Trade Policies and Optimisation of Onion Trade from India

GK Vani and Sange Eton Thungon[1]

This study examined the optimal export quantity of onions while minimising net surplus and maximising trade gains, alongside assessing the impact of trade policy regimes on domestic price from 2007 to 2021. Linear Programming and Goal Programming models were employed to estimate optimal export and import levels. The findings indicate an overall increase in production, consumption, storage, and losses over time, with exports fluctuating between 0.9 and 2.36 million tonnes, while imports remained minimal. Periods of deficit (2007–2014) were followed by substantial surpluses (2015–2021), reaching a peak of 4.35 million tonnes in 2021. Both models suggested eliminating imports with efficient production and trade strategies for the years 2008 to 2021. The Goal Programming model recommended slightly reduced exports during deficit years, indicating the model's sensitivity towards the fall in production. Optimised monthly trade patterns suggested peak exports should be allowed in January and May, during good and bad production years. Export bans led to high price volatility, while export restrictions produced mixed results, curbing price spikes at times but also introducing uncertainty and increased price volatility. Free trade policies have ensured price stability.

A Comprehensive Assessment of Indian Saffron: Export Performance and Competitiveness Analysis

Kuldeep Singh[2], N. Anandkumar Singh[2], Ram Singh[2], Anil Bhat[3], and Snehal Athawale[4]

This study presents a comprehensive evaluation of the export performance and global competitiveness of Indian saffron (HSN Code: 091020 – Saffron) from 2005 to 2024, utilising advanced statistical and economic methodologies. Leveraging harmonised trade datasets from the International Trade Centre (ITC), Directorate General of Commercial Intelligence & Statistics (DGCI&S), and UN COMTRADE, the study analyses long-term trends, volatility, market structure, and destination concentration. Indian saffron exports exhibited a Compound Annual Growth Rate (CAGR) of 12.12%, accompanied by high instability (Instability Index: 49.03) and variability (Coefficient of Variation: 52.19%). Export competitiveness was assessed using the Revealed Comparative Advantage (RCA) and its normalised variant

[1]JNKVV, Jabalpur
[2]College of Post Graduate Studies in Agricultural Sciences, Central Agricultural University (I), Umiam, Meghalaya – 793103
[3]Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu
[4]Institute of Economic Growth, Delhi

(RCSA), showing recurrent competitiveness with notable peaks in 2012 and 2024. Wavelet analysis detected cyclical patterns at multiple time scales (2 to 16 years), confirming that export fluctuations are not random but structurally driven. Markov Chain modelling revealed a strong persistence in high-performance states, with a 55% long-run probability of remaining in "Medium-High" or "High" export categories. However, extreme market concentration, particularly in Hong Kong (78.7% in 2024), poses a significant risk. The Herfindahl-Hirschman Index (HHI) and concentration ratios (CR3 and CR5) further confirmed fluctuating market dependencies. The findings underscore the need for export diversification, quality enhancement, and policy interventions to stabilise performance and strengthen India's saffron export resilience in an increasingly competitive global market.

SPS Measures and Agricultural Trade in BIMSTEC: Evidence from WTO Notifications

Himanshu Jaiswal and A. Ganesh-Kumar[1]

This paper investigates the agricultural trade patterns and the impact of SPS measures on BIMSTEC intra-trade. In a three-step analysis, we first conduct a demand and supply analysis for agricultural products at the HS-6 digit level using Michelaye's index. It shows that each member country has several high-potential commodities that can be traded with other member countries, but these are not being traded. Second, we analyse the trends and patterns related to the SPS measures notified by member countries to the WTO from January 1, 1996, to May 31, 2024. Several stylised facts have been illustrated. Finally, using these SPS statistics in a modified gravity model, we find that both emergency and regular SPS notifications significantly and negatively impact agri-exports, and the former are more harmful than the latter. The notifications, which often escalate into trade disputes, significantly harm trade sentiments. The notifications with objectives such as 'Animal health' and 'Food safety' are trade-distorting, while the notifications with multiple objectives, including 'Plant protection' and 'Protect humans', are, in fact, trade-inducing.

