

## International Journal of Agriculture Extension and Social Development

Volume 7; Issue 9; September 2024; Page No. 580-583

Received: 17-07-2024  
Accepted: 23-08-2024

Indexed Journal  
Peer Reviewed Journal

### Direction of trade for fresh and chilled gherkins exports from India: An analysis of global market destinations

<sup>1</sup>Narayan Murigeppa Gunadal, <sup>2</sup>NM Kerur, <sup>3</sup>Balachandra K Naik, <sup>4</sup>Vilas S Kulkarni and <sup>5</sup>TR Shashidhar

<sup>1</sup>Ph.D. Scholar, Department of Agribusiness Management, University of Agricultural Sciences, Dharwad, Karnataka, India

<sup>2-4</sup>Professor, Department of Agribusiness Management, University of Agricultural Sciences, Dharwad, Karnataka, India

<sup>5</sup>Professor, Department of Horticulture, University of Agricultural Sciences, Dharwad, Karnataka, India

DOI: <https://doi.org/10.33545/26180723.2024.v7.i9h.1093>

Corresponding Author: Narayan Murigeppa Gunadal

#### Abstract

India is the leading producer and exporter of fresh and chilled gherkins globally, with the southern states contributing significantly to the country's total production. This study aimed to analyze the direction of trade of Indian fresh and chilled gherkins using secondary data from 2011-12 to 2022-23. Employing the first-order Markov chain approach, a transitional probability matrix was developed to examine changes in export patterns to key markets over time. The result indicated that Qatar retained 73.95% of Indian fresh and chilled gherkins exports, while the remaining share shifted to other countries, such as Oman, Bahrain IS and Bhutan. Bhutan consistently retained 100% of its import share, indicating a stable demand. However, study suggests that the complete depending on Bhutan is not a good for India so that India has to diversify its trade to other nations then India can mitigate the risk associated with Indian fresh and chilled gherkins export. Relying on just one or two countries for gherkins exports can be risky, as any downturn in trade with those countries can disrupt the entire export system. To mitigate this, diversifying trade across multiple nations is a safer approach. The study also emphasized India's robust gherkins trade relationships with Qatar, Bhutan and the UAE, driven by geographical proximity and advantageous trade agreements. It recommends sustaining strong political relations and pursuing bilateral agreements with importing countries to reduce tariff and non-tariff trade barriers.

**Keywords:** Gherkins, export, direction of trade, markov chain and transitional probability matrix

#### Introduction

India is the leading producer of gherkins globally, with the southern states contributing significantly to the country's total production. The gherkins industry in India is characterized by a network of small to medium-sized farms, contract farming arrangements and processing units that cater to international market. Key export destinations include the United Arab Emirates, Qatar, Bhutan, Kuwait, Maldives, Baharain Is and Oman, where Indian fresh and chilled gherkins are prized for their quality and competitive pricing. The export of gherkins plays a crucial role in India's agricultural economy, generating substantial revenue and employment opportunities, particularly in rural areas where gherkins cultivation is prevalent. The industry contributes significantly to foreign exchange earnings and supports the livelihoods of thousands of farmers and workers engaged in cultivation, harvesting, processing and export activities.

Gherkins (*Cucumis anguria*), small cucumbers popular in pickling, have become a significant agricultural commodity in India, particularly in Karnataka, Tamil Nadu and Andhra Pradesh. India is the world's largest producer and exporter of gherkins, accounting for 15 of global production and 25-27% of global exports, earning \$223 million in 2020-21 (DGCIS). Around 90,000 small and marginal farmers cultivating gherkins on 65,000 acres, supported by over 50 processing and export companies. In 2020-21, India

produced 2,17,521 metric tonnes of gherkins valued at ₹14,873 million. From April to October 2021, India exported 123,846 metric tonnes worth \$114 million, with total exports in 2021-22 exceeding \$200 million (Gunadal *et al.*, 2024) <sup>[1]</sup>.

The direction of trade of exports of fresh and chilled gherkins from India to different destinations is crucial for an economic and strategic standpoint; understanding the direction of trade helps in market identification and expansion, which international markets have a growing demand for Indian fresh and chilled gherkins exports, allowing businesses to focus their efforts on expanding in these regions and adapt Indian gherkins to meet the specific requirements, tastes and regulations of different markets. By knowing which countries import the most, Indian businesses can strategically position themselves to compete effectively with other global exporters. Market insights allow for more competitive pricing strategies based on regional demand and supply dynamics.

