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Shri Dharmasthala Manjunatheshwara Institute for Management Development, Mysuru, India
10th International Conference on
Economic Growth and Sustainable Development: Emerging Trends – November 27-28, 2025

Ayurveda Based Fast Moving Consumer Goods and its Implications for Viksit Bharat and Sustainable Agriculture: A Study of Patanjali Ayurved Ltd.

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Abstract
This study examines the impact of Patanjali Ayurved Ltd. (PAL) on India's Fast-Moving Consumer Goods (FMCG) sector and the economic development of Haridwar, Uttarakhand. The research focuses on the relationship between revenue of PAL and the Gross District Domestic Product (GDDP) and the Gross District Domestic Product of the Primary Sector (GDDPP) of Haridwar. The analysis employs the ARDL model to explore both the long-term and short-term effects of PAL's revenue. The results of the ARDL bounds test confirm a significant long-term relationship between the revenue of Patanjali and both GDDP and GDDPP. The study finds that revenue of PAL positively affects both economic indicators. However, when comparing the influence of PAL's revenue on GDDP and GDDPP, the coefficient values suggest that PAL's revenue has a greater impact on GDDP than on GDDPP. Furthermore, the Error Correction Model (ECM) results show that short-term deviations in these relationships adjust toward long-run equilibrium. These outcomes demonstrate that the revenue of PAL has played a significant role in promoting regional economic growth and sustainable agriculture, in line with national initiatives such as "Atmanirbhar Bharat" and "Viksit Bharat."

Keywords: Viksit Bharat, FMCG Market, Patanjali Ayurved Ltd., Sustainable Agriculture

1. Introduction

The Government of India's Vision @ 2047 or Viksit Bharat sets the goal of transforming India into a developed and self-reliant economy by the 100th year of independence (Dahiya, 2025). Recent economic achievements, including India's emergence as the world's fourth-largest economy, reflect steady progress toward this vision. Among the key contributors to this growth is the fast-moving consumer goods (FMCG) sector, which was valued at USD 210.12 billion in 2023 and is projected to exceed USD 1,100 billion by 2033. A distinct feature of the Indian FMCG sector is the rapid rise of **Ayurveda and organic-based products,** reflecting changing consumer preferences toward health, sustainability, and indigenous knowledge systems (Kathuria et al., 2024). Patanjali Ayurved Ltd. (PAL), established in 2006 by Baba Ramdev and Acharya Balkrishna, has emerged as a leading company in this space (Mehta, 2017). Through its extensive product portfolio including food, healthcare, and

ISBN code 978-93-83302-82-6.

personal care items. Patanjali has played a major role in expanding the Ayurveda-based FMCG market. PAL model emphasizes the use of organic and natural ingredients, reduced reliance on chemical inputs, and direct procurement from farmers (Balkrishna et al., 2024). These practices support sustainable agriculture, improve farmer incomes, and resonate with the government's "Make in India" and "Swadeshi" initiatives. Given its location in Haridwar, Uttarakhand, with significant production capacity, Patanjali has both forward and backward linkages that can influence the local economy.

This study examines the impact of PAL. on the Gross District Domestic Product (GDDP) and the Gross District Domestic Product of the Primary Sector (GDDPP) in Haridwar District. By analyzing the relationship between company revenues and district-level economic indicators, the paper explores how Ayurveda-based FMCG contributes to sustainable agriculture and the broader objectives of Viksit Bharat.

