



Impact of Trade Liberalization on Indian Agriculture: A Gravity Model Approach

Shilpa K. Ramannagol^{#1} , B. H. Nagoor²

¹Assistant Professor, Department of Economics Government First Grade College Belgaum India.

²Professor, Department of Economics, Karnatak University Dharwad.

#corresponding author

Type of Work: Peer Reviewed.

DOI: <https://dx.doi.org/10.21013/jmss.v21.n3.p2>

Review history: Submitted: July 16, 2025; Revised: July 29, 2025; Accepted: August 19, 2025

How to cite this paper:

Ramannagol, S. K., & Nagoor, B. H. (2025). Impact of Trade Liberalization on Indian Agriculture: A Gravity Model Approach. *IRA-International Journal of Management & Social Sciences* (ISSN 2455-2267), 21(3), 100-112. DOI: <https://dx.doi.org/10.21013/jmss.v21.n3.p2>

© IRA Academico Research.

The full text of this paper is available under Open Access subject to a [Creative Commons Attribution-NonCommercial 4.0 International License](#)  and further subject to a proper citation of its primary publication source.

Disclaimer: The scholarly papers as reviewed and published by IRA Academico Research are the views and opinions of their respective authors and are not the views or opinions of IRA Academico Research. IRA Academico Research disclaims any harm or loss caused due to the published content to any party.

IRA Academico Research is an institutional publisher member of *Publishers International Linking Association Inc. (PILA-CrossRef)*, USA. Being an institutional signatory to the *Budapest Open Access Initiative*, Hungary, the content published by IRA Academico Research is available under Open Access. IRA Academico Research is also a registered content provider under *Open Access Initiative Protocol for Metadata Harvesting (OAI-PMH)*.

This paper is peer-reviewed following IRA Academico Research's [Peer Review Program](#) .

Shilpa K. Ramannagol  [/0000-0001-9349-0464](https://orcid.org/0000-0001-9349-0464)

ABSTRACT

The study examines the effects of trade liberalization, with a particular focus on the India-ASEAN Free Trade Area (AIFTA) agreement, on India's agricultural sector. Trade liberalization has been a key catalyst for economic transformation, and agreements like AIFTA are essential in reducing trade barriers and fostering integration into global markets. This study used the gravity model to examine the impact of Free Trade Agreements (FTAs) between India and ASEAN countries on agricultural trade. The advanced panel model, widely used in international trade analysis, suggests that trade flows between two nations are directly proportional to their economic size (GDP), inversely proportional to the distance between them, and influenced by factors such as shared history and trade agreements. Focusing on agricultural trade, the model integrates a dummy variable representing the India-ASEAN FTA to evaluate its specific impact. The analysis incorporates results from various advanced econometrics techniques, including Pooled Ordinary Least Squares (POLS), Fixed Effects, and Random Effects models, to evaluate the determinants of India's agricultural trade with ASEAN nations. The findings suggest that trade liberalization measures, such as tariff reductions and the implementation of free trade agreements, have substantially enhanced agricultural export performance between India and ASEAN countries.

Keywords: Trade, liberalization, AIFTA, agriculture and gravity model

Introduction

Trade liberalization has become a powerful catalyst for global economic transformation, fostering greater cross-border exchanges, improving market efficiency, and enhancing global competitiveness. India has become a rapidly expanding economy in South Asia, reshaping the dynamics of economic integration within the region (Wang, 2006). Central to this transformation are Free Trade Agreements (FTAs), which play a pivotal role in reducing trade barriers, lowering tariffs, and promoting economic integration between nations. FTAs enhance economic strength by eliminating trade barriers and encouraging investment among member countries (Wong & Chan, 2003). One such agreement is the India-ASEAN Free Trade Area (AIFTA), implemented in 2010, which aims to strengthen the economic ties between India and the 10 Southeast Asian nations that comprise the ASEAN group. Since that time, bilateral trade has expanded over tenfold, growing from US\$ 4.7 billion in 1995 to US\$ 67.9 billion in 2014, spanning multiple sectors, including agriculture (ASEAN Secretariat, 2014). Previous studies have indicated that the tariff reduction commitments between India and ASEAN could negatively impact sectors such as tea, coffee, spices, and rubber (Pal & Dasgupta, 2009). Additionally, the rules of origin provision under AIFTA have been viewed as detrimental to the interests of tropical commodity producers in India's Kerala state (Harilal, 2010; Veeramani & Saini, 2011). On the other hand, other studies highlight the significant trade potential between India and ASEAN, driven by enhanced economic cooperation (Sen et al., 2004; Yean & Jia Yi,