It also helps in negotiating favorable trade agreements. For instance, if India exports a significant quantity of gherkins to the UAE, negotiations for reduced tariffs or improved access can be prioritized with these countries and exporters can optimize operations to avoid high tariffs or non-tariff barriers in certain regions by understanding the regulatory landscape of various trade partners. It brings economic

stability and diversification by risk management and supply chain optimization; relying on a few markets can be risky if those economies face downturns or implement trade restrictions. It enables India to diversify its export base, reducing economic vulnerabilities. Exporters can better manage logistics and supply chains by identifying key regions and adjusting transportation, warehousing and distribution strategies to meet market demands more efficiently.

The Indian government can use trade data to develop policies that support sectors with strong export potential, such as fresh/chilled gherkins. This could involve subsidies, tax breaks or infrastructure development aimed at improving export efficiency to target destinations. Insights help Indian government to predict economic outcomes, plan for potential shifts in demand and support industries in sectors where exports are critical. Exporters can benchmark themselves against other global players by comparing India's share of exports to target markets with that of other countries. This enhances India's global standing and competitiveness in international trade. Knowledge of global market preferences and emerging trends allows Indian exporters to adapt quickly, ensuring their fresh and chilled gherkins remain competitive. By identifying high-value markets, India can encourage more sustainable farming practices, ensuring that these practices align with market preferences for organic or environmentally friendly produce and sustaining long-term growth by fostering partnerships and building stronger trade relations with key regions. With this background, this study was taken up with the objective to analyse the trade direction of fresh and chilled gherkins from India to different destinations in the world.

## Methodology

The study was based on secondary data. The data pertaining to the export of gherkins (2011-12 to 2022-23) from India were collected from Agricultural and Processed Food Products Export Authority (APEDA), DGCIS websites and other published sources and data was analysed using first order markov chain technique.

The major fresh and chilled gherkins importing countries from India were United Arab Emirates, Qatar, Bhutan, Kuwait, Maldives, Baharain Is and Oman. The trade directions of Indian gherkins were analyzed using the first order Markov chain approach. The LP Solver software was used to analyze the transition probability matrix. Central to markov chain analysis is the estimation of the transitional probability matrix 'P' whose elements,  $P_{ij}$  indicate the probability of exports switching from country 'i' to country 'j' over time. The diagonal element  $P_{ij}$  where  $i=j$ , measures the probability of a country retaining its market share or in other words, the loyalty of an importing country to a particular country's exports.

Annual export data for period 2011-12 to 2022-23 was used to analyze the direction of trade and changing pattern of Indian fresh and chilled gherkins export. In this context, major gherkins importing countries and others were considered. The average exports to a particular country was considered to be a random variable which depends only on the past exports to that country, which can be denoted algebraically as (Udhayan *et al.*, 2023) [16].

$$E_{jt}E_{jt} = \sum_{i=1}^n [E_{it-1} \sum_{i=1}^n [E_{it-1} \times P_{ij} \times P_{ij} + e_{jt} + e_{jt}]]$$

Where,

$E_{jt}$  = Exports from India to the  $j^{\text{th}}$  country in the year "t"

$E_{it-1}$  = Exports or import to  $i^{\text{th}}$  country during the year t-1

$P_{ij}$  = The probability that exports will shift from  $i^{\text{th}}$  country to  $j^{\text{th}}$  country

$e_{jt}$  = The error term which is statistically independent of  $E_{jt-1}$

n = The number of importing countries

The transitional probabilities  $P_{ij}$ , which can be arranged in a (c x n) matrix, have the following properties.

$$\sum_{i=1}^n P_{ij} \sum_{i=1}^n P_{ij} = 1 \text{ and } 0 \leq P_{ij} \leq 1$$

Thus, the expected export share of each country during period 't' is obtained by multiplying the exports to these countries in the previous period (t-1) with the transitional probability matrix. The probability matrix was estimated for the period 2011-12 to 2022-23.

Thus, transitional probability matrix (T) was estimated using linear programming (LP) framework by a method referred to as minimization of Mean Absolute Deviation (MAD).

Min,  $OP^* + Ie$

Subject to

$X P^* + V = Y$

$GP^* = 1$

$P^* \geq 0$

Where,

$P^*$  is a vector of the probabilities  $P_{ij}$

$P^*$  vectors were arranged to obtain the TPM

O is the null vector

I is an appropriately dimensioned vector of export or import.

e is the vector of absolute errors (IUI)

Y is the vector of exports to each country.

