Agricultural Export Policy* (2018): cluster committees co-run by federal & state; APEDA as single window for incentives	*Agro-Food Policy* (2020): food-processing zones, warehouse receipts; BIDA one-stop shop	Presidential "High-Value Agriculture" plan; Turk Eximbank & Export Development Corp. fund pipeline projects	Fragmented mandates—TDAP, DPP, provincial depts. act in silos

Chapter 7: Policy Recommendations

After mapping the product-specific bottlenecks, the cross-cutting constraints, and the lessons from international peers, the obvious next question is “what should Pakistan do"? The answer must span the entire value chain. Low on-farm productivity cannot deliver export gains unless downstream quality is protected; perfect post-harvest handling is pointless if consignments idle at the port; and hard-won market access is worth little without fast finance and branding. The recommendations are therefore organized in three tightly-linked layers—Production & Pre-Harvest → Post-Harvest & Market Access → Export Facilitation & Trade—each one setting the stage for the next. The sections that follow introduce the logic of every layer before listing the priority levers in table form.

Production & Pre-Harvest

Raising yields, climate resilience, and basic quality.

The first layer tackles the issues that begin in the field: ageing seed, fragmented plots, water stress, weak agronomy, and uninsured climate shocks. Without fixing these, every rupee spent further downstream is a sticking plaster. The focus is therefore on fresher genetics, clearer tenure, climate-smart practices, and risk-sharing finance that together lift the “floor” of quality delivered to mills and pack-houses.

Reform lever	What it tackles	How it should work	Key actors
Seed & varietal renewal	Ageing basmati seed, climate-exposed staples	Multi-year public–private breeder alliances; compulsory varietal replacement schedules issued through provincial seed rules; royalty-sharing with private multipliers	PARC, Federal Seed Certification Dept., provincial Seed Corporations, major exporters
Land-tenure clarity & scale incentives	Fragmented holdings, short leases that block investment	Digitize land records; publish model long-lease templates; make eligibility for mechanization grants contingent on registered lease ≥ entire crop cycle	Boards of Revenue, provincial Agriculture Depts.

Climate-smart agronomy packages	Water stress, fertilizer misuse, GHG footprint	Bundled extension (AWD for rice, precision fertigation, integrated pest management) delivered via a unified agri-advisory app, local field schools and private agro-dealers	MNFSR, Provincial Ext. Services, agritech firms
Soil & water diagnostics	Hidden yield penalties, salinity	Free soil-health cards every three seasons; geo-tag maps open to fertilizer blenders and irrigation planners	Provincial Soil Labs, PARC GIS Unit
Resilience finance	Under-investment, uninsured climate shocks	Weather-index crop insurance + concessional "green" credit lines bundled in one digital wallet; premiums partially offset when farmers adopt approved CSA practices	SBP, ZTBL, private insurers, farm associations
R&D funding realignment	Low public research impact	Competitive grants that reward release of export-oriented cultivars or on-farm pilots reaching scale; mandatory open-data release	MoST, HEC, PARC, universities

Post-Harvest & Market Access

Protecting, proving, and presenting quality.

Even perfect grain can lose value between the farm-gate and the buyer through moisture, mould, mishandling, or missing paperwork. The second layer concentrates on the "middle mile": dryers, graders, labs, traceability platforms, cold-chain corridors, and GI-anchored branding. The goal is to lock in quality, convert it into SPS compliance, and then into shelf-space premiums.

Reform lever	What it tackles	How it should work	Key actors
First-mile technology window	High breakage, aflatoxin, visual defects	Matching-grant scheme (EDF + provincial funds) for dryers, graders, pack-houses, vacuum coolers; preference to shared-service hubs	EDF, REAP/PFVA, provincial Agri Dept.
Quality infrastructure upgrade	Patchy SPS credibility	Full ISO-17025 accreditation of federal & provincial labs; e-linkage with customs for risk-	DPP, PSQCA, PNAC, FBR

		based inspection; single tariff code triggers the correct residue panel	
Digital traceability spine	No chain-of-custody proof	Step-wise roll-out: pilot two flagship chains → embed QR codes & lab results in WeBOC → extend to all plant-products before 2030	National Food-Safety Authority (to be formed), PITB, exporters
Cold-chain & logistics corridors	Spoilage, high inland freight	Viability-gap PPPs for multi-commodity cold terminals at production hubs; rail-reefers and river-barge pilots along Indus corridor; temporary rebate to shift traffic off road	MoC, MoRAIL, NHA, private 3PLs
Geographical Indications & branding	Lost retail premium	Fast-track overseas GI protection (EU–UK–GCC–ASEAN); "Pakistan Origin" seals awarded only to consignments validated by traceability platform	IPO-Pakistan, TDAP, chambers
Market intelligence & buyer matchmaking	Low utilization of preferences	Data-driven dashboards on tariff windows, quota fill-rates, price spreads; virtual sourcing fairs and e-B2B portals targeted at diaspora retailers	TDAP, Commerce Wings, SMEDA

Export Facilitation & Trade

Moving compliant products to market at the speed of demand.