2014). The AIFTA has been instrumental in facilitating the free flow of goods, services, and investments, particularly in sectors such as agriculture, which is vital to India's economy.

India, one of the world's largest agricultural producers, stands to benefit substantially from trade liberalization. Its agricultural sector is not only a significant contributor to the national economy but also a key source of employment and food security for millions of people. Despite this potential, India's agricultural exports have historically been hindered by various trade barriers, both tariff and non-tariff, and limited market access. The India-ASEAN FTA addresses these challenges by improving market access, reducing trade costs, and enhancing India's competitiveness in global agricultural markets. Given the central role that agriculture plays in India's economy, understanding the effects of the AIFTA on agricultural trade flows is essential. The ASEAN-India Free Trade Agreement (AIFTA) is observed as one of the largest Free Trade Agreements globally, encompassing a market of nearly 1.8 billion people and a combined GDP of US\$ 2.8 trillion. However, concerns have been raised regarding India's ability to gain significantly from the agreement, as many ASEAN member countries already have lower tariff rates (Pal and Dasgupta, 2008). This highlights the need to assess the competitiveness of agricultural commodities exported to ASEAN members.

This study employs the gravity model of trade to investigate the impact of the India-ASEAN FTA on India's agricultural sector. The gravity model, widely used in international trade analysis, suggests that trade between two countries is directly proportional to their economic size (measured by GDP), inversely proportional to the distance between them, and influenced by additional factors such as historical ties and trade agreements. By incorporating a dummy variable for the AIFTA, this research specifically assesses how the agreement influences agricultural trade flows between India and ASEAN nations.

The study applies various econometric techniques, including Pooled Ordinary Least Squares (POLS), Fixed Effects, and Random Effects models, to analyse the determinants of India's agricultural exports to ASEAN countries. It explores the impact of tariff reductions and trade barrier removals under the AIFTA on agricultural export performance, offering valuable insights into how trade liberalization measures have contributed to the sector's growth. The findings provide a better understanding of the economic benefits and challenges that the AIFTA brings to India's agricultural sector, contributing to broader discussions on trade liberalization's role in enhancing agricultural productivity and fostering economic growth in developing countries.

Materials and Methods

Gravity Model

The gravity model in economics draws a compelling analogy to Newton's law of gravitation, which posits that the gravitational attraction between two physical objects is directly proportional to the product of their respective masses and inversely proportional to the square

of the distance separating their centers of gravity. Similarly, the gravity model has proven to be a versatile tool for understanding and predicting various types of flows, including migration and foreign direct investment, and notably, international trade flows. The initial empirical exploration of the gravity model's applicability to international trade was pioneered by Tinbergen in 1962 and Poyhonen in 1963. In theoretical terms, the gravity model applied to trade asserts that the volume of trade between two countries is directly proportional to the product of each country's 'economic mass,' often represented by their Gross Domestic Product (GDP), while it is inversely proportional to the distance between their respective economic centers. Frequently, this distance is approximated using the geographical separation between the capital cities of the countries involved. In essence, the gravity model suggests that trade flows are influenced by the economic size and proximity of trading partners, mirroring the way physical objects are drawn together by gravitational forces in the natural world.

The basic form of the gravity model is given by Equation (1)

$$T_{ij} = Y_i * Y_j / D_{ij}$$

where,

T_{ij} = Bilateral trade flows between country 'i' and 'j',

Y_i & Y_j = National income of country 'i' and 'j', respectively measured in terms of GDP

D_{ij} = Distance between the capital cities of country 'i' and country j (in km).

