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Sectoral Exports and Economic Growth in India: Evidence from Tea, Spices, and Ceramic Glassware (2009–2024)

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ABSTRACT- This paper examines the connection between the export values of the chosen groups of commodities - tea, spices, and ceramic glassware and the economic output (GDP) of India, through time series approach based on trend analysis, unit root test, and multivariate regression. In order to ascertain whether these sectors play a major role in real GDP growth, the annual data of 15 years are examined. Augmented Dickey-Fuller (ADF) test confirms the stationarity of each series and trend diagrams provide a graphical display of the changing pattern of the dependent and independent variables. Empirical results of multiple linear regression indicates that the level of explanatory power ($R^2 = 0.986$) is high and this implies that the export performance of the selected sectors is also an important factor in determining macroeconomic results. There is a negative correlation between spices and GDP, and positive correlation between tea exports and ceramic glassware. The results provide guidance as to where trade policies should prioritize and show the different effects of expansion of sectoral exports on the entire economy. To gain a deeper insight, structural and policy variables should be included in the future research as the study has not considered them because of the limited scope of the study to trend and statistical relationships.

KEYWORDS: Export-Led Growth; Sectoral Exports; Tea; Spices; Ceramic and Glassware; Economic Growth
JEL Codes: F14; O47; C22

I. INTRODUCTION

The link between economic growth and export performance is a complicated phenomenon that development economics has long been interested in. The issue of the impact of export commodities on GDP is particularly significant in third world countries such as India that are targeting a consistent growth. The trade structure in India has changed tremendously since 1990s because of the accelerated globalisation and the introduction of liberalisation policies. Exports have ceased to be an imperative element of aggregate demand, but have become a competitive instrument to enhance competitiveness, productivity and long-term progress. The export of items in India has largely been diversified, including glassware, tea, spices and ceramics. These industries offer a unique combination of economic dynamism and tradition since these industries have foundations in traditional industries and modern production systems. A deeper analysis of specific commodities is yet to be carried out even though it has been known that many studies have been conducted to establish the relationship between GDP and total exports. Each of the export types possesses its own characteristics of demand, the instability of the global market, the possibility of value addition, and links to home-based production patterns. An example of the traditional agricultural exports that are highly demanded across the globe is tea and spices. Meanwhile, the rising manufacturing base and the shift towards a semi-industrialized export structure is also indicated in the area of ceramics and glassware. In such a way, the analysis of the individual and aggregate impact of these selected commodities on the GDP of India can offer valuable sector-specific data and targeted policy recommendations. The aim of this study is to evaluate the empirical correlation between GDP and some of the most important export commodities in India using the time series methods. The study tries to establish the direction and strength of these relationships in the long run through the unit root testing, trend diagram analysis, and multiple linear regression models. In order to further improve the estimation, logarithmic transformations are used that reduce the heteroskedasticity problems and also allow interpretation of elasticity. The data, provided by the reserve bank of India, is assured to be trustworthy and up to date. It also has actual GDP values accompanying the annual export values in rupees; tea, spices, ceramic and glassware products and other sectors that have been identified.

It is assumed that the findings of the study will be valuable in understanding the relationship between the commodity-level growth and exports. The outcomes will be used in particular by the policymakers to make their decisions on which industries they should be given priority attention regarding export promotion, investment support and supply chain development. Knowing the types of commodities with the highest influence on GDP can help in the creation of a robust multi-faceted trade policy particularly when there is uncertainty in geopolitical changes or the global demand. The study is important in the body of literature because it focuses the analysis in specific areas of export and uncovers its financial cost to a developing nation such as India.

II. LITERATURE REVIEW

The correlation between export and economic growth is often presented in the context of the export-led growth (ELG) hypothesis, and the connection between exports and economic growth has been analysed by various scholars over decades. Balassa [4] was one of the earliest people to make empirical evidence in support of this theory when he argued that policies aimed outwardly but not inward lead to higher growth. This claim has been confirmed in numerous subsequent researches, particularly in underdeveloped countries. [23] revealed in one of his cross-country studies a high positive correlation between the growth of GDP and manufactured exports. Similarly, Kavossi (1984) found out that high level of exports spurs economic growth through better allocation of resources, economies of scale and transfer of technology.