X is a block diagonal matrix of lagged values of Y

V is the vector of errors

G is a grouping matrix to add the row elements of P arranged in  $P^*$  to Unity.

## Results and Discussion

The pattern and flow of products and services between different countries is referred to as trade direction. It usually referred to the direction of exports and imports, indicating whether a country exports or imports the products and services of the destination countries.

Trade directions can vary widely between countries and alter over time due to a variety of reasons such as economic situations, government policies, trade agreements and technological improvements. Some countries specialize in exporting specific commodities or services, while others rely significantly on imports to meet internal needs.

The structural variations in India's fresh and chilled gherkins export share to key destinations, including the United Arab Emirates, Qatar, Bhutan, Kuwait, Maldives, Bahrain IS, Oman, and others, were analyzed using a first-order Markov chain model.

A transitional probability matrix was developed to examine the real quantity of exports to these importing countries

across different years in the time series.

Transitional probabilities were applied to analyze trade directions and forecast export trends. The diagonal elements of the transitional probability matrix indicated the likelihood of retaining market share from the previous period, while the row elements represented the probability of trade loss to competing countries. The column elements reflected the likelihood of gaining trade from rival nations.

Table 1 displays the transitional probability matrix for Indian gherkins (Fresh/Chilled) exports, offering detailed insights into the changes in trade patterns over the study period, which spans from 2013-2014 to 2022-2023. This matrix captures the directional shifts in gherkins exports to various key markets during these years. To provide a clearer understanding of the overall trade dynamics, exports to all other nations outside of these major destinations were combined under a broad category labeled "Others". This grouping allows for a more focused analysis of the key markets, while still accounting for exports to less prominent destinations. The transitional probability matrix effectively highlights the evolving trends in export shares and trade directions for Indian fresh and chilled gherkins, offering a comprehensive view of market retention and potential shifts in global trade over the studied period.

Table 1 illustrates the findings from the transitional probability matrix regarding Indian gherkins (Fresh/Chilled) exports. According to the matrix, about 73.95% of India's previous gherkins exports to Qatar were retained throughout the study period, which covers 2013-2014 to 2022-2023. This indicates a strong consistency in Qatar's import demand for Indian gherkins. The remaining 26.05% of the previous export share was redistributed to other markets specifically Oman, Bahrain IS and Bhutan.

The redistribution was as follows: 15.17% of the previous export share went to Oman, 9.38% to Bahrain IS and 1.50% to Bhutan. This shift highlights a partial reallocation of export shares from Qatar to these other destinations. In addition, the matrix reveals that Qatar gained approximately 71.48% of its market share from Bahrain IS during the study period. This suggests a notable shift in market dynamics, where Qatar increased its import volume of gherkins at the expense of Bahrain IS. Bhutan emerged as the most consistent importer of Indian fresh/chilled gherkins, with a 100% probability of retaining its share throughout the study period. This high retention rate underscores Bhutan's strong and unwavering demand for Indian gherkins, reflecting a stable and reliable market for these exports.

India has been a major supplier of fresh and chilled gherkins to Bhutan, Qatar and United Arab Emirates due to its proximity and trade agreements. The United Arab Emirates has been an important market for Indian gherkins exports, often serving as a transshipment point for re-exports to other countries. India has supplied fresh and chilled gherkins to Bhutan as part of bilateral trade agreements. It's important to note that India's gherkins (Fresh/Chilled) trade can fluctuate based on global market conditions and various factors that influence supply and demand in the international market. The increase in gherkins (Fresh/Chilled) exports has been made possible by the APEDA's numerous activities, including the organization of business-to-business shows in various nations, the exploration of new potential markets and the launch of marketing campaigns with active participation from Indian Embassies. COVID-19 pandemic has significantly affected the worldwide supply of gherkins. At the time of pandemic trade was distracted due to export ban and SPS measures.

**Table 1:** Direction of trade of gherkins (Fresh/Chilled) from India to different destinations (2013-14 to 2022-23)

Destinations	Loss								Gain
	United Arab Emirates	Qatar	Bhutan	Kuwait	Maldives	Baharain Is	Oman	Others	
United Arab Emirates	0.6869	0.0474	0.0000	0.0038	0.0149	0.0058	0.0065	0.2348	
Qatar	0.0000	0.7395	0.0150	0.0000	0.0000	0.0938	0.1517	0.0000	
Bhutan	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Kuwait	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000	
Maldives	0.0000	0.0335	0.0000	0.0000	0.0036	0.0000	0.0000	0.9628	
Baharain Is	0.0000	0.7148	0.0000	0.0000	0.0900	0.0000	0.1952	0.0000	
Oman	0.0000	0.0000	0.1074	0.7002	0.0772	0.0000	0.1152	0.0000	
Others	0.9873	0.0000	0.0000	0.0012	0.0115	0.0000	0.0000	0.0000	