Finally, compliance must travel. The third layer removes the frictions that still eat margins after the truck reaches the port: patchy border automation, costly trade finance, underused FTAs, and slow dispute resolution. By modernizing border processes, widening export-credit tools, and hard-wiring market-opening diplomacy to product-level opportunities, Pakistan can turn a clean, traceable shipment into cash—quickly enough to reinvest in the next season's crop.

Reform lever	What it tackles	How it should work	Key actors
Border process modernization	Time & cost delays	End-to-end electronic SPS certificates embedded in WeBOC; pre-arrival document vetting; joint risk-profiling	FBR (Customs), DPP, MoC

		by Customs & DPP to cut physical checks	
Trade finance & risk-mitigation toolkit	Working-capital squeeze, FX volatility	Exim-Bank lines for inventory holding, freezer containers and brand roll-out; mandatory forward-cover and cargo insurance embedded in facility	Exim-Bank, SBP, commercial banks
FTA utilization cells	Under-used preferences	Desk within TDAP + embassy wings that guides firms through rules-of-origin, quota apps, partner-country SPS norms; performance tracked by utilisation ratios	TDAP, MoC, missions abroad
Strategic market-opening diplomacy	Tariff & NTB gaps vs. peers	Fast-track second-generation deals: • CPFTA—weigh duty-free rice TRQs vs. India parity• ASEAN—seek rice/meat parity with Vietnam• GCC—mutual recognition of halal & residue limits	MoC, MoFA, line ministries
Single-window logistics incentives	Fragmented haulage, port dwell	National Port Community System links terminals, labs, banks; priority berths for traceability-validated cargo; rail/river links auto-booked via PCS portal	Port QAS, MoMA, PR, private terminals

Conclusion

From diagnosis to durable export growth

This report set out to answer a deceptively simple question: "How can Pakistan turn its natural resource base into sustained, higher-value agri-food exports?" To do so, we combined product-level analytics (ten detailed dossiers), cross-cutting constraint mapping, international benchmarking, and a staged policy blueprint. Five messages stand out:

1. **The opportunity is large and specific**: Ten products alone—rice, bovine meat, potatoes, onions, tomatoes, chickpeas, bananas, maize, cherries, and olives/olive oil—hold quantifiable untapped potential of USD 3-4 billion in the next five years, provided quality and consistency gaps are closed.

2. **Bottlenecks are systemic, not siloed**: Stagnant on-farm productivity, leaky post-harvest handling, SPS non-compliance, high domestic logistics costs, and weak branding form a mutually reinforcing chain. Fixing one link without the others delivers, at best, temporary gains.
3. **Peers show what is possible**: India's cluster-based export policy, Turkey's one-window trade logistics, and Bangladesh's climate-smart insurance demonstrate that rapid productivity and export gains are achievable when reforms are bundled and sequenced.
4. **Reform must run the full length of the value-chain:** The policy matrix proposed—spanning Production & Pre-Harvest → Post-Harvest & Market Access → Export Facilitation & Trade—translates broad insights into institution-anchored levers, from seed renewal and micro-irrigation to national traceability platforms and rail-freight rebates.
5. **Implementation is a collective, iterative task**: No single ministry, provincial department, or private association can deliver the agenda alone. Coordinated action—underpinned by data transparency, climate resilience, gender-aware extension, and pragmatic public-private cost-sharing—will be critical.

Looking ahead

If Pakistan adopts the bundled reforms outlined here, it can realistically double its agri-food exports to USD 10 billion by 2030, create hundreds of thousands of higher-wage rural jobs, and strengthen its external balance. The first signs of success will not be headline numbers, but quieter shifts on the ground: fresher seed in the field, lower moisture at mill-gate, fewer EU RASFF alerts, faster clearance at Karachi Port, and Pakistani brands gaining shelf-space in Riyadh, Kuala Lumpur, and Shanghai.

