
Cash Crop Exports and Economic Growth in India: A Regression Based Analysis of Cotton, Jute, and Spices

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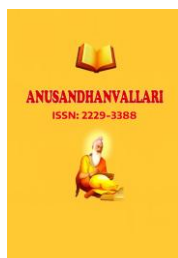
Abstract

This study examined how the cotton, jute, and spice exports have impacted the economic development of India during the years 1991 to 2022. The research intends was descriptive research design. Further, the secondary data were collected via the RBI Handbook of statistics and the World Bank database. To find out the relationship that exist between Gross Domestic Product (GDP) and exports of cotton, jute, and spices, multiple regression analysis was employed. Descriptive statistics indicated that variation in GDP and cash crop exports was quite significant, spices had the highest average export value and cotton and spices had high year to year volatility. The correlation outcome indicates that all the three cash crops are positively correlated with GDP, though the correlation between spices and the other two cash crops appears to be the best. In considering the regression analysis, exports of cotton, jute and spices combined were found to explain approximately 96.5 percent of the variation in the GDP. Nevertheless, of the latter, spice exports are the only ones that exert a significant and statistically important effect on economic development. This indicates that the high value crops, particularly the spices have a significant role in the Indian economy. Meanwhile, the findings also point out that the fluctuations in exports should be addressed and the competitiveness in the international market improved.

Keywords: Cotton, Jute, Spices, Exports, Economic Growth, India, Regression Analysis

Introduction

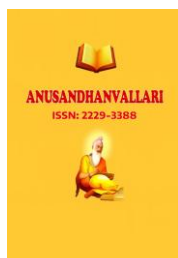
Traditionally, agriculture has been one of the key components of the Indian economy that has play a major role in the provision of employment, income, and the general economic progress of the country (Government of India, 2023). Although the structures are being transformed into industrialization and the service sector is growing, agriculture remains the source of livelihood to a large percentage of the population especially the rural regions (World Bank, 2024). The industry is also significant in guaranteeing food security, alleviating poverty, and achieving inclusive development of developing economies such as India (Food and Agriculture Organization, 2022). In the agricultural industry, cash crops form a significant part because they are mainly grown with commercial intentions and are also a significant source of farm revenue and exports (Singh, 2018). Diversification into high-value cash crops is the manifestation of the changing consumption trends, globalization, and the rising levels of integration of India into the international agricultural markets (Birthal et al., 2015). The prominent place is held by cotton, jute, and spices as they have a great demand in the market and could be exported (Sharma and Kaur, 2020). In India, cotton is among the most significant commercial crops, and the textile industry is based on it, which contributes to the great amount of industrial production and the foreign exchange rate (Indian Council of Agricultural Research, 2021). Millions of farmers depend on the cotton economy and it is interwoven with the downstream sectors of the ginning, spinning, weaving and garment



production (Ministry of Textiles, 2022). Moreover, during the last decades, cotton productivity and export competitiveness have been boosted due to technological development and the assistance of the policy (Chand et al., 2017). Another important cash crop in India is jute, which is also called the golden fibre, and good agro-climatic conditions and a well-established processing industry are a comparative advantage in India (Das, 2019). The trend of sustainable and eco-friendly commodities across the world has resurged interest in products made out of jute, and this has boosted its export potential (Food and Agriculture Organization, 2022). Moreover, government programs on the use of biodegradable packaging resources have only exacerbated the applicability of jute in the local and global markets (Ministry of Textiles, 2022). Spices industry is a highly dynamic and export-driven sector of Indian agriculture, and India is the largest producer, consumer, and exporter of many different types of spices (Spices Board of India, 2023). There is a high demand in the world market of the spices like pepper, cardamom, turmeric, and cumin, which are leading to export income and jobs at the rural levels (Rao & Reddy, 2021). The industry is marked by small and marginal farmers as a majority, and thus it is important to the inclusive agricultural development (BIRTHAL et al., 2015). Cash crops export performance is tied closely with the macroeconomic growth as agricultural exports are one of the sources of foreign exchange reserves, they address the trade balance, and they increase the global competitiveness (World Bank, 2020). Moreover, the export-led agricultural development promotes investment in infrastructure, the adoption of technology, and the development of the value chain (Gulati et al., 2017). Direct and indirect interconnections that are created through the production of cash crops also enhance rural industrialization and job creation (Chand et al., 2017). Nevertheless, the industry is experiencing various problems, such as price variations in the global market, climate change, and pest attacks as well as insufficient access to modern technology (Ramesh Chand, 2022). Production and export variability is also an indicator of structural inefficiency and policy limits that may inhibit long-term growth (Rakshit and Basistha, 2020). In addition, the problem of supply chain inefficiencies, quality requirements and the international competitiveness are also still impacting the export performance (BIRTHAL et al., 2015).