The Gross Domestic Product (GDP) serves as a crucial indicator of a nation's economic strength, reflecting both its market size and purchasing power. In the context of the gravity model in international trade, the GDP is a pivotal factor that influences trade dynamics. The fundamental postulate is that countries with larger economies are expected to engage in more trade due to their increased capacity for both production and consumption. On the other hand, the distance variable is equally significant in understanding trade patterns. It not only represents higher transportation costs but is also associated with greater cultural differences. These cultural disparities can impede the smooth transfer of information and the establishment of trust between trading partners, resulting in a negative correlation between distance and bilateral trade.

However, using geographical distance alone to approximate the economic barriers in international trade is considered simplistic. To provide a more nuanced analysis, researchers have adopted the practice of including dummy variables. These variables account for qualitative aspects of trade relationships, such as whether two countries share a colonial history and Free Trade Agreement. Countries that share a colonial history tend to exhibit higher levels of bilateral trade. Moreover, countries that frequently engage in bilateral and

regional trading agreements tend to experience enhanced trade relationships, underlining the role of trade agreements in boosting international commerce. These multifaceted factors, both quantitative and qualitative, contribute to the complex tapestry of international trade relations. Given the multiplicative nature of the model, the natural logarithms can be taken to obtain the linear relationship and the Equation (2).

$$\ln \text{Trade}_{ijt} = \beta_0 + \beta_1 \ln \text{GDP}_{it} + \beta_2 \ln \text{GDP}_{jt} + \beta_3 \ln \text{Pop}_{it} + \beta_4 \ln \text{Pop}_{jt} + \beta_5 \ln \text{Dist}_{ijt} + \beta_6 \ln \text{Exchangerate}_{ijt} + \beta_7 \text{Common colony}_{ijt} + \beta_8 \text{FTA}_{ijt} + eu_{ijt}$$

where,

i = India

j = ASEAN Countries

t = 1991, 1992, 1993.....2022

Trade_{ijt} = India's trade with Partner Countries in year t

GDP_{it} = GDP of reporter country i in the time t

GDP_{jt} = GDP of trade partner country j in the time t

Pop_{it} = Population of reporter country i in the time t

Pop_{jt} = Population of trade partner country j in the time t

Dist_{ijt} = Geographical distance between country i and j

Exchangerate_{ijt} = Exchange rate between country i and j

Common colony_{ijt} = common colony

FTA_{ijt} = Free Trade Agreement between India and ASEAN

eu_{ijt} = Error term

Panel data analysis involves methods like Pooled OLS, Fixed Effects, and Random Effects models. Before estimation, the study conducted a panel unit root test using the LLC (Levin, Lin, and Chu) method, which tests for stationarity. Non-stationary variables were differenced to achieve stationarity. Pooled OLS assumes a uniform relationship between variables but does not account for cross-country heterogeneity. One key limitation of the pooled OLS model is its failure to account for the diversity among countries. It does not estimate country-specific effects and presumes that all countries are uniform and identical (Abu et al., 2010). Fixed Effects models allow for unique intercepts across groups, controlling for individual-specific differences. In the fixed-effects model, intercept terms are allowed to vary across individual units, capturing unit-specific variations, whereas in the random-effects model, these variations remain constant (Wooldridge, 2012). Random Effects models consider both unique intercepts and coefficients, addressing unobserved heterogeneity. The Hausman test determines whether Fixed or Random Effects is more suitable.

Diagnostic tests like Breusch-Pagan and Modified Wald tests were used to detect heteroscedasticity, which occurs when error variances are unequal. Robust standard errors and FGLS methods were applied to correct for these issues, ensuring reliable model performance

The nominal bilateral trade data (in US\$) for the period 1991–2022 was sourced from the UNCOMTRADE database and ITC Trade Map. Additional data, including GDP figures, were obtained from the World Development Indicators (World Bank), while information on distance and colonial ties was referenced from the Centre for Prospective Studies and International Information (CEPII, France). GDP and trade values were adjusted to real terms at 2010 prices using the GDP deflator. The distance data from CEPII, measured in kilometres, was calculated using the great circle distance formula, which considers the longitude and latitude of each country's capital.