2. Literature Review

Patanjali Ayurved Ltd. has emerged as a transformative force in India's Fast-Moving Consumer Goods (FMCG) sector and disrupted the market dynamics that were previously dominated by multinational companies. The company's rapid growth is tied to the broader "Swadeshi" movement, which promotes economic self-reliance through the consumption of domestically produced goods (Jain, 2020; Yadav, 2022). In doing so, Patanjali gained the trust of Indian consumers across both rural and urban areas by crafting a strong brand identity based on Ayurveda, cultural symbolism, and affordability. As a result, this strategy altered consumer behavior and reshaped market dynamics (Gaur & Nimit, 2016; Mathur et al., 2022). Patanjali's unique business approach blends low-cost pricing strategies with strong brand positioning centered on Indian cultural values. This combination enabled the company to challenge global FMCG giants and fueled remarkable revenue growth. Between 2012 and 2021, Patanjali recorded an astounding 2083.85% increase in revenue, which reflects the magnitude of its expansion (Ahuja et al., 2020; Yadav, 2022). This success was largely driven by an extensive distribution network, competitive pricing, and innovative marketing, with Baba Ramdev's widespread popularity enhancing visibility and fostering consumer trust (Kapoor & Chaudhary, 2017; Thomas et al., 2019). Moreover, the company's expansion reflects the shift in consumer preferences toward natural and herbal products. Patanjali capitalized on the growing health-consciousness trend by offering Ayurvedic alternatives. As a result, Patanjali's success helped it capture significant market share and prompted competitors to incorporate similar product categories, thus driving sector growth and positioning Ayurveda as both a cultural tradition and a modern commercial force (Gaur & Nimit, 2016; Mathur et al., 2022). Beyond market share acquisition, Patanjali contributes to sustainable agriculture by sourcing organic and herbal raw materials, promoting eco-friendly farming practices, and reducing reliance on chemical-based inputs. This aligns with the company's role in driving rural resilience, supporting biodiversity, and improving the livelihoods of farmers—objectives that align with national Sustainable Development Goals (SDGs) (K. M. et al., 2023; Mahajan, 2025; Philip et al., 2025). Furthermore, Patanjali's strategic initiatives align with national agendas, particularly the Atmanirbhar Bharat initiative and the vision for Viksit Bharat. These efforts coincide with schemes such as the National Mission for Sustainable Agriculture (NMSA) and the Paramparagat Krishi Vikas Yojana (PMVY), which aim to enhance agricultural productivity and promote sustainability. While considerable literature exists on Patanjali's role in transforming the FMCG sector and advancing sustainable agriculture, a gap remains in research on its district-level economic impact. Specifically, the contribution of PAL revenue to Gross District Domestic Product (GDDP) has not been explored. Addressing this gap would provide valuable information on role of PAL in local economic development and establish a connection between microeconomic outcomes and broader growth trajectories.

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3. Methodology

The present study focuses on examining the economic impact of Patanjali Ayurveda Limited (PAL) on the district-level economy of Haridwar, Uttarakhand. To capture this relationship, two dependent variables were considered Gross District Domestic Product (GDDP) of Haridwar and Gross District Domestic Product of the Primary Sector (GDDPP) of Haridwar. These indicators were selected as they reflect both the aggregate and sectoral performance of the district economy. The independent variable is the annual revenue (R) of Patanjali Ayurveda Limited, which represents the scale of operations and business expansion of the firm. The dataset spans the period from 2006 to 2021, which covers the early establishment and subsequent growth trajectory of PAL. Data on PAL revenue was obtained from the annual reports of Patanjali Ayurveda Limited, while data on GDDP and GDDPP were collected from the District Statistical Surveys and reports published by the Directorate of Economics and Statistics, Government of Uttarakhand. After data collection, the trend of the data is analyzed to understand its nature, which is presented in Figure 1.