## Conclusion

The study aimed to analyze the direction of trade of Indian fresh and chilled gherkins using secondary data from 2011-12 to 2022-23. Employing the first-order Markov chain approach, a transitional probability matrix was developed to examine changes in export patterns to key markets over time. The data indicated that Qatar retained 73.95% of Indian fresh and chilled gherkins exports, while the remaining share shifted to other countries, such as Oman, Bahrain IS and Bhutan. Bhutan consistently retained 100% of its import share, indicating a stable demand. However, study suggests that the complete depending on Bhutan is not a good for India so that India has to diversify its trade to other nations then India can mitigate the risk associated with Indian fresh and chilled gherkins export. Depending on one or two countries, for export of gherkins is risky because of when the trade to particular country downturns it affects the

whole system of gherkins export so it is always better to diversity the trade to different nations. The study also highlighted India's strong gherkins trade ties with Qatar, Bhutan and the UAE, supported by geographical proximity and favorable trade agreements. Export patterns were influenced by global market conditions, including supply chain disruptions during the COVID-19 pandemic. It suggest to maintain the political relationship and to go for bilateral agreement with the importing countries, which helps in minimizing the tariff and non-tariff barriers to trade.

## References

- Ahmadzai AB, Sidana BK, Guleria A. Direction and export performance of coffee in India. *Int J Bio-resource Stress Management*. 2022;13(9):995-1002.
- Ashwini SD, Datarkar S, Patil S. Performance and

- competitiveness of onion export from India. *Int J Trop Agric*. 2015;33(2):1095-1099.
3. Broeck GV, Maertens M. Horticultural exports and food security in developing countries. *Global Food Security*. 2016;10:11-20.
  4. Chaitanya K. Horticulture exports in India: A study. *Int J Sci Res*. 2017;6(2):693-695.
  5. Chandan K, Nalin B. Indo-EU agricultural trade: Trade restrictions and SPS measures. *Obuda University e-Bulletin*. 2018;8(1):13-23.
  6. Chetia A, Chavan RV, Bharati SV. Export profile and trade direction of fresh grapes from India: Markov chain approach. *The Pharma Innovation J*. 2022;11(12):1831-1836.
  7. Dastagiri MB. India's horticultural export markets: Growth rates, elasticities, global supply chains, and policies. *Modern Economy*. 2017;8:847-864.
  8. Devi IB, Srikalab M, Anandac T, Subramanyam V. Direction of trade and export competitiveness of chillies in India. *Agr Econ Res Rev*. 2016;29(2):267-272.
  9. Devi N. Foreign trade of tea - Growth and direction. *Int Res J Commerce Arts Sci*. 2016;7(8):36-41.
  10. Gaware UP, Ganvir BN, Thawale SM, Ahmad N. Export competitiveness and direction of trade of eggs in India: An economic assessment. *J Community Mobilization Sustainable Dev*. 2021;16(2):543-547.
  11. Madhu DM, Narayan Murigeppa Gunadal, Harshitha HC, Rosalin Geetha I, Kota Karuna Sri, Siripuram Haripriya, Hanumanthappa R. A comprehensive analysis of export performance and trade competitiveness of millets from India. *J Sci Res Report*. 2024;30(5):43-55.
  12. Mushair H, Murugananthi D, Rohini A. Export performance and trade direction of fresh and dried grapes (raisin): Evidence from Afghanistan. *J Econ Management Trade*. 2020;26(4):37-44.
  13. Narayan Murigeppa Gunadal, Kerur NM, Naik BK, Kulkarni VS, Shashidhar TR. Unveiling India's export success: The remarkable performance of gherkins. *J Sci Res Report*. 2024;30(8):90-101.
  14. Padmanaban K, Mishra P, Sahu PK, Havaladar YN. Export of cashew kernel from India: Its direction and prediction. *Economic Affairs*. 2014;59(4):521-527.
  15. Singh M. Projection of potato export from India: A Markov chain approach. *Potato J*. 2010;37(1-2):48-55.
  16. Udhayan N, Naik AD, Naik BK, Kerur NM, Dolli SS. Export of wheat from India: Destinations and competitiveness. *The Pharma Innovation Journal*. 2023;12(7):2754-2758.