Results and Discussion

This study investigates the influence of Free Trade Agreements (FTAs) between India and ASEAN countries on agriculture trade flows, using the gravity model and employing FTAs as a dummy variable. The analysis designates agriculture trade as the dependent variable, examining its determinants through independent variables like GDP, Population, Distance, and Exchange Rate. To account for qualitative aspects, dummy variables—such as Common Colony and FTA—are incorporated. This captures shared historical ties and the specific impacts of trade agreements, respectively. This holistic approach provides a nuanced understanding of the complex factors driving agriculture trade between India and ASEAN countries.

Factors influencing India's Agriculture Trade with ASEAN

The provided table representing the results of a gravity model estimation for India's agriculture exports to ASEAN countries. In gravity models, economic interactions between countries are modelled based on their economic sizes, distances, and other relevant factors. Let's break down the key variables and their coefficients based on the different estimation models (POLS - Pooled OLS, Fixed Effect, Random Effect) in the context of India's agriculture exports to ASEAN countries.

The coefficients for each variable are reported, along with their respective p-values denoted by ***, **, and * to signify significance levels at 1%, 5%, and 10%, respectively. Notably, the Fixed Effect model, selected based on the Hausman Specification test (p-value = 0.000), is deemed more appropriate for this analysis.

Table 1.1: Estimation of Gravity model under different estimation model India's Agriculture Trade with ASEAN countries

Variables	POLS		Fixed Effect		Random Effect	
	Coef.	P>	Coef.	P>	Coef.	P>
lngdpit	-1.675	0.008***	-2.679	0.000***	-1.675	0.007***
lngdpjt	0.941	0.000***	2.414	0.000***	0.941	0.000***
lnpopit	12.054	0.000***	12.888	0.000***	12.054	0.000***
lnpopij	-0.406	0.000***	-1.806	0.000***	-0.406	0.000***
lnexchange rateijt_d	0.009	0.845	0.074	0.060*	0.009	0.844
Indistijt	-0.772	0.000***	-	-	-0.772	0.000***
Common colonyijt	0.540	0.000***		-	0.540	0.000***
FTAijt	0.321	0.017**	0.281	0.013**	0.321	0.016**
_cons	-125.350	0.000***	-131.914	0.000***	-125.350	0.000***
Number of Obs	180.000		180.000			
Number of groups	6.000		6.000			
R-squared	0.928		0.939		0.918	
Adj R-squared	0.925					
Hausman Specification			0.000			
Breusch Pagan LM test			0.000			
Wooldridge test			0.000			

Note: ***, **and * indicate the significance of the coefficients at 1%, 5%, and 10% levels of significance, respectively

One of previous study stated that, India's fluctuating gross domestic product (GDP) exerts negative and significant impacts on overall trade, amounting to -0.376 points across 26 Asian nations from 2011 to 2022. Conversely, the GDP of partner nations yields positive and substantial outcomes, indicating that a 1% increase in their GDP correlates with a 0.95% growth in total trade. This contradicts the predictions of the gravity theory. Notably, India predominantly trades low-tech items such as leather footwear, jewels, marine products, organic chemicals, cereals, and fruits, which are distinct products with close substitutes. Price sensitivity likely plays a role in the demand for such products, where a country with lower prices can outsell its competitors. (Bharti & Nisa, 2021). In contrast, ASEAN countries boast a

higher export to GDP ratio, and the agreement has granted them enhanced access to Indian markets.

So, in the present study, table 1.1 analysis that India's GDP is having negative coefficient in all models (-1.675 in POLS, -2.679 in Fixed Effect, -1.675 in Random Effect) suggests that an increase in India's GDP negatively impacts its agricultural exports to ASEAN countries. The coefficient is statistically significant at the 1% level in both POLS and Fixed Effect models. Positive coefficient in all models (0.941 in POLS, 2.414 in Fixed Effect, 0.941 in Random Effect). The coefficient is highly significant at the 1% level in all three models. India's population showing Positive coefficient in all models suggests that an increase in India's population leads to higher agricultural exports to ASEAN countries. The coefficient is statistically significant at the 1% level in all three models. Exchange rate between countries is having insignificant coefficient in all models suggests that the exchange rate does not significantly impact India's agricultural exports to ASEAN countries. The distance between India and ASEAN countries is having Negative coefficient in all models (-0.772) suggests that greater distance has a negative impact on India's agriculture exports to ASEAN countries. The coefficient is statistically significant at the 1% level in all three models. In the context of common colony, there is a positive coefficient in POLS and Random Effect models suggests that common colonial history positively influences agriculture exports, but the Fixed Effect model does not include this variable because this variable is time invariant variable.