Ceramic and glassware industry is not a widely studied field yet it has potential in recent years. The growing exports of sanitaryware and ceramic tiles by India indicate the growing production capacity of the country [14]; [11]. The industry enjoys economies of scale, technology and the increasing demand in the world. [21] states that the export growth in this industry needs better logistics and legislative policy in order to maintain it. The methodological tools of studying the relationship between exports and growth have evolved with time. Though more powerful time series methods such as unit root tests, cointegration, and vector autoregressive (VAR) models were later to be employed, in the early research, simple regression and correlation models were employed. An example is that, [12] used cointegration and discovered that there was a long-run stable relationship between exports and GDP in the developing countries. More recently[26] applied ARDLs to Indian data and demonstrated that the chosen commodity exports have a short- and long-run impact on GDP. Export elasticity of GDP has also been addressed in the recent literature. The price and income elasticity of export demand were estimated by [16] who have also shown the variation in the elasticities across the product category. In the same manner, [17] found that the competitiveness in prices and the global demand conditions are two key determinants of the export-led growth. Other scholars such as [13], [22] and [19] have also highlighted the importance of trade facilitation policies, infrastructure development as well as structural reforms. Although a lot has already been written on the export-growth nexus, only a few studies have examined the direct role of individual production factors of export to the GDP through a combined method of trend analysis, unit root tests, and regression analysis. This study seeks to address this gap by considering some of the main sectors including tea, spices, ceramics, and garments, each with different roles to play in the India export portfolio. By doing this, it helps in the development of empirical literature as well as policy discussion as it determines sectors that are leading to growth in the macroeconomy and proposing specific interventions.

III. RESEARCH GAP

Export-led growth (ELG) hypothesis has been debated extensively within the international economics field where different evidence is found in different countries and industries. Although a good amount of research confirms the positive correlation between exports and economic growth[4]; [7], the evidence is not unanimous. Namely, in the Indian scenario, the majority of ELG research studies include aggregate exports or large-scale industries such as software, petroleum products, and textiles [20]; [6] and minor yet potentially significant sectors of commodities are under-researched. Traditional export goods are tea and spices that have a very solid historical and cultural background in India. Although the foreign exchange earnings, their contribution to rural employment and development in the region is substantial, little studies have empirically discussed their connection with the national income or GDP growth. Likewise, the ceramic and glassware industry, a smaller part of total exports, is also indicative of the developing non- agricultural manufacturing foundation in India, but is still ignored statistically in growth studies. Additionally, previous research is more likely to take a panel or cross-country design [1] [10], or take macroeconomic variables on a large scale and does not separate the contribution of a sector. The absence of time series analyses concentrating on the specific export of commodities, in particular, with adequate stationarity analysis, trend analysis and regression diagnostics is a methodological gap. Moreover, the majority of previous analysis either lacks the issue of multicollinearity among the variables of exports or lacks sufficient reasons as to why the economic justification of the chosen commodities surpass their aggregate export worth is important.

Thus, the paper tries to fill the said gaps by choosing GDP as an indicator of economic growth and examines the correlation with the log-transformed export values of tea, spices, and ceramic/glassware. In doing this, it offers a narrow econometric analysis of the manner in which the traditional and niche exports interrelate with the macroeconomy. Also, it will be possible to employ the simplest time-series analysis, as in unit root tests, trend diagrams, and regression specifications, which brings clarity and simplicity to address the necessity of easily available yet strong empirical studies in the Indian export-growth field.

IV. RATIONALE OF THE STUDY

The question of whether exports spur economic growth or vice versa is one that has occupied a long time by economists and policymakers. According to the Export-Led Growth (ELG) hypothesis, exports can be the driver of growth because of the economies of scale, the enhancing of efficiency due to the global competition, the provision of foreign exchange earnings, and the technological development as a result of the exposure to the global markets. In Indian situation, ELG framework has attracted a lot of empirical interest but most of the studies have been done on aggregated exports or on sectors like information technology, petroleum products, textiles, and gems and jewellery where traditional or emerging areas of export have been overlooked that have a region-specific economic significance. This paper would give a proposal to investigate ELG hypothesis using three Indian export goods that are tea, spices, and ceramic/glassware. The justification behind this sector focus is due to both economic reasons and policy reasons. Historically relevant in the Indian trade profile, tea and spices remain an important part of rural livelihoods, with a role in job opportunities and local