Delivering that future will require disciplined sequencing, relentless monitoring, and the courage to adjust course as evidence accumulates. But the prize—greater rural prosperity, a more resilient balance of payments, and a stronger, climate-smart food system—is well worth the collective effort.

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Annexures

Annex A: Normalized Revealed Comparative Advantage (NRCA)

The NRCA is based on Balassa's index of revealed comparative advantage.[158] Balassa's Revealed Comparative Advantage (RCA) for sector j is given by:

$$RCA_j = \frac{\frac{X_j}{X}}{\frac{WX_j}{WX}}$$

Where X_j is Pakistan's exports of goods in sector j, X is Pakistan's total exports for a given year, WX_j is world exports of goods in sector j, and WX are total world exports. The normalized RCA is a transformation of the standard RCA to yield a number between -1 and 1 and is given by:

$$NRCA_j = \frac{RCA_j - 1}{RCA_j + 1}$$

An NRCA greater than 0 represents a sector for which Pakistan has a comparative advantage, whereas a number less than 0 represents a sector for which Pakistan has a comparative disadvantage, with higher numbers representing a greater comparative advantage. As Table B1 below shows, Pakistan has a comparative advantage in textiles and apparel, cotton, cereals including rice and maize, sugar and beverages, and leather goods, with textiles, apparel, and cereals making up about half of total exports.

Export Potential Indicator

The ITC's methodology of estimating export potential relies on estimating both supply and demand side factors, as well as tariff information. It relies on studying the country x market x product triple. The export potential indicator (EPI) of country *i* in product *k* to market *j* is defined as:

$$EPI_{ijk} = Supply_{ik}^{EPI} \times Ease_{ij} \times Demand_{ijk}$$

[158] B. Balassa (1965) – *Trade liberalization and "Revealed" Comparative Advantage,* The Manchester School, Vol 33 (2), pp. 99-123.

Where

$$Supply_{ik}^{EPI} = \frac{v_{ik} \times \Delta GDP_i}{\sum_i \quad (v_{ik} \times \Delta GDP_i)} \times \left(\frac{1 + av.tariff_{ik}}{1 + av.tariff_k}\right)^{\sigma_k}$$

v_{ik} is the market share of country *i* of product k weighted over the last six years with higher weights for more recent years. The second term in the supply function $\left(\frac{1+av.tariff_{ik}}{1+av.tariff_k}\right)^{\sigma_k}$ is the market tariff disadvantage that country *i* faces in exporting product *k* where σ_k is the supply elasticity of product *k*. The demand function is defined as follows:

$$Demand_{ijk} = v_{ik} \times \frac{\Delta\, GDP_j{}^{Em}dc}{\Delta Pop_j} \times \Delta Pop_j \times \zeta_{dc} \times \left(\frac{1+av.tariff_{jk}}{1+av.tariff_{jk}^{FL}}\right) \times$$

$$e^{-|av.logdistance_{jk} - logdistanceij|}$$

v_{ik} is the market share of country *i* of product k weighted over the last six years with higher weights for more recent years. E_{mdc} is the revenue elasticity of import demand per capita, $\zeta_{dc} = e^{\frac{22}{3} * \alpha_{dc}}$ is a constant accounting for residual trends in import growth, where α_{dc} measures the average annual growth of imports due to factors unrelated to GDP per capita growth such as inflation. The second term term, $\left(\frac{1+av.tariff_{jk}}{1+av.tariff_{jk}^{FL}}\right)$, is a measure of tariff reduction of product *k* for market *j*. $e^{-|av.logdistance_{jk} - logdistanceij|}$ is a measure of the effect of the distance between country *i* and market *j*. Finally, the ease of trade between the pairs (*i,j*) is defined as:

$$Ease_{ij} = \frac{v_{ij}}{\sum_k \left(Supply_{ik} \times Demand_{ijk}\right)}$$

v_{ij} is the weighted market share of country *i* to market *j* over a five-year period with higher weights for more recent years. The denominator consists of the static versions of the supply and demand functions aggregated over all products. Then unrealized export potential is defined as the difference between EPI_{ijk} and v_{ijk} i.e.

$$Unrealized\ export\ potential\ = EPI_{ijk} - \min\left(v_{ijk}, EPI_{ijk}\right)$$

Product Diversification Indicator

Measuring the export potential for new products is difficult because of the lack of historical trade data of *new* products. The ITC uses the same $Ease_{ij}$ and $Demand_{ijk}$ functions but estimates a different supply function. Their approach relies on a technique applied in (Hidalgo, Klinger,

Barabasi, & Hausmann, 2007). Briefly, this approach estimates export potential of new products by considering products exported by countries similar to country *i* that also export products that country *i* exports. The underlying assumption here is that a country will have a comparative advantage in exporting products that are also exported by countries that are similar to country *i* in geophysical characteristics and that also export products already exported by the country in question. The ITC uses data available from the Global trade and development project (GTAP) to construct a basket of goods which are designated to be "similar".