In the context of FTA, the positive coefficients across all models (0.321 in POLS, 0.281 in Fixed Effect, 0.321 in Random Effect) suggest that having a Free Trade Agreement positively influences India's agriculture exports to ASEAN countries. The coefficients are statistically significant at the 5% level in both Fixed Effect and Random Effect models. The positive and statistically significant coefficients for FTA indicate that the presence of a Free Trade Agreement has a favourable impact on India's agriculture exports to ASEAN countries.

The R-squared values represent the proportion of the dependent variable's variance explained by the independent variables in the model. In the case of the Pooled OLS (POLS) model, the R-squared is reported at 0.928, suggesting that approximately 92.8% of the variation in India's Agriculture trade with ASEAN countries is explained by the included variables. Moving to the Fixed Effect model, the R-squared value is 0.939, indicating that the dependent variable trade is explained by various independent variable by 93.9 % and The Random Effect model, with an R-squared of 0.918, also provides a high level of explanatory power.

Hausman specification test suggests that the p-value is less than 0.05, rejecting the null hypothesis and indicating that the fixed effects model is more suitable, but there are issues with autocorrelation and heteroscedasticity (Both the Breusch Pagan LM test and Wooldridge test indicate the presence of heteroskedasticity and serial autocorrelation in the model), then using Feasible Generalized Least Squares (FGLS) is a reasonable approach. FGLS is a method that can be applied to correct for heteroscedasticity and autocorrelation in panel data models.

By addressing these issues, FGLS aims to improve the efficiency and reliability of the estimated coefficients. It's a common practice to employ diagnostic tests, like the Hausman test, to guide the choice of the initial model and then apply further techniques, such as FGLS, to handle specific statistical problems.

Table 1.2: FGLS model estimation results for determinants of India's Agriculture Trade with ASEAN countries

Variables	Coef.	Robust Std. Err	t	P>t
lngdpit	-2.679	0.673	-3.980	0.011**
Lngdpjt	2.414	0.111	21.800	0.000***
lnpopit	12.888	3.067	4.200	0.008***
lnpopij	-1.806	0.458	-3.940	0.011**
lnexchange rateijt_d	0.074	0.038	1.940	0.111
Indistijt	-	-	-	-
Common colonyijt	-	-	-	-
FTAijt	0.281	0.050	5.570	0.003***
_cons	-	-	-	-
	131.914	29.709	-4.440	0.007***
Number of Obs	180.000			
Number of groups	6.000			
R-squared	0.939			

Note: ***, **and * indicate the significance of the coefficients at 1%, 5%, and 10% levels of significance, respectively

The table 1.2 FGLS analysis indicates that India's fluctuating Gross Domestic Product (GDP) has a negative and significant impact on total agriculture trade in ASEAN countries from 1991 to 2021. Specifically, there is a total decrease of -2.679 in total agriculture trade associated with the fluctuations in India's GDP during this period.

Conversely, the GDP of partner nations (ASEAN) demonstrates favourable and substantial effects on total trade. This positive correlation indicates that as the economic performance of partner nations improves, it contributes to a substantial boost in the overall volume of Agriculture trade in the region.

India's Population, coefficient is 12.888 suggests that a larger population in India has a positive impact on its agriculture exports to the ASEAN region. The coefficient of -1.806, implies a negative correlation between the population of ASEAN countries and India's agriculture

exports. The Exchange Rate coefficient is 0.074 suggests that the exchange rate has a positive impact, though statistically insignificant, on agriculture exports. This implies that a favourable exchange rate may have a small positive effect on India's agriculture exports, but the result is not statistically robust.