[1]Indira Gandhi Institute of Development Research, Mumbai- 400065

Assessing India and Nepal Agricultural Trade: Current Trends, Trade Framework and Trade Barriers

Amit Yadav, D.P. Malik, Neeraj Pawar, and Yashpal[1]

This paper explores and investigates the agricultural trade relationship between India and Nepal, highlighting historical ties and modern trade agreements that have shaped the current trade dynamics between the two countries. Using secondary data from officially published sources covering the period from 2005-06 to 2023-24, the study analysed trends in total trade, agricultural trade, trade balance, and the Trade Complementarity Index (TCI), highlighting the nature, direction, and intensity of trade between the two countries. Findings from the study revealed an upward trend in India's trade surplus. India's total trade with Nepal rose from USD 1,239.80 million in 2005-06 to USD 7,872.09 million in 2023-24, with a CAGR of 10.89 per cent. The Trade Complementarity Index revealed higher asymmetrical trade between the countries. Additionally, it suggests that India's export structure is highly aligned with Nepal's import demands, whereas Nepal's exports exhibit low complementarity with India's import needs. Agricultural trade between the two nations also showed an upward trend, with India maintaining a consistent agricultural trade surplus, except in 2005-06, when a marginal deficit of USD 0.8 million was recorded. Despite having multiple strategic advantages, a significant trade imbalance existed. This asymmetry in trade balance highlighted Nepal's heavy reliance on India, raising concerns about Nepal's trade independence and long-term economic resilience.

Export Dynamics of Key Agricultural Commodities in India

Prachi Singh[2], Rakesh Singh[2], Shalini Dash[3], Vijay Kumar Saran[2], Shubham Kumar Verma[2], and Anukriti Raj[2]

This study conducts a comprehensive analysis of the trends, growth trajectories, and performance of India's agricultural exports from 2000 to 2025. Relying on secondary data from government trade reports, export databases, and international sources, the research adopts a descriptive and trend analysis methodology to examine shifts in export composition, volume, and global competitiveness. The findings indicate that India has emerged as one of the top ten global agricultural exporters, with notable contributions to the international supply of key commodities. This rise has occurred in the context of evolving global trade

[1]CCS Haryana Agricultural University, Hisar 125004
[2] Banaras Hindu University, Varanasi- 221005
[3]Navsari Agricultural University, Navsari, Gujarat

dynamics influenced by geopolitical tensions, protectionist policies, and sustainability norms. Simultaneously, India's trade policy has evolved to strike a balance between domestic food security and the strategic promotion of exports. The study recommends enhancing climate-resilient practices, expanding commodity diversification, and strengthening institutional and policy support to ensure the continued sustainability and competitiveness of India's agricultural export sector.

From Growth Trends to Global Trade: Time Series Forecasting and Competitiveness of Major Fruits in India and Haryana

Monika Devi, D.P. Malik, and Rijul Sihag[1]

This study presents a comprehensive analysis of the growth trends, variability, and export competitiveness of major fruits in Haryana and India from 2000–01 to 2023–24. Utilising statistical tools such as Compound Annual Growth Rate (CAGR), Coefficient of Variation (CV), Cuddy-Della Valle Instability Index (CDVI), and Revealed Comparative Advantage (RCA), the study evaluates temporal patterns in area, production, and productivity of key fruits—mango, citrus, guava, banana, and papaya. The results show a significant structural shift in Haryana's fruit cultivation, with citrus emerging as the dominant fruit in both area and production, while mango declined notably. Guava maintained moderate and stable growth. At the national level, banana and papaya showed strong early growth that stabilised in recent years. Export performance of fruits remained modest, with RCA values below 1 for most crops, indicating limited global competitiveness. Forecasting using ARIMA and NNAR models demonstrated reasonable accuracy for predicting future production, with citrus having the most reliable forecast. The study highlights the need for crop-specific policy interventions, enhanced infrastructure, and export-oriented strategies to improve the sustainability and global competitiveness of India's fruit sector.

Export Potential of NICHE Commodities of NE Hill Region: A Competitive Analysis

Ram Singh, Deviya Pichimayum, and Jiaul Hoque[2]

The present study analyses the export potential of selected NICHE agricultural commodities from the North Eastern Hill Region (NER) of India, based on secondary data obtained from the Directorate General of Commercial Intelligence and Statistics (DGCI&S) and Agricultural and Processed Food Products Export

[1]CCS Haryana Agricultural University, Hisar, Haryana-125004
[2]Central Agricultural University (I), Umiam, Meghalaya.