Literature Review

The importance of agriculture to the economic development in India has been discussed extensively in terms of economic development where agriculture is still considered one of the largest sources of employment, income, as well as support of rural livelihoods (Government of India, 2023). Although structural change to industrialization and services is taking place, agriculture has remained an important factor in ensuring economic stability and inclusive growth (World Bank, 2024). In the agriculture sector, the cash crops have become highly visible, as they have an exemplary connection to commercialization and export income (Singh, 2018). Export led growth Hypothesis gives a framework of theoretical understanding on the linkage between exports and economic growth (Balassa, 1985). Agricultural exports are also a big contributor of foreign exchange revenues and macroeconomic stability in developing economies such as India (World Bank, 2020). The focus on high-value crops has been targeted at as a major contributor to agricultural changes (BIRTHAL et al., 2015). The substitution of subsistence agriculture with commercial crop production is strengthening the income of the farms and increasing their integration in the market (Gulati et al., 2017). Hypothesis testing evidences indicate that cotton and spices are high-value crops that positively affect agricultural growth (Chand et al., 2017). In India, cotton is among the greatest commercial crops as it is highly industrial and export connected (Sharma and Kaur, 2020). In India, there is a comparative advantage in cotton exports due to the fact that the climatic conditions are favorable (Indian Council of Agricultural Research, 2021). Nevertheless, the activities of cotton export are affected by price volatility and shifting demand conditions across the world (World Bank, 2024). Jute is another valuable and commonly cash crop that is also known as the golden fibre because of its economic value (Das, 2019). The country is one of the top jute producers because of the appropriate agro-climatic conditions (Food



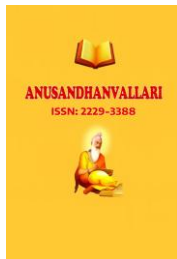
and Agriculture Organization, 2022). Another issue that will present a challenge to the jute industry is the lack of modern technology and the existence of synthetic alternatives (Kar, 2017). The rise in demand on products that are green in the whole world has revived curiosity on jute exports (UNEP, 2021). The initiatives by the government on the promotion of biodegradable materials have facilitated the development of the jute industry (Ministry of Textiles, 2022). The spices industry is a vibrant division of the Indian agricultural export (Spices Board of India, 2023). India is also the biggest producer, consumer, and exporter of a very vast range of spices (Rao & Reddy, 2021). Exports of spices have been growing steadily as a result of the rising demand in other parts of the world (Mathew, 2014). The industry has a substantial contribution to foreign exchange and rural jobs (Birthal et al., 2015). Value-addition is a relevant factor in contributing to the competitiveness of exports in the spices industry (Spices Board of India, 2023). Economic growth is directly related to agricultural exports because they influence the level of trade and foreign exchange payments (Feder, 1983). Increase in exports also leads to investment and technological development in agriculture (Krueger, 1990). The problem of export instability still exists because of the changes in world prices and national production (Rakshit & Basistha, 2020). Cash crops are impacted by climatical changes and environmental factors (IPCC, 2022). The trade liberalization has promoted the integration of India into the world markets (Gulati and Sharma, 1995). Globalization has led to opportunities of exportation and also exposure to external shocks (Rodrik, 2006). Improvement in productivity and competitiveness in exports cannot be achieved without changes in technology (Pingali, 2007). Effective supply chain is a key to the improvement of the export performance (Reardon et al., 2009). Numerous works have been invested on individual crops instead of analyzing them collectively (Dev, 2012). The current studies are usually based on descriptive approaches instead of econometric approaches (Singh, 2018). Regression studies are also required to enhance the existing knowledge on export-growth connection (Chand et al., 2017). This gap is addressed in the current study as the economic growth in India based on cotton, jute and spice exportation is discussed (Government of India, 2023).