The coefficient of 0.281 indicates that being part of a Free Trade Agreement is associated with a significant increase of approximately 0.281 percent in agriculture exports from India. This highlights the positive impact of trade agreements on India's agriculture exports to ASEAN countries.

The R-squared value of 0.939 indicates that the model explains approximately 93.9% of the variation in agriculture exports to ASEAN countries. This suggests that the included variables collectively account for a large proportion of the variability in the dependent variable. In summary, the FGLS model results suggest that economic factors such as GDP, population, exchange rates, and participation in Free Trade Agreements significantly influence India's agriculture exports to ASEAN countries. The findings provide policymakers and researchers with valuable insights into the complex dynamics of agricultural trade between India and ASEAN nations.

Conclusion

The findings of this study highlight the significant role economic factors play in shaping India's agricultural trade with ASEAN countries. India's fluctuating GDP exerts a negative impact on its agricultural exports to ASEAN, emphasizing the need for consistent and stable economic growth. Conversely, the positive contribution of ASEAN countries' GDP to trade highlights the importance of robust economic partnerships in enhancing trade volumes.

India's large population positively influences agricultural exports, indicating the potential to leverage its extensive agricultural base to cater to ASEAN markets. However, the negative impact of ASEAN countries' population suggests a need for diversification and market-specific strategies to address regional demands. While exchange rates showed minimal statistical significance, they remain a critical area for monitoring and managing trade competitiveness.

The study highlights the positive influence of Free Trade Agreements (FTAs) in boosting India's agricultural exports to ASEAN countries. Policymakers should prioritize strengthening and expanding FTAs while addressing barriers to trade. Trade facilitation measures, such as reducing logistical costs, improving infrastructure, and addressing non-tariff barriers, are essential to maximizing the benefits of FTAs.

Finally, policy efforts should focus on stabilizing India's economic performance, diversifying its export portfolio, and fostering stronger bilateral and regional cooperation to sustain and expand agricultural trade with ASEAN nations. By aligning trade policies with economic realities, India can harness its agricultural potential to strengthen its position in ASEAN markets.

Reference

- Angles, S. (2001). *Production and Export of Turmeric in South India-An Economic Analysis* (Doctoral dissertation, UNIVERSITY OF AGRICULTURAL SCIENCES GKVK, DHARWAD).
- Angles, S., Sundar, A., & Chinnadurai, M. (2011). Impact of globalization on production and export of turmeric in India-An economic analysis. *Agricultural Economics Research Review*, 24(2), 301-308.
- Akhter, N. and Ghani, E. (2010) Regional integration in South Asia: An analysis of trade flows using the gravity model. *The Pakistan Development Review*, 49(2):105- 118.
- Aparna, V. A study on the impact of trade agreements on the performance of plantation industry in India.
- ASEAN Secretariat (2014) ASEAN Statistical Year Book. Jakarta, Indonesia.
- Asick Iqbal, A. (1998). A study of export marketing of pepper in India.
- Babu, P. H. (2017). Export performance of spices in India: an empirical study. *Parikalpana: KIIT Journal of Management*, 13(1), 66-74.
- Balakrishnan, V. An economic study of cardamom plantation in Idukki district Kerala.
- Banjare, N. K. (2016). *An economic analysis of production and marketing of major spices in Raigarh district of Chhattisgarh* (Doctoral dissertation, Indira Gandhi Krishi Vishwavidyalaya, Raipur).
- Batra, A. (2004) India's Global Trade Potential: The Gravity Model Approach. Working Paper No.151, Indian Council for Research on International Economic Relations, New Delhi.
- Chaitra, G. B., & Sonnad, J. S. (2019). Export performance of chilli and cumin from India: An empirical analysis. *Journal of Pharmacognosy and Phytochemistry*, 8(2), 2014-2020.
- Chaitra, G. B., & Sonnad, J. S. (2022). Export performance of coriander from India: An empirical analysis. *Indian Journal of Economics and Development*, 18(3), 681-688.
- Chakravarty, L.S. and Chakrabarty, R. (2014) A gravity model approach to Indo-ASEAN trade-fluctuations and swings. *Procedia - Social and Behavioral Sciences*, 133: 383-391.
- Chan, H. L., Hui, A. Y., Wong, M. L., Tse, A. M., Hung, L. C., Wong, V. W., & Sung, J. J. (2004). Genotype C hepatitis B virus infection is associated with an increased risk of hepatocellular carcinoma. *Gut*, 53(10), 1494-1498.
- Chan, A. O. O., Peng, J. Z., Lam, S. K., Lai, K. C., Yuen, M. F., Cheung, H. K. L., ... & Wong, B. C. (2006). Eradication of *Helicobacter pylori* infection reverses E-cadherin promoter hypermethylation. *Gut*, 55(4), 463-468
- Chakravorthy, R., & Parvin Banu, I. (2017). A Study on the Export Performance of Pepper in India. *International Journal of Interdisciplinary Research in Arts and Humanities*, 2(1), 145-148.
- Chand, R., Raju, S. S., Garg, S., & Pandey, L. M. (2011). Instability and regional variation in Indian agriculture.
- Cuddy, J. D., & Della Valle, P. A. (1978). Measuring the instability of time series data. *Oxford bulletin of economics & statistics*, 40(1).
- Ibrahim, Y. C. (2017). Performance of spices exports during the WTO regime: A disaggregated analysis. *International Journal of Applied Research*, 3(7), 577-584.
- Ibrahim, Y. C., & Arunachalam, P. (2015). *Export performance of Indian spices in the WTO regime: a disaggregated analysis* (Doctoral dissertation, Cochin University Of Science And Technology).
- Jaffee, S. (2005). *Delivering and taking the heat: Indian spices and evolving product and process standards*.