First, define

$$v`_{ik} = v_{ik} \times \left(\frac{1 + av.tariff_{ik}}{1 + av.tariff_{k}}\right)^{\sigma_k}$$

And define the comparative advantage of country *i* in product *k* as:

$$CA'_{ik} = \frac{v'_{ik} \times \sum_{ik} \ v'_{ik}}{\sum_{i} \ v'_{ik} \times \sum_{k} \ v'_{ik}}$$

That is, the comparative advantage in product *k* of country *i* is the market share accounting for global tariff disadvantages over all products *k* and all exporting countries *i*. Next, define the conditional probability of country *i* having a comparative advantage in exporting product *k* given its comparative advantage in exporting product *l* i.e.,

$\phi_{ik} = P(CA'_{ik} | \ CA'_{il} \ )$

With the normalization that CA'_{il} =1 if $CA'_{il} \ \geq 1$ and 0 otherwise. Next define:

$$Density_{ik} = \frac{\sum_{l} \ (CA'_{il}\phi_{kl})}{\sum_{l} \ \phi_{kl}}$$

And $Density'_{ik} = Density_{ik}^{\frac{logSupply_{ik1}^{EPI} - logSupply_{ikN}^{EPI}}{logDensity_{ik1} - logDensity_{ikN}}}$

Using the normalization that $PDI_{jk} = \frac{v_{jk} \times \Delta GDP_j}{\sum_j \left(v_{jk} \times \Delta GDP_j\right)}$ so that PDI

Finally, define $Supply_{ik}^{PDI} = Density'_{ik} \times \frac{\sum_{jk} \ v_{ijk} \times \Delta GDP_i}{\sum_{jk} \frac{v_{ijk} \times \Delta GDP_i}{\sum_j \left(v_{jk} \times \Delta GDP_i\right)}}$

So that

$$PDI_{ijk} = Supply_{ik}^{PDI} \times Ease_{ij} \times Demand_{ijk}$$

Annex B: List of Stakeholder Consultations

Date	Name	Organization
13th February	Nauman Zaffar	NaumanSAB Oil Company
14th February	Abdul Hadi Durani	Al Naseeb Dry Fruit Quetta
18th February	Amanullah Khan	Hunza Dry Fruits (distributor and exporter)
21st February	Bilal Tarar	Rice Farmer and miller
21st February	Dr. Asghar Ali	Researcher, Pakistan Agricultural Research Council (PARC)
21st February	Mr. Ilyas Khan	Pakistan food and vegetable association
6th March	Zahid Durrani	Hunza Organics (Fruits and dry fruits)
8th March	Bilal Shahid	TATA Pakistan (Bovine meat exports)
13th March	Sohail Haroon	Sohail Haroon Corporation
19th March	Kazim Saeed	Pakistan Agricultural Coalition
10th April	Marco Marchetti	Olives
10th April	Sanakhawan Hussain	Indus Acres
10th April	Sohaib	Mian Sohaib and Co.
18th April	Constantino Parma	Olive Culture
22nd April	Syed Mahd	National Foods
22nd April	Safder Mehkri	Maize Exporter
23rd April	Alan Xi	CMEC

Annex C: Literature Review

Theoretical Developments

Classical trade theory, rooted in David Ricardo's Comparative Advantage model, suggests that countries should specialize in producing and exporting goods they can produce relatively more efficiently than others. In practice, this efficiency is measured by the revealed comparative advantage (RCA) index, developed by Balassa (1977) or extensions thereof. In Pakistan's case, agricultural products like rice, fruits, and cotton-based goods have historically exhibited a comparative advantage. However, this model assumes that trade occurs under perfect competition and does not account for trade barriers, quality concerns, and regulatory constraints, which can hinder export growth despite apparent comparative advantage. Given Pakistan's large agricultural workforce and extensive farmland, the country should theoretically be competitive in agricultural exports. However, high tariffs on imported inputs, lack of technological advancements, and adoption of productivity-enhancing measures such as investment in development and use of higher-yield seeds, more efficient input use management, along with poor infrastructure, have resulted in the growth of exports being stunted. Moreover, the absence of downstream processing means that raw agricultural goods are exported with minimal value addition, while processed food imports continue to rise. This fact reveals itself in the decrease of the revealed comparative advantage of both rice and cotton products in recent years for Pakistan as well as the downward trend of Pakistan's exports in the last two decades.