Research Gap

Despite a large amount of literature discussing the role of cash crops in agricultural and export performance of India, there are still a number of gaps (Birthal et al., 2015). A significant percentage of available research prefers to examine crops, including cotton, jute, and spices individually or in a larger scope of agricultural evaluation, therefore, do not provide a deeper insight into their overall contribution to economic growth (Rakshit and Basistha, 2020). Such a discontinuous methodology limits the capacity to record interlink ages and comparative importance of key export based cash crops (Dev, 2012). Moreover, though prior studies have thoroughly addressed the trend in production, export performance, and comparative advantage, little empirical corpus of research involving advanced econometric models quantifies the impact of cash crop export on macroeconomic variables as gross domestic product (Chand et al., 2017). The numerous studies are based on a descriptive or trend-based analysis that, despite being informative, could not describe the dynamic and causal relationship of the export growth nexus (Singh, 2018). All in all, these gaps show that a thorough, comparative, and methodologically sound study is necessary that will also look into various cash crops and apply rigorous econometric methods (Gulati et al., 2017). Such approach is necessary to know more about the importance of cotton, jute and spices export in the economic development of India and make the contributions in the development of the policy.

Research Objectives

1. To examine the impact of cotton exports on economic growth in India.



2. To analyze the effect of jute exports on economic growth in India.
3. To evaluate the contribution of spice exports to economic growth in India.
4. To assess the combined impact of cotton, jute, and spice exports on gross domestic product (GDP) in India.

Research Methodology

This study adopts a quantitative and empirical research framework to analyze the relationship between cash crop exports and economic growth in India.

Research Design

This study uses a descriptive research design to understand how exports of selected cash crops are related to economic growth in India. The approach is useful for examining trends and patterns over time and for identifying possible connections between key variables. By focusing on cotton, jute, and spices, the study tries to explain how changes in export performance are linked with movements in Gross Domestic Product (GDP). In doing so, it provides a simple and clear view of the export–growth relationship within the agricultural sector.

Study Period

The study covers the period from 1991 to 2022, which represents the post-liberalization segment of the Indian economy. During this time, India introduced major economic reforms, opened up trade, and became more connected to global markets. Because of these important changes, this period is particularly appropriate for examining how export growth and economic development are related.

Data Sources

The study relies on secondary data collected from credible and widely accepted sources. Export-related data and macroeconomic indicators are drawn from the Reserve Bank of India's Handbook of Statistics, while GDP and other economic variables are sourced from the World Bank database and CEMI Economic Outlook reports. The use of these sources ensures the reliability, consistency, and comparability of the data employed in the analysis.

Variables Specification

Dependent Variable: Gross Domestic Product (GDP)

Independent Variables: Export values of cotton, jute, and spices

Analytical Technique

Multiple regressions are a superior statistical method that examines the association between one dependent variable and two or more independent variables. It extends simple linear regression by incorporating multiple

predictors, allowing researchers to assess the concurrent impact of quite a few factors on the outcome variable (Montgomery, Peck, & Vining, 2012).

The general equation for multiple regressions is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \epsilon$$

Where:

Y = Dependent variable

$X_1, X_2, \dots, X_n$ = Independent variables

β_0 = Intercept

$\beta_1, \beta_2, \dots, \beta_n$ = Coefficients (how much Y changes with each X)

ϵ = Error term

Multiple regression analysis is employed to examine the relationship between the dependent variable, gross domestic product (GDP), and the independent variables, namely exports of cotton, jute, and spices in India. This econometric technique facilitates the estimation of both the magnitude and direction of the relationships among variables, while simultaneously enabling the assessment of statistical significance and the overall goodness of fit of the model. Moreover, it provides insights into the relative contribution of each explanatory variable in accounting for variations in economic growth.