development in such states like Assam, West Bengal, Kerala, and Tamil Nadu. These products have continued to enjoy high demand throughout the world and are usually advertised under several government programs like the Spices board of India, Tea board incentives. On the same note, the ceramic and glassware industry which is very small in volume has reported stable growth in the export basket owing to increased demand in the gulf and European markets and also because of better production opportunities in areas such as Gujarat. In selecting these three goods, the paper will strive to assess the extent to which even the niche or conventional sectors might be a major influence on the growth of GDP, thus supporting the larger argument of inclusive and diversified export policies. Another reason why the study is also aware of the increasing focus on microeconomic disaggregation of macroeconomic analysis, capable of providing more actionable information than aggregate export studies. To give an example, as aggregate exports can increase, it can be better informed by why some sectors contribute the most to GDP in order to give more useful information to trade and industrial policy. Moreover, the fact that the methodological process is not complex (it is based on time series regression with stationarity tests and trend analysis) offers an easy-to-use model to policy makers and researchers with small statistical understanding. Instead of having complicated economic models, this study aims at simplicity and repeatability. The study ensures that the statistical rigour is upheld by applying the ordinary least squares regression on the log-transformed values of the GDP and the selected exports, but the regression ensures that it is interpretable. Finally, the study is driven by a practical gap, which is the lack of empirical evidence at the commodity level linking export earnings with national income growth in India. It tries to cast more light on the compatibility of certain fields with ELG hypothesis and whether the government should put more attention on promotion of a commodity specific trade. This is especially pertinent in the post-pandemic world economy where resilience, diversification, as well as localised value chains have become the priority in national export policy. Altogether, the study adds to the literature by isolating the contribution of major and niche exports to the Indian economic growth and supports the sectoral approach to export promotion.

V. OBJECTIVE OF THE STUDY

The main aim of this research is to analyse the relationship between the export performance of India in the traditional sectors- tea, spices and ceramic/glassware with the Gross Domestic Product (GDP) of the country with time. It examines the long-run patterns and growth rates in these export categories and GDP and tests the stationarity of each of the time-series variables to verify the validity of econometric estimation, and assesses the effect of these exports on GDP in relation to a log-log linear regression model. In general, the research provides empirical data regarding the importance of these sectors in terms of their impact on economic development of India.

In order to accomplish the objectives of the study, a series of null and alternative hypotheses are developed to establish the level of significance of each category of exports to the GDP of India. The hypotheses determine the presence of any measurable effect of tea, spices, and ceramic/glassware exports on the economic growth. In particular, the null hypothesis can be formulated as the Hs have no significant effect on the GDP whereas the alternative hypotheses are the fact that the Hs do have a significant effect. It is a framework that directs the empirical analysis of sectoral performance in the Indian economic performance.

VI. DATA SOURCE

The secondary time-series data of all the studies in this paper was also obtained in the annual Handbook of Statistics on the Indian Economy by the reserve bank of India (RBI). Most individuals believe that the RBI Handbook is one of the most reliable sources of information on the macroeconomic indicators of India, including the national income aggregates, trade statistics and the output in the different sectors. Since the selected data is 15 years old, the analysis will ensure that both the short-term fluctuations and the long-term trends relevant to the Indian economy will be incorporated. The dependent variable used in the study is the GDP of India at constant prices. Specifically, the trends of exponential growth are linearised and stabilising the variance is done on the basis of the natural logarithm of GDP (Ln_GDP) in the period under consideration. Such a transformation is especially helpful when interpreting the results as elasticities and when making sure that they are consistent with time-series modelling practices. Three independent variables are included concerning their past and relevance to the economy of India in the outside sector. These are: (i) Ln Tea; (ii) Ln Spices: This represents the export value of the products of Indian spices; (iii) Ln Ceramic Glass ware: this represents the export value of the ceramic and glassware products. All values of exports are measured in Indian Rupees (INR crore), but they are also transformed to take their natural logarithmic values to limit the effect of variation in scales and the concern of heteroscedasticity usually observed in the regression analysis. These specific export goods are not only the typical industries (spices and tea) but also newer ones (glassware and ceramics) to the merchandise trade of India. The aim of the study is to examine the potential value of certain exports on the development of national income in an open economy that is dynamic, by linking such exports to the GDP.

VII. METHODOLOGY OF THE STUDY

The present study uses secondary annual time-series data for the period 2009–10 to 2023–24, sourced from the RBI Handbook of Statistics. To examine the effect of selected export commodities (tea, ceramic glassware, and spices) on India's GDP, econometric analysis was carried out. Prior to estimation, the stationarity of the series was examined using the Augmented Dickey-Fuller (ADF) unit root test. The general ADF regression equation is specified as:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-1} + \varepsilon_t$$

where:

- Y_t = the time series under consideration (GDP or export variables),
- Δ = first-difference operator,
- t = time trend,

- p = optimal lag length determined by information criteria,
- α = constant,
- ε_t = error term.