While classical models focus on factor endowments, New Trade Theory (NTT), pioneered by Dixit & Stiglitz (1977) and Krugman (1979), introduces the role of economies of scale, product differentiation, and market structure in explaining trade patterns. According to NTT, even if two countries have similar resources, trade can occur due to increasing returns to scale and specialization. Countries that develop large-scale industries with diversified product offerings can gain competitive advantages beyond their initial resource endowments. For Pakistan, this implies that merely relying on natural agricultural endowments is insufficient for sustainable export growth. Instead, investments in processing facilities, branding, and compliance with international standards are necessary to enhance competitiveness. This cannot be achieved without leverage economies of scale, a common theme that emerges from many of our stakeholder consultations.

Additionally, the theoretical trade literature has also emphasized the role of participating in global value chains (GVCs). Countries engaged in higher-value segments of GVCs—such as processing, packaging, and branding—capture greater economic benefits than those merely exporting raw commodities. In the case of Pakistan, agriculture remains upstream in the value chain, meaning that raw agricultural products are exported, but further processing is done elsewhere. This is evident in cotton-based exports, where Pakistan exports unprocessed cotton while importing higher-value textiles and garments. Similarly, Pakistan's seafood exports remain largely unprocessed, whereas neighboring countries like Thailand and Vietnam have built strong processing industries, allowing them to command higher prices in global markets.

Participation in global value chains requires productivity enhancement, which as modern growth theory emphasizes, is driven by technological advancements, human capital development, and innovation rather than just resource endowments. In trade, this means that countries with strong research and development (R&D), well-trained labor, and investments in innovation can enhance their export competitiveness.

Empirical Developments

The empirical research on Pakistan's agricultural exports has primarily focused on assessing export potential, trade competitiveness, and barriers to market expansion using methodologies such as Revealed Comparative Advantage (RCA), gravity models, and stochastic frontier analysis. These studies provide critical insights into Pakistan's agricultural trade performance, identifying high-potential export products and structural challenges that limit growth.

Riaz, Jansen, & Malik (2010) have assessed Pakistan's export competitiveness in agricultural products using RCA analysis, which measures a country's relative advantage in exporting specific goods. They find that **rice, mangoes, dates, kinnows, and vegetables** exhibit a comparative advantage in global markets. Similarly, Nabi (2010) identifies kinnows as a high-potential agricultural export, particularly for China and ASEAN markets.

Beyond RCA, empirical estimates of untapped export potential rely on gravity models of trade, which predict bilateral trade flows based on economic size, geographic distance, and trade agreements. Khan, Ezad, & Atiq (2022) apply this approach to Pakistan's horticulture sector and estimate an untapped export potential of $729 million. Their study highlights that while Pakistan

has strong market access in some regions, infrastructural and regulatory bottlenecks limit actual exports.

For the ASEAN market, Kamal, Shad, Khan, Ullah, & Khan (2022) analyze Pakistan's seafood exports and identify **fish and mollusks** as key products with expansion potential. Similarly, Ali, Huang, & Xie (2022) focus on China and highlight **fresh and preserved vegetables** as viable export products. These studies collectively emphasize the need to expand beyond traditional agricultural exports and explore new high-growth markets.

While gravity models have been widely used to measure untapped export potential, one limitation is that they estimate trade based on average expected values, which may lead to underestimation of true potential. To address this, stochastic frontier models provide an alternative approach by accounting for inefficiencies in trade performance. Atif, Haiyun, & Mahmood (2017) employ a stochastic frontier model on trade data from 1995-2014 and find that Pakistan's agriculture sector has significant untapped export potential due to trade inefficiencies. Their study suggests that institutional barriers, inadequate trade facilitation, and high transaction costs contribute to suboptimal export performance.

A different approach is used by the International Trade Centre (ITC), which combines RCA, tariff structures, and projected GDP growth to estimate Product Diversification Ranks. Ahmad, Ahmad, Qadir, & Afridi (2023) report an untapped export potential of $7.1 billion for Pakistan using the ITC's Export Potential Assessment (EPA) and Product Diversification Index (PDI). These findings highlight the scope for intensive margin growth (expanding existing exports) and extensive margin growth (introducing new products).