Data Analysis: The analysis is as follows-

Table 1-Descriptive Statistics

	Mean	Std. Deviation	N
GDP	1263567.42	928995.936	31
Cotton	1109.45	1161.157	31
Jute	266.40	111.645	31
Spices	1441.82	1324.811	31

(Source- SPSS)

Table 1: Descriptive statistics of variables included in the study GDP and exports of Indian cash crops like cotton, jute, and spices. The mean of GDP is 1,263,567.42 million with a relatively higher standard deviation of 928,995.94. This indicates fluctuations in the performance of the economy during the period under consideration. Among these cash crops, spices have the maximum average export value of 1,441.82, while cotton has an average export value of 1,109.45. Among these cash crops, jute has the least average export value of 266.40. This indicates that spices have the maximum contribution to export earnings among these cash crops. Concerning fluctuations in export performance over time, spices and cotton have relatively higher standard deviations of 1,324.81 and 1,161.16, respectively. This indicates fluctuations in their export performance over time. However, jute has a relatively lower standard deviation of 111.65. This indicates a stable export performance over time.

Table 2-Correlations

		GDP	Cotton	Jute	Spices
Pearson Correlation	GDP	1.000	.735	.827	.983
	Cotton	.735	1.000	.756	.723
	Jute	.827	.756	1.000	.816
	Spices	.983	.723	.816	1.000
Sig. (1-tailed)	GDP	.	.000	.000	.000
	Cotton	.000	.	.000	.000
	Jute	.000	.000	.	.000
	Spices	.000	.000	.000	.
N	GDP	31	31	31	31
	Cotton	31	31	31	31
	Jute	31	31	31	31
	Spices	31	31	31	31

(Source- SPSS)

The Pearson correlation coefficients, GDP, and exports of cotton, jute, and spices from India during the study period are shown in Table 2. The findings indicated a strong positive correlation between GDP and all of the chosen cash crops, indicating a close connection between economic growth and export performance. The correlation between GDP and spices is exceptionally high ($r = 0.983$), indicating a very strong positive relationship and suggesting that increases in spice exports are closely aligned with increases in GDP. Similarly, GDP shows a strong positive correlation with jute exports ($r = 0.827$) and cotton exports ($r = 0.735$), reflecting a significant association, although comparatively weaker than that observed for spices. The interrelationships among the independent variables are also positive and relatively strong. Cotton is positively correlated with jute ($r = 0.756$) and spices ($r = 0.723$), while jute and spices exhibit a strong positive correlation ($r = 0.816$). These outcomes suggest a degree of co-movement among cash crop exports, probably due to shared market conditions or common macroeconomic influences. All correlation coefficients are statistically significant at conventional levels ($p < 0.001$), indicating that the observed relationships are unlikely to have occurred by chance. General, the findings demonstrate a strong positive association between cash crop exports and economic growth in India, with spices showing the highest degree of correlation with GDP.

Table 3-Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.984 ^a	.969	.965	173409.761	.969	277.999	3	27	.000	1.057

a. Predictors: (Constant), Spices, Cotton, Jute

b. Dependent Variable: GDP

(Source- SPSS)

Summary statistics for the multiple regression models for estimating the correlation between the exports of cotton, jute, and spices in India. The correlation coefficient (R) is 0.984, indicating a very high level of association between the dependent variable and the set of independent variables included in the model. The coefficient of determination (R^2), which is 0.969, implies that 96.9% of the variation in GDP is explained by the combined effect of the exports of cotton, jute, and spices. The adjusted R^2 is 0.965, which further validates the robustness of the model by controlling for the number of predictors included. This suggests that 96.5% of the variation in GDP is explained by the model after adjusting for the complexity of the model. The standard error of the estimate is 173,409.761, which represents the average deviation between the observed values for GDP and the predicted values generated by the regression model. This high explanatory power of the model validates the fit of the model to the observed data and suggests that the chosen cash crops are significant determinants of economic growth in the country.