Development Authority (APEDA). The Revealed Comparative Advantage (RCA) and Revealed Symmetric Comparative Advantage (RSCA) methodologies were employed to examine export competitiveness for the period 2014-15 to 2023-24. The results reveal a mixed performance across states and commodities. Among Assam's niche crops, KarbiAnglong ginger consistently demonstrated a strong comparative advantage, while KajiNemu, Joha rice, and Tezpur litchi witnessed a comparative disadvantage in export. Arunachal Pradesh's Wakro orange and Manipur's Kachai lemon, ChakHao, and Tamenglong orange exhibited persistent comparative disadvantages. In Meghalaya, Lakadong turmeric showed high export competitiveness, unlike Khasi mandarin and Tamenglong orange. Mizoram's Mizo ginger recorded high RCA values, indicating high export potential, whereas Mizochilli showed low competitiveness. Nagaland's Naga Mircha transitioned from disadvantage to advantage in recent years, while the state's Tree Tomato and Sweet Cucumber remained relatively low in competitiveness in exports. Despite large-scale cultivation, Tripura's Queen Pineapple displayed low RCA values, indicating comparative disadvantage in export. Sikkim's large cardamom consistently maintained a high RCA, affirming its strong export position, in contrast to Dalle Khursani, which showed limited competitiveness. The findings highlighted the need for commodity-specific interventions focusing on improved production, improving processing and value addition, and strengthening export-oriented market linkages to harness the full potential of NICHE commodities from NER.

Post-WTO Horticultural Trade in India: Trends, Sustainability Challenges and Policy Implications

Amanveer, Rahul, D.P. Malik, Gurnam Singh, and Ashok Dhillon[1]

The research aims to examine India's exports and imports of fruits and vegetables from 2009-10 to 2023-24, utilising data extracted from APEDA and DGCIS to assess the movement of both fresh and processed commodities. The findings indicate strong growth in processed exports, with a Compound Annual Growth Rate (CAGR) exceeding 11%, accompanied by a gradual shift in import trends. Descriptive analysis reveals that, although exports remain focused on traditional foreign markets, new trade destinations are gradually emerging in the international market. Along with the growth in trade, sustainability issues are also rising, including significant water footprints, excessive pesticide use, and carbon emissions from cold supply chains. These environmental issues threaten the long-term sustainability of export-driven horticulture products. The evidence highlighted

[1]CCS Haryana Agricultural University, Hisar, Haryana-125004

the need for policy recommendations that focus on green certification, crop diversification, and sustainability, all of which are aligned with WTO norms.

Analysis of EXIM Trends in Major Processed Food Products

Avishi, Shweta and Jitender Kumar Bhatia[1]

This study analyses export-import trends, compares trade dynamics, and identifies opportunities for sustainable growth in the processed food sector. Secondary data from MoFPI, APEDA and DGCIS reports (2015–2023) were used, and growth trends were assessed using Compound Annual Growth Rate (CAGR). India's exports have grown, particularly in cereals and spices, but imports of high-value items, such as oils and beverages, are also increasing, reflecting shifting consumer preferences and domestic processing gaps. Post-harvest losses and weak supply chain infrastructure pose significant challenges to sustainability. Further research is needed on consumer behaviour, product-level trade patterns, and policy impacts to support long-term sectoral growth and to improve the balance of payments.

Export–Import Instability of Soybean in India: A Temporal Perspective

R. K. Narwariya, P. Mishra, and L. Vishwakarma[2]

The present study analysed the trends and instability in soybean exports and imports in India during the period 1996–2023, using secondary data sourced from the Ministry of Commerce. Various functional forms, including linear, quadratic, cubic, logarithmic, exponential, compound, and growth models, were applied to capture the trajectory of soybean trade. Among these, the cubic model emerged as the best fit for both export and import, confirming the non-linear and fluctuating nature of trade flows. The results revealed that soybean exports exhibited sharp rises and steep declines across different phases, reflecting the influence of domestic supply conditions, global demand, and policy shifts. Imports, on the other hand, followed a strong upward and fluctuating path, with major surges particularly after 2014, underscoring India's growing reliance on external markets. Instability analysis using the Cuddy and Della (1978) index indicated that soybean exports were most unstable during Period I (1996–2009), but instability declined in subsequent years. Imports also showed higher instability in the initial phase, but variability decreased significantly after 2009, suggesting greater stability in the recent period. Overall, the findings highlight the cyclical nature of the soybean trade in India and emphasise the

[1]CCS Haryana Agricultural University, Hisar, Haryana-125004
[2]JNKVV, Jabalpur

need to strengthen domestic production to reduce external dependency and mitigate vulnerability to global market fluctuations.

Balancing Growth and Sustainability: India's Economic and Environmental Trends in the WTO Era

Indu Walia, Neeraj Pawar, Janailin S. Papang, and Sanjay[1]

Using the secondary data from 2000 to 2023, this study analyses key indicators, including trends in sectoral emissions, emission intensity of GDP, renewable energy consumption, and changes in forest cover, to examine the dichotomy between growth and sustainability. The findings reveal that while globalisation under the WTO has accelerated economic growth, it has also intensified environmental pressures. In response, India has implemented corrective measures, such as expanding renewable energy capacity, improving carbon efficiency, and aligning trade and climate policies with its sustainability goals. The paper argues that achieving a sustainable development path for India requires integrating trade policy with environmental commitments, while WTO reforms should support developing economies in adopting green growth strategies.