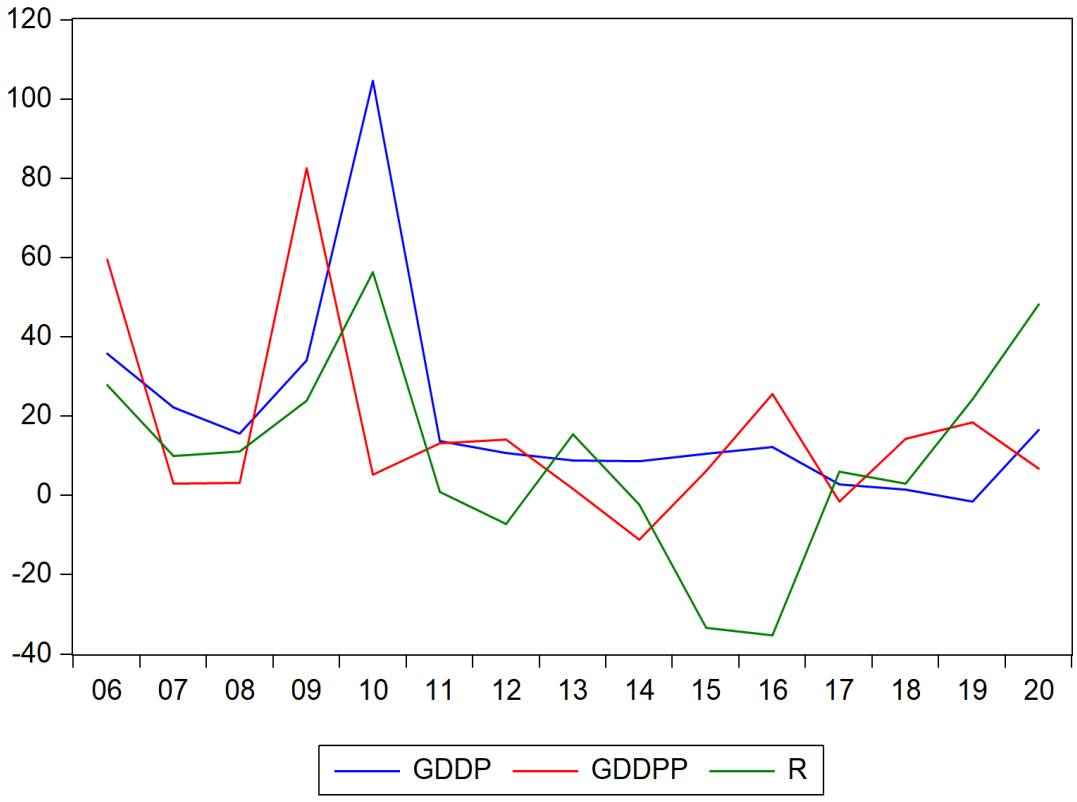

Figure 1: Trend Analysis

Figure 1 represents the trend lines of the Gross District Domestic Product (GDDP), the Gross Domestic Product (GDDPP) of the Primary Sector, and the annual revenue (R) of Patanjali Ayurveda Limited. GDDP, shown by the blue line, reflects the total economic output of Haridwar. The data shows sharp peaks and declines, particularly around 2009 and 2015. These fluctuations suggest that external factors affected the economy of the region.

ISBN code 978-93-83302-82-6.

The red line, which stands for GDDPP, follows a similar pattern, which shows how much the primary sector adds to Haridwar's total Gross Domestic Product. In contrast, the green line, which tracks the annual revenue of Patanjali Ayurveda Limited, shows a steady upward trajectory, particularly from 2014 onward. It is suggested that the growth in revenue results from the company's expansion of its market presence, increase in its product offerings, and benefit from rising consumer demand. The consistent increase in Patanjali's revenue, especially in the later years, highlights the company's success in capitalizing on emerging market trends. However, the sharp fluctuations in GDDP and GDDPP indicate potential structural changes. Specifically, the sharp changes in 2010 in the primary sector likely resulted from the early expansion of PAL, which increased demand for agricultural raw materials and shifted local agricultural practices, thereby affecting the economic performance of the primary sector. Additionally, changes in national agricultural policies, adoption of modern farming techniques, and environmental factors, such as adverse weather conditions, likely contributed to this shift (GOI, 2014; DES, 2014). Furthermore, the changes in 2011 in GDDP likely correspond to Patanjali's rapid growth in the FMCG sector, which had a significant impact on the overall economic activity of Haridwar district, thereby leading to a shift in the economic structure, particularly in the secondary and tertiary sectors (BS, 2016; ET, 2014). To verify these deviations, it is essential to examine structural breaks in the data. In time-series analysis, testing for structural breaks accounts for policy reforms and economic shifts, ensuring reliable results. Given the clear shifts in the trends of GDDP and GDDPP in Figure 1, the Quandt-Andrews unknown breakpoint test is applied. The results are presented in Table 1. After identifying the breakpoint dates, the Augmented Dickey-Fuller unit root test is applied to examine the stationarity of the data. The unit root test results indicate a mixed order of integration, with some variables being stationary at level, while others are stationary at first difference. The mixed order of stationarity supports the use of the ARDL model, which provides several advantages over other cointegration methods (Adil et al, 2022). One key benefit of the ARDL model is its reliability in identifying cointegration, even with small sample sizes (Pesaran et al, 1999). Additionally, it accommodates multiple lags to capture the underlying data generation process effectively (Qasim et al, 2025). Furthermore, it integrates short-term dynamics with long-run equilibrium through a simple transformation, ensuring that essential long-term information is preserved (Pesaran et al., 1999). Moreover, the model allows variables to have different lag lengths, providing greater flexibility. Further, excluding short-term dynamics from long-run models could lead to instability (Laidler, 1993). To address this, we estimate an error correction model (ECM) to incorporate short-run effects. Equations [1] and [2] specify this within the ARDL framework as an unrestricted error correction model (UECM) as follows:

Model 1

$$\Delta GDP_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i}\,\Delta GDP_{t-i} + \sum_{i=0}^{p} \beta_{2i}\,\Delta R_{t-i} + \sum_{i=0}^{p} \beta_{3i}\,\Delta DUM2011_{t-i} + \theta_1 GDP_{t-i} + \theta_2 R_{t-i} + \theta_3 (DUM2011)_{t-i} + \varepsilon_t \quad 1$$

Model 2

$$\Delta GDDPP_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i}\,\Delta GDDPP_{t-i} + \sum_{i=0}^{p} \beta_{2i}\,\Delta R_{t-i} + \sum_{i=0}^{p} \beta_{3i}\,\Delta DUM2010_{t-i} + \theta_1 GDDPP_{t-i} + \theta_2 R_{t-i} + \theta_3 (DUM2010)_{t-i} + \varepsilon_t \quad 2$$

ISBN code 978-93-83302-82-6.

The combined significance of the lagged variables is tested using the F-test. In the bounds testing procedure, a set of critical values for a given significance level is provided (Pesaran et al., 1999). In this method, the lower and upper bounds are determined under the assumption that all variables are either I (0) or I (1). If the calculated F-statistic exceeds the upper bound, the null hypothesis of no cointegration is rejected. When the result is inconclusive, as it falls within the bounds, cointegration can be determined using the error correction term (ECT). Once a long-term relationship is confirmed, the next step is to compute the error correction model as follow:

Model 1

$$\Delta GDDP_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i}\, \Delta GDDP_{t-i} + \sum_{i=0}^{p} \beta_{2i}\, \Delta R_{t-i} + \sum_{i=0}^{p} \beta_{3i}\, \Delta(DUM2011)_{t-i} + \lambda ECT_{t-1} + \mathcal{E}_t \quad 3$$

Model 2

$$\Delta GDDPP_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i}\, \Delta GDDPP_{t-i} + \sum_{i=0}^{p} \beta_{2i} \Delta R + \sum_{i=0}^{p} \beta_{3i}\, \Delta(DUM2010)_{t-i} + ECT_{t-1} + \mathcal{E}_t \quad 4$$

Where Δ represents the first difference operator, β_o is the intercept, and ε_t is the random error term, assumed to follow a white noise process. The variable GDDP, GDDPP and R represent Gross District Domestic Product, Gross District Domestic Product of the Primary Sector and annual revenue of Patanjali Ayurveda Limited. DUM represent dummy. The terms with summation signs ($\beta_{1i} - \beta_{3i}$) represent the short-run coefficients, while the coefficients ($\theta_1 - \theta_3$) correspond to the long-run effects.

Finally, diagnostic tests were performed to ensure the robustness of the model. The residuals were tested for serial correlation under the null hypothesis of independence (Durbin, 1970). Furthermore, the distribution of residuals was examined to ensure normality of the data (Thadewald & Büning, 2007). In addition, the variance was tested under the assumption of homoscedasticity (Ilori & Tanimowo, 2022). Moreover, after the inclusion of dummy variables, the stability of both short-run and long-run parameters was assessed through cumulative measures, under the null hypothesis of parameter stability (Brown et al., 1975).

4. Result and Analysis

Table 1: Quandt-Andrews Unknown Breakpoint Test Results

	Model 1: Breakpoint 2011		*Model 2: Breakpoint 2010*	
Statistic	***Value***	***Prob.***	***Value***	***Prob.***
Maximum LR	***56.82975***	***0.0003***	***19.32071***	***0.0000***
Maximum Wald	***113.6595***	***0.0000***	***38.64142***	***0.0000***
Exp. LR	***26.11334***	***0.0000***	***7.358667***	***0.0000***
Exp. Wald	***54.52717***	***0.0000***	***17.01813***	***0.0000***
Average LR	***18.19296***	***0.0000***	***2.674514***	***0.0288***
Average Wald	***36.38592***	***0.0000***	***5.349028***	***0.0288***

Note: probabilities calculated using Hansen's (1997) method

The Quandt-Andrews Unknown Breakpoint Test assessed the likelihood of structural breaks at unknown points in both models. Table 1 presents key statistics from these tests. For Model 1, where GDDP is the dependent variable, all test values provide strong evidence of a structural break in 2011.