The null hypothesis (H_0: γ=0) assumes that the series has a unit root (non-stationary), while the alternative hypothesis (H_1: γ<0) indicates that the series is stationary. Testing was conducted both at levels and first differences. Once stationarity was confirmed, log-linear regression models were estimated with GDP as the dependent variable and exports of tea, ceramic glassware, and spices as independent variables. Model adequacy was evaluated using R^2, adjusted-R^2, F-statistics, and the significance of regression coefficients.

The research has been conducted solely using secondary sources, which were the Reserve Bank of India (RBI) Handbook of statistics on Indian Economy and the Directorate General of Commercial Intelligence and statistics (DGCIS). The analysis period is 2000-01 to 2020-21 consisting of twenty years of export and GDP figures in India. The variables that are taken include the GDP (at constant prices) of India and its exports of three traditional sectors, which include tea, spices and ceramic and glassware. Every variable is transformed to natural logarithmic value so as to stabilize the variance and use coefficients as elasticities. The discussion is based on a three-step econometric model: First, time-series plots of each export category and GDP are used to analyse the trends and growth with the help of visualizations. The diagrams are useful in determining the visual direction, stability, and volatility in time series of the chosen years. Descriptive information is also done by calculating average annual growth rates (AAGR). Second, the study uses the Augmented Dickey-Fuller (ADF) unit root test to test the stationarity of each of the variables. The Stationarity is a very crucial condition to be met when conducting valid regression models since non-stationary series may result in spurious regression. ADF test is carried out at the level and first difference with proper choice of lag depending on the Akaike Information Criterion (AIC). Lastly, after establishing the stationarity (usually at first differencing), the study uses a log-linear multiple regression model with GDP as the dependent variable and tea, spices and ceramic/glassware exports as the independent variables. The regression equation is specified as

$$Ln(GDP_t) = \beta_0 + \beta_1 Ln(Tea_t) + \beta_2 Ln(Spices_t) + \beta_3 Ln(Ceramic_t) + \epsilon_t$$

Where: ln represents the natural logarithm, t is the time index (year), β_0 is the intercept, $\beta_1, \beta_2,$ and β_3 are the partial elasticities, ϵ_t is the error term.

The results of the regression model are evaluated based on R-squared, F-statistic, and p-values to determine the model's overall fit and the statistical significance of each explanatory variable. The analysis is conducted using MS Excel and EViews for graphical and econometric computations.

VIII. RESULTS

To begin the empirical analysis, a simple linear regression was carried out to examine the trend of the natural logarithm of Gross Domestic Product (LnGDP) over time. The regression equation estimated LnGDP as a function of time (where time is coded from 1 for 2009–10 to 15 for 2023–24). The results indicate a very strong linear relationship between LnGDP and time, with an R-squared value of 0.9784 and an Adjusted R-squared of 0.9768, suggesting that approximately 97.8% of the variation in LnGDP can be explained by the passage of time alone. The F-statistic of 589.53 with a corresponding p-value of 3.25×10^{-12} confirms the overall significance of the regression model at the 1% level. The estimated intercept of the model is 15.8231, and the slope coefficient for time is 0.0573, both statistically significant at the 1% level (p-values < 0.01). The positive slope coefficient implies that the logarithmic value of GDP has increased consistently over the years, highlighting a robust upward trend in real economic output. The standard error of the estimate is 0.0395, reflecting a tight fit of the regression line around the actual data points.