Additionally, empirical research on Pakistan's major agricultural exports highlights both opportunities and constraints across key sectors. Ali (2020) reports that Pakistan exported 400,000 tons of **rice** in 2019, identifying untapped potential in China, the Middle East, and ASEAN, but notes that branding and certification remain significant barriers. In the seafood sector, the World Bank (2018) finds that Pakistan's total **fish production** (623,000 tons in 2018) is far lower than competitors like Bangladesh (3.4 million tons) and India (9.6 million tons), with overfishing and open-access fishing rights limiting sectoral growth. However, **shrimp farming** is identified as an area with high export potential. Similarly, Khan & Chen (2024) use gravity models to assess **fresh and preserved vegetables** and find strong export potential to China, though challenges related to

pest control and cold storage infrastructure continue to hinder expansion. Across these sectors, common constraints include limited branding, compliance with international standards, and weak integration into global value chains, which collectively restrict Pakistan's ability to maximize its agricultural export potential.

While traditional models of agricultural trade emphasize output specialization, whereby countries leverage their comparative advantage to produce and export certain crops (Eaton & Kortum, 2012; Donaldson, 2019), more recent research has expanded this perspective by revealing that trade in agricultural inputs—such as chemical fertilizers, modern seeds, pesticides, and mechanized equipment—is equally instrumental in driving productivity improvements (Farrokhi & Pellegrini, 2023). By facilitating access to these critical inputs, trade can help shift production away from labor-intensive, traditional farming methods toward modern, input-intensive techniques. This transition is particularly crucial for countries like Pakistan, where low productivity has long hindered competitiveness. Empirical evidence indicates that modern farming practices can yield four to seven times greater outputs than those achieved with conventional methods. Donovan (2021) further documents that as countries develop, a higher share of agricultural expenditure is directed toward modern inputs—a trend that underscores the pivotal role of technology adoption in enhancing productivity. For Pakistan, the challenge then is that its agriculture sector remains largely traditional, with limited investment in agro-technology, biotechnology, and high-yield crops. Additionally, branding and market positioning remain weak, preventing Pakistani agricultural exports from competing effectively in premium markets.

Summing up, empirical studies on Pakistan's agricultural exports confirm substantial untapped export potential, particularly in rice, fruits, vegetables, seafood, and processed agricultural products. Findings emphasize that branding, certification, and infrastructure constraints remain significant barriers to expanding exports to China, ASEAN, Middle East and Europe. Consequently, despite possessing vast agricultural resources and favorable agro-climatic conditions, Pakistan's agricultural sector continues to grapple with persistently low productivity—a challenge that constrains both domestic food security and the nation's export competitiveness.

Finally, the role of trade policy and agreements are also important in determining the growth of the agriculture sector. On the one hand, higher productivity is necessary to produce export-quality goods and compete effectively globally. On the other, increased exposure to international

markets—by reducing tariffs and trade barriers—can catalyze productivity improvements. Farrokhi and Pellegrini (2023) show that trade liberalization, particularly in the agricultural input sector, lowers the cost of acquiring modern inputs relative to local wages. This price adjustment incentivizes farmers to adopt more efficient, technologically advanced farming methods.

This dynamic suggests that even modest initial steps toward trade liberalization can trigger a virtuous cycle. Once Pakistani agriculture achieves a minimum threshold of modernization through improved access to advanced inputs, productivity gains can accelerate, further enhancing the sector's competitiveness. For example, (Yusuf, 2013) suggests Chinese FDI via CPEC could benefit Pakistan's textile and leather industry. However, the literature also warns that without overcoming initial productivity deficits—often entrenched by domestic constraints such as outdated infrastructure and inefficient supply chains—the full benefits of globalization may remain out of reach (Gollin, Parente, & Rogerson, 2007; Sotelo, 2020).

In essence, while low productivity impedes agricultural export growth, the literature indicates that strategic trade liberalization can serve as a critical lever for overcoming this challenge. By tapping into the reinforcing feedback loop between trade and productivity, Pakistan can break free from its current constraints and enhance its agricultural exports efficiency and competitiveness. In this context, it is heartening to see recent steps towards curtailing trade barriers, as manifested by free trade agreements with China and the GCC region. For Pakistan to take full advantage of these trade liberalization policies, it must facilitate productivity-enhancing measures taken by the industry to ensure that Pakistan's agricultural products are competitive.