Table 4- ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	25079087961609.836	3	8359695987203.278	277.999	.000 ^b
Residual	811915521383.705	27	30070945236.434		
Total	25891003482993.540	30			

a. Dependent Variable: GDP

b. Predictors: (Constant), Spices, Cotton, Jute

(Source- SPSS)

The results of the study are that cash crop exports have a great influence in determining the economic growth in India. Spices among the crops that are selected become a major contributor to growth of gross domestic product (GDP) as they offer a strong contribution to foreign exchange earnings, job creation and the economy in general. The F-statistic value of 277.999 is highly significant, with a p-value of less than 0.001. This confirms that the overall regression model is statistically significant and that the independent variables exports of cotton, jute, and

spices jointly have a meaningful impact on GDP. In other words, the null hypothesis that all regression coefficients are equal to zero is rejected. Overall, the ANOVA results demonstrate the robustness and reliability of the model, indicating that the selected cash crop exports collectively explain a significant portion of the variation in economic growth in India.

Table 5- Coefficients^a

Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
B	Std. Error	Beta			Zero-order	Partial	Part
182171.932	98663.442		1.846	.076			
23.662	43.377	.030	.545	.590	.735	.104	.019
495.300	539.595	.060	.918	.367	.827	.174	.031
640.301	43.105	.913	14.855	.000	.983	.944	.506

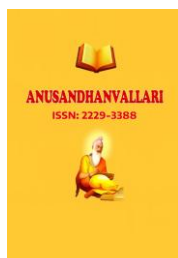
a. Dependent Variable: GDP

(Source- SPSS)

Table 5 below indicates the predictable regression coefficients for the model of testing the effect of cotton, jute, and spice exports on gross domestic product (GDP) in India. The constant term, or intercept, is equal to 182,171.932, showing the base level of GDP when all other variables are controlled. However, it is not statistically significant at a p-value of 0.076. The coefficient for cotton exports is equal to 23.662, but it is not significant at a very low standardized beta value of 0.030, or a p-value of 0.590. This indicates a negligible and statistically insignificant effect of cotton exports on GDP when other variables are controlled. The coefficient for jute exports is equal to 495.300, but it is not significant at a very low standardized beta value of 0.060, or a p-value of 0.367.

Findings and Discussion

The outcomes of the study are that cash crop exports have a great influence in determining the economic growth in India. Spices, among the crops that are selected become a major contributor to growth of gross domestic product (GDP) as they provide a strong contribution to foreign exchange earnings, job creation and the economy in general. Although cotton and jute are still significant products of the agricultural sector, their contribution to the growth of the economy is relatively low when compared to the spices. Its findings highlight the need to enhance export oriented agriculture with high value in order to maximize economic gains and improve the role of agriculture in the national income. In this regard, the policy interventions ought to aim at enhancing productivity, maintaining price stability and enhancing competitiveness of these crops internationally by providing them with a better infrastructure, adoption of new technologies and market access. In perspective, it can be seen that much more can be done to explore the impact of developing issues such as climate change, technology, and the changing world trade dynamics on cash crop exports. The research can also be extended in future by researching into the possibility of diversifying into new crops, implementation of sustainable agricultural techniques to improve the performance of exports and guarantee economic growth in the long run. The regression model explains 96.5% of GDP variation, highlighting the key role of cash crop exports in India's



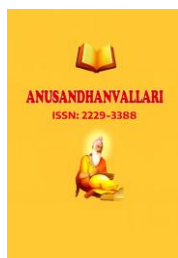
economy. These results suggest that focusing on high-value crops like spices can boost foreign exchange earnings, support rural incomes, and promote growth, while strategies are needed to manage the volatility in cotton and spice markets.