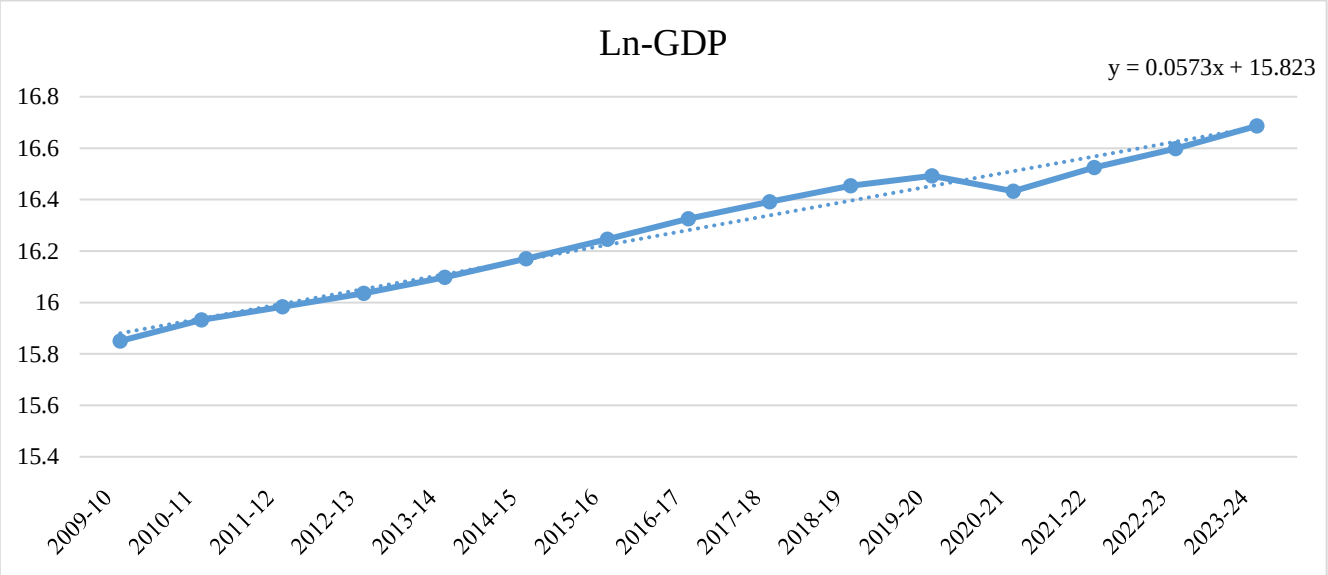
Table 1: Estimated Trend Equation of lnGDP, 2009–10 to 2023–24

Regression Statistics		
Multiple R	0.9892	
R Square	0.9784	
Adjusted R Square	0.9768	
Standard Error	0.0395	
F	589.53	
Significance F	3.25E-12	
	Coefficients	P-value
Intercept	15.8231	1.98E-31
Time	0.0573	3.25E-12

(Source: Own calculation based on secondary data from RBI handbook statistics)

Table 1 shows the regression output of a trend analysis that regresses the natural logarithm of GDP (lnGDP) on the time in the period 2009 2010 to 2023 2024. The Multiple value of 0.9892 shows that the lnGDP and time are very strongly related meaning the regression line fits very well in the GDP trend. The coefficient of determination (R Square) is 0.9784 which means that about 97.84% of the change in lnGDP can be explained by the lapse of time. The adjusted R squared at 0.9768 is another confirmation of how strong the model is when considering the degrees of freedom. Standard error is 0.0395 which indicates that the model is accurate in estimating lnGDP with the overall validity of the regression being determined by the F-statistic of 589.53 which has significance of 3.25E-12 which is significant at the 1% level. This means that time as an explanatory variable is very effective to explain the systematic growth of the Indian

economy over the period of study. The intercept of the estimate equals 15.8231 with a p-value of 1.98E-31 that is statistically significant. The intercept is the starting value of the log GDP (200910). Since lnGDP is given a log-linear specification, the time coefficient (not shown in the summary below) would be a reflection of the average growth rate in GDP per year. Accordingly, Table 1 has a high confidence towards the presence of a deterministic increasing curve in the GDP, which supports long-run economic growth in the 200910-202324.