- Jaffee, S. M., & Henson, S. (2005). Agro-food exports from developing countries: the challenges posed by standards. *Global agricultural trade and developing countries*, 91-114.
- Jaffee, S. R., Caspi, A., Moffitt, T. E., Dodge, K. A., Rutter, M., Taylor, A., & Tully, L. A. (2005). Nature× nurture: Genetic vulnerabilities interact with physical maltreatment to promote conduct problems. *Development and psychopathology*, 17(1), 67-84.
- Li, J. Y., Kuo, T. B., Yen, J. C., Tsai, S. C., & Yang, C. C. (2014). Voluntary and involuntary running in the rat show different patterns of theta rhythm, physical activity, and heart rate. *Journal of neurophysiology*, 111(10), 2061-2070.
- Meena, M. D., Lal, G., Meena, S. S., & Meena, N. K. (2018). Production and export performances of major seed spices in India during pre and post-WTO period.
- Meena, M. D., Lal, G., Meena, S. S., Lal, S., & Chaudhary, N. (2019). Seed spices export from India: prospects and constraints. *International Journal of Seed Spices*, 9(2), 12-20.
- Montanari, M. (2005). EU Trade with the Balkans: Large room for growth? *Eastern European Economics*, 43(1), 59-81.
- Nagoor, B. (2021). Market Integration and Changing Direction of Trade: Case of India's Trade in Tea.
- Nagoor, B. H. (2008). *World trade organization and India's agricultural exports: performance and prospects* (Doctoral dissertation).
- Nagoor, B. H. (2009). Economic analysis of agricultural exports of major developing countries under world trade organization regime. *Karnataka Journal of Agricultural Sciences*, 22(5), 1130-1132.
- Nagoor, B. H. (2009). Performance of India's tea exports: A comparative study of major tea exporting countries of the world. *IGIDR Proceedings/Project Reports Series*, PP-062-21. Retrieved from <http://www.igidr.ac.in/pdf/publication/PP-062-21.pdf>.
- Nagoor, B. H., & Kumar, C. N. (2010). Assessing the Impact of the ASEAN-India FTA on the Tea Industry. *Economic and Political Weekly*, 112-116.
- Naik, V. R., & Hosamani, S. B. (2013). Growth and export dimensions of Indian turmeric.
- Nair, K. R. (2006). *The history of trade union movement in Kerala*. Manak Publications, New Delhi.
- Nair, S. K. (2006). The problems of production and marketing in the cardamom industry with particular reference to Kerala.
- Nayar, K. G. (1987). *Problems and prospects of marketing Indian cardamom at home and abroad* (Doctoral dissertation, Ph. D. Thesis, Cochin University of Science and Technology, Cochin).
- Pal, P., & Dasgupta, M. (2009). The ASEAN-India free trade agreement: An assessment. *Economic and Political Weekly*, 11-15.
- Radhakrishnan, V. V. (2003). Studies on variability genetic divergence and crop improvement in cardamom *elettaria cardamomum maton*.
- Rajalakshmi, A. Trade liberalisation and its impact on marketing of selected spices in Tamil Nadu.
- Rajesh, R., & Rajasenan, D. (2015). *Implication of Trade, Livelihood and Employment Exclusion among Workers in Plantation Sector in Kerala* (Doctoral dissertation, Cochin University of Science And Technology).
- Ramannagol, S. K., & Nagoor, B. H. (2023). Performance of India's Ginger Export: A Comparative Study of Major Ginger Exporting Countries of the World. *International Journal of Humanities Social Science and Management (IJHSSM)*. pp: 457-465
- Ramannagol, S. K., & Nagoor, B. H. (2022). Trade Performance of Cumin in India During Post Globalization Period. *International Journal of Scientific Research and Engineering Development*.
- Ramannagol, S. K., & Nagoor, B. H. (2022). Impact of Globalization on Production and Export