The p-values for each statistic are below 0.05, indicating the rejection of the null hypothesis of no structural break. This suggests a significant structural change in the model around 2011. Similarly, the results for Model 2, where GDDPP is the dependent variable, provide strong evidence of a structural break in 2010. The p-values for all statistics are also below 0.05, leading to the rejection of the null hypothesis of no break and indicating a significant change in the model around 2010. Both results confirm that structural changes occurred at both breakpoints, providing strong evidence that the models do not remain stable at these points. To address this instability, it is necessary to include break dummies in the models. Without them, the models would suffer from structural instability, making the estimated relationships unreliable (Kisswani & Zaitouni, 2023).

Table 2: Unit Root Test Results

Variable	*Level (Intercept)*	*Level (None)*	*First Difference (Intercept)*	*Order of Integration*
GDDP		*-2.215148 (0.0304)*		*I(0)*
GDDPP	*-4.770197 (0.0026)*			*I(0)*
R			*-3.555337 (0.0238)*	*I(1)*

Note: Figures in parentheses are MacKinnon (1996) p-values.
****, **, and *** represent significance at the 1%, 5%, and 10% levels, respectively.***

The results presented in Table 2, based on the ADF test, establish the stationarity characteristics of the selected macroeconomic variables. The variables GDDP and GDDPP are stationary in their level form, while the variable R does not exhibit stationarity in its level form but becomes stationary after transformation to its first differences. These findings indicate a mixed order of integration. Moreover, none of the variables are stationary at order I (2). This structure, with variables either being I (0) or I (1), and none exhibiting stationarity at I (2), satisfies the precondition for applying the ARDL model. Therefore, both long-run and short-run coefficients are estimated using the ARDL framework (Nkoro & Uko, 2016).

Table 3: ARDL -Bounds Test

Model 1: Dependent variable GDDP				
Test Statistic	*Value*	*Significance Level*	*Lower Bound I(0)*	*Upper Bound I(1)*
F-statistic	*3.71*	*10%*	*2.63*	*3.35*
K	*2*	*5%*	*3.10*	*3.87*
		2.5%	*3.55*	*4.38*
		1%	*4.13*	*5.00*
Model 2: Dependent variable GDDPP				
F-statistic	*12.19*	*10%*	*2.63*	*3.35*
K	*2*	*5%*	*3.1*	*3.87*
		2.5%	*3.55*	*4.38*
		1%	*4.13*	*5*

Table 3 provides the ARDL Bounds Test results for the equation with GDDP as the dependent variable and R as the independent variables. The F-statistic equals 3.71, which exceeds both the lower and upper bound critical values at the 10% significance level. This result confirms the presence of a long-run relationship among the variables. Similarly, in Model 2, GDDPP is the dependent variable, and the

ISBN code 978-93-83302-82-6.

R, along with year-specific variables for 2010 as the independent variables. The F-statistic equals 12.19. This value exceeds both the upper and lower critical bounds, which confirms the existence of a long-run relationship in the model (Alam et al., 2025). As a result, the analysis estimates the long-run and short-run coefficients through the ARDL approach, and the results appear in Tables 4 and 5.

Table 4: Long run Estimation Results

Model 1: Dependent variable GDDP				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
R	***0.729680***	***0.346121***	***2.108165***	***0.0612***
DUM2011	***-1.228143***	***17.03666***	***-0.072088***	***0.9440***
C	***12.93557***	***15.84410***	***0.816428***	***0.4333***
Model 2: Dependent variable GDDPP				
R	***0.110002***	***0.020168***	***5.454138***	***0.0016***
DUM2010	***-19.85236***	***5.981486***	***-3.318968***	***0.0160***
C	***27.77546***	***4.881972***	***5.689393***	***0.0013***

The empirical findings from Equations 1 and 2, shown in Table 4, provide significant evidence of the relationship between PAL revenue and the economic growth of the Haridwar region, especially with regard to its influence on GDDP and GDDPP. In the context of Equation 1, the coefficient for PAL revenue is statistically significant at the 10% level. This positive and significant coefficient indicates a direct relationship between PAL revenue and GDDP. As PAL revenue increases, GDDP in Haridwar also rises. The statistical significance of this relationship strengthens the hypothesis that PAL revenue growth contributes significantly to regional economic growth. This finding suggests that the economic benefits of PAL's growth extend beyond the company itself, generating broader positive effects on the local economy. This relationship may reflect several underlying mechanisms, such as the creation of employment opportunities, increased demand for local goods and services, and a rise in investments within the region. The results indicate that PAL can substantially affect the economy of the region. In addition to its direct economic activities, the company can cause a ripple effect, driving job creation, increasing capital investments, and producing broader economic activity that benefits the region as a whole.