Indian Agriculture at the Crossroads: Reconciling WTO Commitments with Food Security and Environmental Sustainability

Shubham[2]

India's agricultural sector serves as the backbone of rural livelihoods, a guarantor of national food security, and a significant actor in the global trading system. Membership in the World Trade Organisation (WTO) has intensified pressures on Indian agriculture by subjecting it to multilateral trade rules while simultaneously limiting domestic policy autonomy. The central challenge lies in balancing three interconnected imperatives: honouring WTO commitments, ensuring food security for a growing population, and safeguarding environmental sustainability amid resource degradation and climate change. This paper critically examines the evolution of India's agricultural policies under the WTO framework, analyses the tensions between trade liberalisation and domestic food security goals, and assesses the ecological consequences of prevailing production systems. It argues for an integrated policy approach that reconciles India's trade obligations with ecological stewardship and the imperative of feeding over 1.4 billion people, thereby charting a pathway toward sustainable agricultural transformation.

[1]CCS Haryana Agricultural University, Hisar, Haryana-125004
[2]Dr. Yashwant Singh Parmar, University of Horticulture and Forestry, Nauni, Solan-173230

Intra-industry Trade Patterns in Cotton Products for India: A Panel Data Analysis Approach

Priya Brata Bhoi, Kamal Vatta, Kashish Arora, Sunny Kumar, Pradipkumar Adhale, and Rohit Saini[1]

The present study aims to examine the trade patterns of cotton, focusing on intra-industry trades at the HS 4-digit and HS 6-digit levels for the period from 2001 to 2024. Although India is one of the largest producers of cotton worldwide, its raw cotton trade export has declined to just 5.4 per cent of global trade, while its import share has increased to 15.30 per cent of total global imports. During the study period, exports of processed products from HS 5202 to HS 5212 have increased, while imports of processed products have declined. India has a significant presence in the global market for manufactured cotton products. India has emerged as a significant manufacturing power in the cotton sector. The study employed the Grubel-Lloyd index of intra-industry trade (IIT) along with the decomposition of IIT using methods developed by other scientists. The intra-industry trade (IIT) pattern for India suggests dominance of vertical intra-industry (nearly 70%) trade (VIIT) in cotton than horizontal intra-industry trade (30%). Further decomposition of VIIT suggests that high-value VIIT (HVIIT) and low-value VIIT (LVIIT) exist in the Indian cotton trade. Furthermore, the study employed high-dimensional panel data models to identify the determinants of vertical intra-industry trade (HVIIT and LVIIT). The empirical analysis reveals a clear quality-based market segmentation pattern, where income similarity between trading partners promotes the expansion of low-value intra-industry trade (LVIIT), while income disparities constrain high-value intra-industry trade (HVIIT). When India's capital formation outpaces that of its trading partners, low-value industries expand, reflecting India's comparative advantage in labour-intensive, lower-value cotton products. Simultaneously, high-value IIT contracts indicate that resources may be diverted from newly developing high-value segments or that capital accumulation alone is insufficient to increase sophisticated product development without complementary technological and skill investments.

Evolving Agri-Economic Relations between Afghanistan and India: A Two-Decade Analysis

Bashir Ahmad Esar, Gurlal Singh, and Gurleen Kaur[1]

The current study explores how trade in agricultural products (agri-economic relations) can strengthen the connection between Afghanistan and India. This research examines trade data between these countries from 2000 to 2020, with a

[1]Department of Economics and Sociology, Punjab Agricultural University, Ludhiana-141004

focus on trends and the composition of trade before and after the establishment of the South Asian Free Trade Agreement (SAFTA). This study uses two main methods, namely, first and trend analysis, which help to identify the overall direction and potential future growth of trade between India and Afghanistan, and the trade potential formula, which assesses how well India and Afghanistan are utilising their trade possibilities in various agricultural goods based on existing trade flows. India's trade with Afghanistan is currently approximately US$855.2 million, which represents a small portion (0.19%) of India's global trade. However, the study revealed significant potential for increased trade between the two nations. It even predicts future trends in India's exports, imports, and overall trade with Afghanistan, suggesting a continuing upward trajectory.