- Performance of Chilli and Ginger in India. *Mukt Shabd Journal*
- Ramesh Chand, R. C., Raju, S. S., Sanjeev Garg, S. G., & Pandey, L. M. (2011). Instability and regional variation in Indian agriculture.
- Rao, D. S. (2009). An econometric analysis of spices exports from india.
- Raziya, M. (2022). Impact of WTO on spices with special reference to pepper and cardamom.
- Renjini, V. R., Kar, A., Jha, G. K., Kumar, P., Burman, R. R., & Praveen, K. V. (2017). Agricultural trade potential between India and ASEAN: An application of gravity model. *Agricultural Economics Research Review*, 30(1), 105-112.
- Sabu, S. S., Kuruvila, A., & Manojkumar, K. (2019). Price behaviour of black pepper in Indian and International markets: a comparative analysis.
- Sakamma, S. (2009). *Export Trade of Major Spices of India: An Economic Analysis* (Doctoral dissertation, University of Agricultural Sciences GKVK, Bangalore).
- Salvatore, D. (1998). Capital flows, current account deficits, and financial crises in emerging market economies. *The International Trade Journal*, 12(1), 5-22.
- Salvatore, D. (1998). Europe's structural and competitive problems and the euro. *World Economy*, 21(2).
- Soumya, C., Burark, S. S., Sharma, L., & Jain, H. K. (2014). Growth and instability in production and export of selected spices of India. *International Journal of Seed Spices*, 4(2), 1-10.
- Sreedharan, K. (2015). A study on the impact of pesticides in the Cardamom Hill Reserve of Southern Western Ghats Kerala.
- Sunil, A., & Nair, K. (2018). Marketing opportunities and export competitiveness of Indian spices: An econometric analysis.
- Supriana, T., Pane, T. C., & Khaliqi, M. (2022). Export of Indonesian cinnamon in international market: competitiveness and performance. *Journal of Central European Agriculture*, 23(3), 704-713.
- Thomas, J. K., & Sundaresan, R. (1996). Export performance of cardamom in India.
- Thomas, L., & Sanil, P. C. (2019). Competitiveness in spice export trade from India: A review. *Journal of Spices & Aromatic Crops*, 28(1).
- Veeramani, C., & Saini, G. K. (2011). Impact of ASEAN-India Preferential trade agreement on plantation commodities: a simulation analysis. *Economic and Political Weekly*, 83-92.
- Yesudas, S. Cardamom in Kerala _ an analytical study of its production marketing export and prices.
- Yogesh, M. S., & Mokshapathy, S. (2014). Growth of Indian export and import of spices. *International Journal of Humanities, Arts, Medicine and Sciences*, 2(9), 41-46.
-