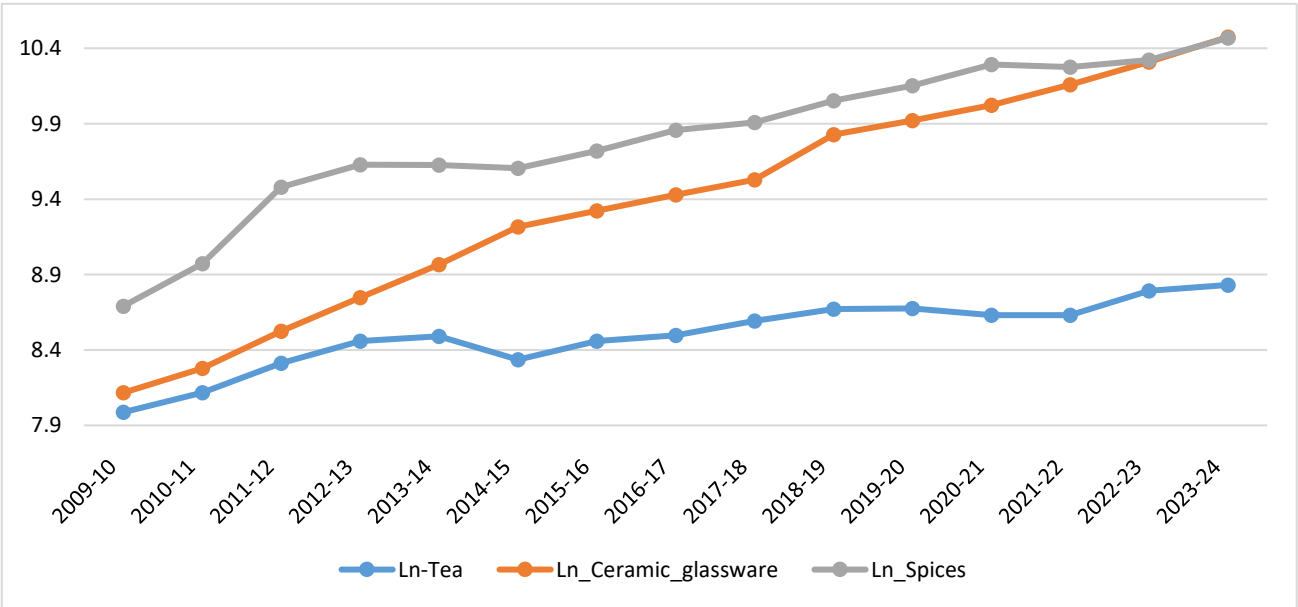


(Source: Own calculation based on secondary data from RBI handbook statistics)

Figure 1: Fitted Trend of lnGDP in India, 2009–10 to 2023–24

Figure 1 depicts the trend of the natural logarithm of GDP (lnGDP) in India from 2009–10 to 2023–24. The trajectory reveals a consistent upward movement, highlighting sustained economic growth over the period. While lnGDP rises steadily, minor fluctuations are evident, particularly around 2020–21, which aligns with the COVID-19 shock and its temporary effect on economic output. After this brief dip, the trend resumes its upward path, underscoring recovery and resilience. Overall, the figure illustrates a strong deterministic growth pattern in GDP, with time acting as the primary driver of long-term expansion.

This study investigates the relationship between the export performance of select commodities—tea, spices, and ceramic glassware—and India's Gross Domestic Product (GDP) from 2009–10 to 2023–24 using a log-log regression framework. The regression results demonstrate a strong model fit, with an R^2 value of 0.986, indicating that approximately 98.6% of the variation in GDP is explained by the three independent variables considered. The Adjusted R^2 remains robust at 0.982, even after accounting for degrees of freedom, confirming the explanatory power of the model.



(Source: Own calculation based on secondary data from RBI handbook statistics)

Figure 2: Trend of Export Growth in Tea, Ceramic Glassware, and Spices (2009–10 to 2023–24)

Figure 2 shows the export patterns of tea, ceramic glassware, and spices between 2009 -10 and 2023 24 in the long-term perspective. The graph shows a consistent upward trend in all the three commodities albeit at varying growth rates. Spices were always the leaders in terms of export volumes due to the high demand in the world and the advantage of India in this field. Ceramic glassware showed a strong growth after 2012 -13, overtaking tea exports and closing its difference with spices within the last few years. The exportation of tea is positive, but exhibits fairly moderate growth with stagnant periods. In general, the figure highlights sectoral difference in export performance.

To be able to validate the regression estimates, the unit root tests were conducted based on the Augmented Dickey-Fuller (ADF) method. Most of the variables at level were non-stationary, and the test statistics have not rejected the null hypothesis of unit root, particularly under constant or trend-specification. Nevertheless, the first difference of Ln Tea, Ln Spices and Ln Ceramic glassware were stationary, as reflected on the statistically significant ADF test statistics at different specifications. As an example, Ln Spices became very stationary at first difference with a test statistic of -4.49 (100% level of significance) when it was specified constant. On the same note, Ln Tea and Ln Ceramic glassware were highly stationary at the 5 percent mark.