Carbon Footprint Assessment of Basmati and Non-Basmati Rice Cultivation in Haryana: Implications for Environmental Sustainability

Sanjay[1]

This study assesses the carbon footprint of basmati and non-basmati rice cultivation in Haryana, India, using primary data collected from 60 farmers across Karnal and Sirsa districts during the 2020-21 period. The research evaluates carbon emissions from different varieties under puddled transplanted rice (PTR) and direct-seeded rice (DSR) systems. Results reveal significant variation in carbon footprint, ranging from 5,241 kg CO_2/ha (CSR-30) to 23,177 kg CO_2/ha (CR-114/126), with residue burning contributing 66-76% of total emissions in high-emission varieties. Basmati varieties exhibit a lower average carbon intensity (13,067 kg CO_2/ha) compared to non-basmati varieties (14,209 kg CO_2/ha), although the sample size limits statistical significance. DSR systems emit 4.9% less than PTR methods. The study provides critical insights for sustainable rice production and climate-smart agricultural policies.

India's Basmati Rice Exports Dilemma: Trade Barriers in Key Markets

Arshdeep Singh[2], Manjeet Kaur[3], and Kashish Arora[3]

Indian basmati rice continues to face rising non-tariff challenges in major global markets, particularly in European Union (EU) and United States of America (USA). This study investigates key non-tariff barriers influencing India's basmati exports, using secondary data from the European Commission, U.S. Food and Drug Administration, and other international and national regulatory agencies. The findings

[1]CCS Haryana Agricultural University, Hisar, Haryana-125004
[2]ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi
[3]Punjab Agricultural University, Ludhiana-141004

indicate a significant mismatch between Indian Maximum Residue Limits (MRLs) and EU regulations. In context of USA, four out of ten assessed pesticides had MRLs aligned with Indian standards, two lacked established limits, and four showed non-compliance. From 2020 to 2023, the EU issued 23 border rejections of Indian basmati rice, primarily due to residues of tricyclazole and thiamethoxam. Between 2007 and 2024, rejections of Indian basmati by the USA peaked in 2013 with 311 refusals. While, 2013 and 2014 together accounted for 598 rejections. Although refusals declined afterward, 182 cases were still reported in 2024. Major chemicals of concern included tricyclazole, buprofezin, difenoconazole, tebuconazole, and isoprothiolane. Violation rates of imported rice in the USA (majorly from Thailand and India) increased from 5.10 percent (2001–2011) to 26.23 percent (2012–2022). Comparatively, Saudi Arabia and Codex standards were more aligned with Indian norms. Strengthening judicious use of pesticides, enforcing pre-export conformity certification, improving bilateral trade arrangements, and expanding market diversification are essential to sustain India's competitiveness in basmati rice trade.

Exploring the Rural and Agricultural Impacts of India's Rice Export Ban through CGE Modelling

Renjini V R[1], Manmeet Ajmani[2], Barun Deb Pal[2], Alka Singh[1], Chiranjit Mazumder[1], Sukhendu Nandi[1], Popavath Bhargav[1], and Yoihenba Naorem[1]

Rice sustains nearly 60% of India's population, making it central to both consumption and livelihoods. To shield consumers from potential price hikes, the government imposed a temporary export ban. While such measures aim to stabilise domestic markets, prior evidence suggests mixed outcomes for prices, welfare, and rural communities. Using IFPRI's Computable General Equilibrium (CGE) model built on India's 2019–20 Social Accounting Matrix, this paper evaluates the macroeconomic and household-level effects of the rice export ban. Two scenarios are assessed: a short-run case without land reallocation and an intermediate-run case with adjustments to cropping. Sensitivity tests include outcomes under productivity losses and gains. Findings indicate that consumer prices initially rise but ease in the medium run. Yet GDP declines persist, accompanied by higher unemployment, falling household incomes, and reduced consumption, with rural farm households bearing the greatest losses.

[1]ICAR-IARI, New Delhi, 110012
[2]IFPRI, SAO, New Delhi

Environmental Sustainability and Technology Lead Export Performance: Firm-level Evidence from the Indian Food Processing Industry

M L Nithyashree[1]

In this study, the behaviour of exporting firms and how investment in technology, automation, and environmental compliance facilitates their participation in the global market is investigated. The analysis draws on time-series data and unit-level data for the year 2022–23 from the Annual Survey of Industries (ASI). Firm-level evidence from the estimated Tobit model consistently showed a significant effect of environmental compliance on export performance. Although automation and technology intensity showed limited effects in expanding the exports, their benefits are amplified in the presence of environmental compliance measures.

[1]ICAR-IARI, New Delhi, 110012