Conclusion

The results of the study are that cash crop exports have a great influence in determining the economic growth in India. Spice, among the crops that are selected become a major contributor to growth of gross domestic product (GDP) as they provide a strong contribution to foreign exchange earnings, job creation and the economy in general. Although cotton and jute are still significant products of the agricultural sector, their contribution to the growth of the economy is relatively low when compared to the spices. Its findings highlight the need to enhance export-oriented agriculture with high value in order to maximize economic gains and improve the role of agriculture in the national income. In this regard, the policy interventions ought to aim at enhancing productivity, maintaining price stability and enhancing competitiveness of these crops internationally by providing them with a better infrastructure, adoption of new technologies and market access. In perspective, it can be seen that much more can be done to explore the impact of developing issues such as climate change, technology, and the changing world trade dynamics on cash crop exports. The research can also be extended in future by researching into the possibility of diversifying into new crops, implementation of sustainable agricultural techniques to recover the performance of exports and guarantee economic growth in the long run.

References

- [1] Balassa, B. (1985). Exports, policy choices, and economic growth in developing countries. *Journal of Development Economics*, 18(1), 23–35.
- [2] BIRTHAL, P. S., JOSHI, P. K., ROY, D., & THORAT, A. (2015). Diversification in Indian agriculture toward high-value crops: The role of smallholders. *Canadian Journal of Agricultural Economics*, 63(4), 631–652.
- [3] Chand, R., Saxena, R., & Rana, S. (2017). Estimates and analysis of farm income in India. *Economic and Political Weekly*, 52(22), 139–145.
- [4] Das, K. (2019). Jute sector in India: Performance and challenges. *Journal of Natural Fibers*, 16(5), 678–690.
- [5] Dev, S. M. (2012). Small farmers in India: Challenges and opportunities. IGIDR Working Paper.
- [6] Feder, G. (1983). On exports and economic growth. *Journal of Development Economics*, 12(1–2), 59–73.
- [7] Food and Agriculture Organization. (2022). *FAOSTAT database*. FAO.
- [8] Government of India. (2023). *Economic Survey 2022–23*. Ministry of Finance.
- [9] Gulati, A., & Sharma, A. (1995). Subsidy syndrome in Indian agriculture. *Economic and Political Weekly*, 30(39), A93–A102.
- [10] Gulati, A., Juneja, R., & Saini, S. (2017). *Agriculture-nutrition linkages in India*. International Food Policy Research Institute.
- [11] Indian Council of Agricultural Research. (2021). *Agricultural statistics at a glance*. ICAR.
- [12] IPCC. (2022). *Climate change 2022: Impacts, adaptation, and vulnerability*.
- [13] Kar, S. (2017). Jute sector: Issues and challenges. *Asian Journal of Agriculture*, 9(2), 45–52.



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- [14] Krueger, A. O. (1990). Government failures in development. *Journal of Economic Perspectives*, 4(3), 9–23.
- [15] Mathew, S. (2014). Trends in spice exports. *Indian Journal of Agricultural Marketing*, 28(2), 45–56.
- [16] Ministry of Textiles. (2022). *Annual report 2021–22*. Government of India.
- [17] Montgomery, D. C., Peck, E. A., & Vining, G. G. (2012). *Introduction to linear regression analysis* (5th ed.). Wiley.
- [18] Pingali, P. (2007). Agricultural growth and economic development. *Handbook of Agricultural Economics*, 3, 2341–2378.
- [19] Rakshit, M., & Basistha, D. (2020). Trend and instability in India's agricultural exports. *Agricultural Economics Research Review*, 33(1), 95–107.
- [20] Ramesh Chand. (2022). *Transforming Indian agriculture: Challenges and opportunities*. NITI Aayog.
- [21] Rao, P. P., & Reddy, G. P. (2021). Spices export performance of India: Trends and prospects. *Indian Journal of Agricultural Economics*, 76(2), 245–260.
- [22] Rodrik, D. (2006). What's so special about China's exports? *China & World Economy*, 14(5), 1–19.
- [23] Sharma, R., & Kaur, M. (2020). Cotton export competitiveness in India. *International Journal of Agricultural Sciences*, 12(3), 215–222.
- [24] Singh, S. (2018). Cash crops and agricultural development in India. *Indian Journal of Economics and Development*, 14(2), 310–318.
- [25] Spices Board of India. (2023). *Spice statistics*. Ministry of Commerce and Industry.
- [26] World Bank. (2020). *World development indicators*. World Bank.
- [27] World Bank. (2024). *Agriculture and food overview*. World Bank.