Table 2: Results of Augmented Dickey–Fuller (ADF) Unit Root Test for GDP and Export Variables

ADF Test					
		LN_GDP	LN_TEA	LN_SPICES	LN_CERAMIC_GLASSWARE
At Level	Without Constant & Trend	5.9335	2.3568	3.2667	8.3967
	With Constant	-0.6213	-2.0393	-2.8698	-1.6544
	With Constant & Trend	-1.9274	-4.7272	-9.9248***	-1.6867
At First	Without Constant & Trend	-1.3779	-2.5466**	-1.8907*	-0.9196
	With Constant	-3.2917**	-3.0315*	-4.4914***	-3.1948**
Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant					

(Source: Own calculation based on secondary data from RBI handbook statistics)

Although Ln_GDP remained non-stationary at first difference in some specifications, it achieved stationarity at the 5% level under the constant specification (ADF statistic: -3.29), suggesting that the series is integrated of order one [I (1)]. Overall, the stationarity diagnostics support the use of regression analysis, although future studies may consider cointegration techniques such as the Johansen test (Johansen, 1988) or ARDL bounds testing to validate long-run relationships.

The ANOVA test reveals a highly significant model with an F-statistic of 263.34 and a corresponding p-value of 1.60×10^{-10}, indicating that the joint effect of tea, spices, and ceramic glassware exports on GDP is statistically significant at the 1% level.

Table 3: Regression Results of GDP on Exports of Tea, Ceramic Glassware, and Spices (2009–10 to 2023–24)

Regression Statistics		
Multiple R	0.9931	
R Square	0.9863	
Adjusted R Square	0.9825	
Standard Error	0.0342	
F	263.3383	
Significance F	1.61E-10	
	Coefficients	P-value
Intercept	11.9849	5.07E-09
Ln-Tea	0.3226	0.0869
Ln_Ceramic_glassware	0.3879	4.55E-06
Ln_Spices	-0.2129	0.0700

(Source: Own calculation based on secondary data from RBI handbook statistics)

The individual variables show that the log of ceramic and glassware export (Ln_Ceramic_glassware) is a good positive predictor of GDP. It has a coefficient of 0.388 with t-statistic of 8.31 and a p-value of less than 0.001 and indicates that a one percent increase in the exports of ceramic and glassware is associated with a 0.39 percent increase in the GDP, all things remaining unchanged. This effect is robust as indicated by the 95 percent confidence interval (0.285 to 0.491). The coefficient of Ln Tea is 0.323 which means that it relates positively with GDP but is not significant (p = 0.087). This indicates that the relationship between the tea exports and the GDP is either weak and not conclusive as compared to zero at the traditional levels of significance but it might play a role in explaining long term models. On the other hand, the value of Ln_Spices is negative (0.213) and statistically significant at the 10% level (p = 0.070). This unforeseen negative correlation can be seen as volatile pricing, fluctuating export volumes, or as an overall problem in the spices export industry that dilutes its positive contribution to GDP. In short, the regression findings show that the GDP growth of India in the years 2009 2010 to 2023 2024 strongly depends on the performance of the exports, in particular, the ceramic and glassware products. This is because the findings reveal the significance of diversification and consolidation of non-

traditional export industries to assure sustainable economic growth.

IX. DISCUSSION

The results of the regression analysis give important insights of the correlation between the exports of India in tea, spices and ceramic/ glassware and the growth of GDP within the years 2009-10 to 2023-24. It exhibits a high level of explanatory power, with the level of R-squared of 0.986, indicating that the three components of export accounted about 98.6 percent of the change in GDP. This shows that the model fits well and that selected export commodities play a critical role in determining the performance of the national economy (Gujarati and Porter, 2009). The coefficient of ceramic and glassware export (Ln_Ceramic_Glassware) is up and statistically significant at the 10 percent mark (coefficient = 0.3878, $p < 0.01$) which implies that there is a strong and positive correlation between this export and the GDP. This is consistent with more general results that non-traditional exports, which craft and artisanal products represent, are gaining a greater share in the outside trade of India and are helping to sustain employment in the rural areas (Das, 2017; Veeramani and Aerath, 2020). Taking into account the fact that the government is focused on increasing the exports according to the scheme, such as the One District One Product (ODOP) and the Make in India, the role of exporting ceramics and glassware may signify the effect of the specific interventions. There is a positive coefficient (0.3226) but tea exports (Ln_Tea) are only significant at the 10% level ($p = 0.087$). This implies a non-strong positive association between tea exports and the GDP. India is a major producer and exporter of tea in the world and although the demand of tea in the world has been relatively stable, fluctuations in prices, and intense competition with other countries such as Kenya and Sri Lanka have limited performance. The results herein imply that although tea will be of significance, the macroeconomic effect of tea can be tempered by the global market price and trade competitiveness.

On the other hand, the exports of spices (Ln Spices) have a negative but relatively insignificant coefficient (-0.213, $p = 0.07$). This observation is rather paradoxical, because one of the Indian traditional advantages is spices. Nonetheless, it could represent the supply side bottlenecks, changes in prices, and quality, particularly after the pandemic. Contamination by pesticides and inability to meet export standards are also among the problems with the Indian spice industry, which caused rejections in the major markets such as the EU. Therefore, even though volume increases, the lack of homogeneous value disclosure could be the cause of the negative correlation with GDP at this stage. The results of the Augmented Decky Fuller (ADF) test show that Ln Spices is stationary at level with a trend at the 1 per cent level whereas Ln Tea and GDP are non-stationary at level yet stationary at the first difference. This implies that the series are order one integrated [I (1)], as is typical of macroeconomic time series. The mixed stationarity of the variables implies that there may be long-run relationships, and hence the application of the log-log regression with differencing and/or cointegration testing in the future.

The F-statistic of the general model is statistically significant ($F = 263.34$, $p = 0.001$), which proves the significance of all independent variables together. Nevertheless, t-statistics and standard errors indicate that multicollinearity might not be a problem of a high level, but additional diagnostics such as VIFs might be implemented to verify this point (Wooldridge, 2015). Collectively, the results are an indication of the changing export composition in India. Although the non-traditional exports such as the ceramic / glassware have been found to be having strong linkages to the GDP, the traditional export sectors such as spices might need to be improved in terms of quality and compliance in order to maximize the returns in terms of the economy. The weak and positive meaning suggests that value addition, branding, and diversification of tea in the market are within the realms of rejuvenating the macroeconomic value of tea. Additionally, the post 2016 era, characterized by changes in policies such as demonetization, the introduction of GST and reorganization of the export incentives, may have contributed to these dynamics. The future analysis may take a structural break test or interaction terms to determine how these shocks have affected the export performance and GDP (Perron, 1989; Bai and Perron, 2003).

X. CONCLUSION

This paper has investigated how the export performance in the tea, spices, and ceramic and glassware industries has affected the growth rate in the GDP between the 2009-10 and 2023-24. The regression model exhibited a very high explanatory power (Adjusted $R^2 = 0.9825$) which implies that the variables used to explain the exports in India have been successful in explaining the real GDP fluctuations almost by 98%. The findings indicated that ceramic and glassware exports had a very significant and positive influence on GDP, then came tea exports with a positive but insignificant relationship. Interestingly, there was a negative relationship between interest in the export of spice and GDP, which should be researched further. The result of the unit root tests indicated that most variables would be stationary after first differencing, which shows the significance of non-stationarity in time-series macroeconomic research. This conforms to previous empirical results on Indian macroeconomic. Policymaking-wise, the ongoing high and tremendous contribution of ceramic and glassware export to the GDP highlights the potential of the industry as a means of growth. This is an industry that has the benefits of the old and the new in terms of design innovation and with the right policy backing, it might even be even more significant in India export of manufacturing products. Therefore, the development of ceramic clusters, infrastructure, and facilitation of access to international markets might play the key role in maximizing the returns in this sector. The tea business, which was an important business historically, is experiencing a drop in its margins and international competitiveness problems. The insignificance of tea exports at the margins implies that some specific changes are needed, including product diversification (e.g. organic teas), improved branding, and international certification to add more value and increase sustainability.

A negative value in the export of spices may indicate that its price is very volatile or it has a poor quality or it may not have value added processing in the supply chain. Although India has a relative advantage in the spices industry, it is

also possible that the industry is implicitly facing a supply side constraint or concentration in the low-value exports. According to the recommendations of Mishra et al, (2022), one of the possible ways to turn this situation around is to invest more in agro-processing facilities, new cold chains, and rigorous quality standards that would allow the industry to contribute to GDP more significantly. Finally, even though export-led growth remains a working strategy in India, industry-oriented plans are critical. The policy makers are supposed to focus on diversification, value addition, and competitiveness of non-traditional exports such as ceramic and glassware and also mitigating structural weaknesses of the conventional exports such as tea and spices. These insights should be incorporated into the wider trade and industrial policies to enable India to maintain a strong economic growth.

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