In Equation 2, the coefficient of PAL revenue also indicates a statistically significant and positive relationship with primary sector growth. Specifically, the results show that for each unit increase in PAL revenue, primary sector growth increases by 0.11 percent. This positive relationship suggests that PAL's financial success has a notable and beneficial impact on the primary sector of the economy. It implies that the company's revenue growth is not only advantageous for its own operations but also plays an important role in stimulating growth within the primary sector, likely through increased demand for raw materials, agricultural products, and other primary goods. This finding emphasizes the importance of PAL's financial performance as a driving force for economic development, particularly in sectors traditionally considered vital for foundational economic growth.

Moreover, the DUM variable, which represents a specific condition or event, shows an insignificant negative relationship with overall economic growth in Haridwar. This suggests that the event or condition represented by DUM2011 does not have a meaningful impact on GDDP in this model. In contrast, DUM2010 in Model 2 is statistically significant and exhibits a negative effect on GDDPP. This means that the occurrence or situation that occurred in 2010 caused a considerable decline in the performance of the primary sector during that time period. This might be due to regulatory changes, supply chain interruptions, and external shocks that slowed primary sector growth. The negative

ISBN code 978-93-83302-82-6.

coefficient associated with the DUM variable emphasizes the significance of knowing the larger context in which economic activity occurs.

Overall, the results of both equations emphasize the impact of PAL revenue expansion on regional and sectoral economic growth. The positive effect on GDDP and primary growth demonstrates how corporate performance promotes economic benefits. The adverse effect of the DUM variable emphasizes the necessity of understanding external influences that could prevent growth. These findings explain how corporate performance, especially Patanjali, can affect regional economic development and influence the primary sector.

Table 5: Short-run Dynamics and ECM Results

Model 1: Dependent variable GDDP				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
ECT(-1)	***-0.783395***	***0.178476***	***-4.389355***	***0.0014***
R-squared				***0.77***
Model 2: Dependent variable GDDPP				
D(DUM2010)	***-37.14363***	***15.38037***	***-2.415002***	***0.0522***
ECT(-1)	***-2.751840***	***0.321790***	***-8.551659***	***0.0001***
R-squared				***0.94***

The short-run estimation results, as presented in **Table 5**, reveal the dynamic behavior of **GDDP** and **GDDPP**. In the **GDDP equation**, the coefficient for changes in **R** does not appear in the short-run output, indicating that the immediate effect of **revenue of Patanjali** on **GDDP** is negligible. This is consistent with the **ARDL model**, which excludes such variables when their short-term effects lack statistical significance. In contrast, in the **GDDPP equation**, although the coefficient for the change in **R** is absent, the **dummy variable for 2010** shows a negative and statistically significant effect at the **10% significance level**. This suggests that the event linked to **DUM2010** led to a decline in **GDDPP** in the short run, thus acting as an barrier to economic progress during that period. The **Error Correction Term (ECT)** in **Model 1** is negative and statistically significant, confirming that short-run disequilibrium adjusts toward long-run equilibrium. The adjustment speed in this model is **78%,** which indicates a quick correction of deviations. However, in **Model 2**, the **ECT coefficient** exceeds **one,** suggesting that the error correction process fluctuates around the long-run value in a dampened manner, rather than converging monotonically (Narayan & Smyth, 2006). Once the adjustment completes, the system quickly returns to its long-term equilibrium. Finally, both models show strong explanatory power, with **R-squared values** of **0.77** for Model 1 and **0.94** for Model 2, indicating that they explain a significant portion of the variation in the respective dependent variables.

Table 6: Diagnostic Results

Test	***Test Name***	***Prob. (GDDP)***	***Prob. (GDDPP)***
Serial Correlation	***Breusch Godfrey LM***	***0.82***	***0.79***
Heteroscedasticity	***Breusch-Pagan***	***0.14***	***0.40***
Normality	***Jarque-Bera***	***0.06***	***0.39***

To assess the accuracy and reliability of the results obtained from both models, several diagnostic tests were conducted. The residuals were found to be free from serial correlation, and their variance remained constant (Gooijer & MacNeill, 1999). The models were correctly specified, with no evidence of omitted variables or functional form misspecification (Sapra, 2005). Furthermore, the residuals followed a normal distribution (Cardoso et al., 2025). These results confirm that both models satisfy the assumptions of classical linear regression (see Table 6). This confirmation supports the validity of

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the results and the applicability of both models for economic interpretation and policy formulation (Qasim et al., 2025).

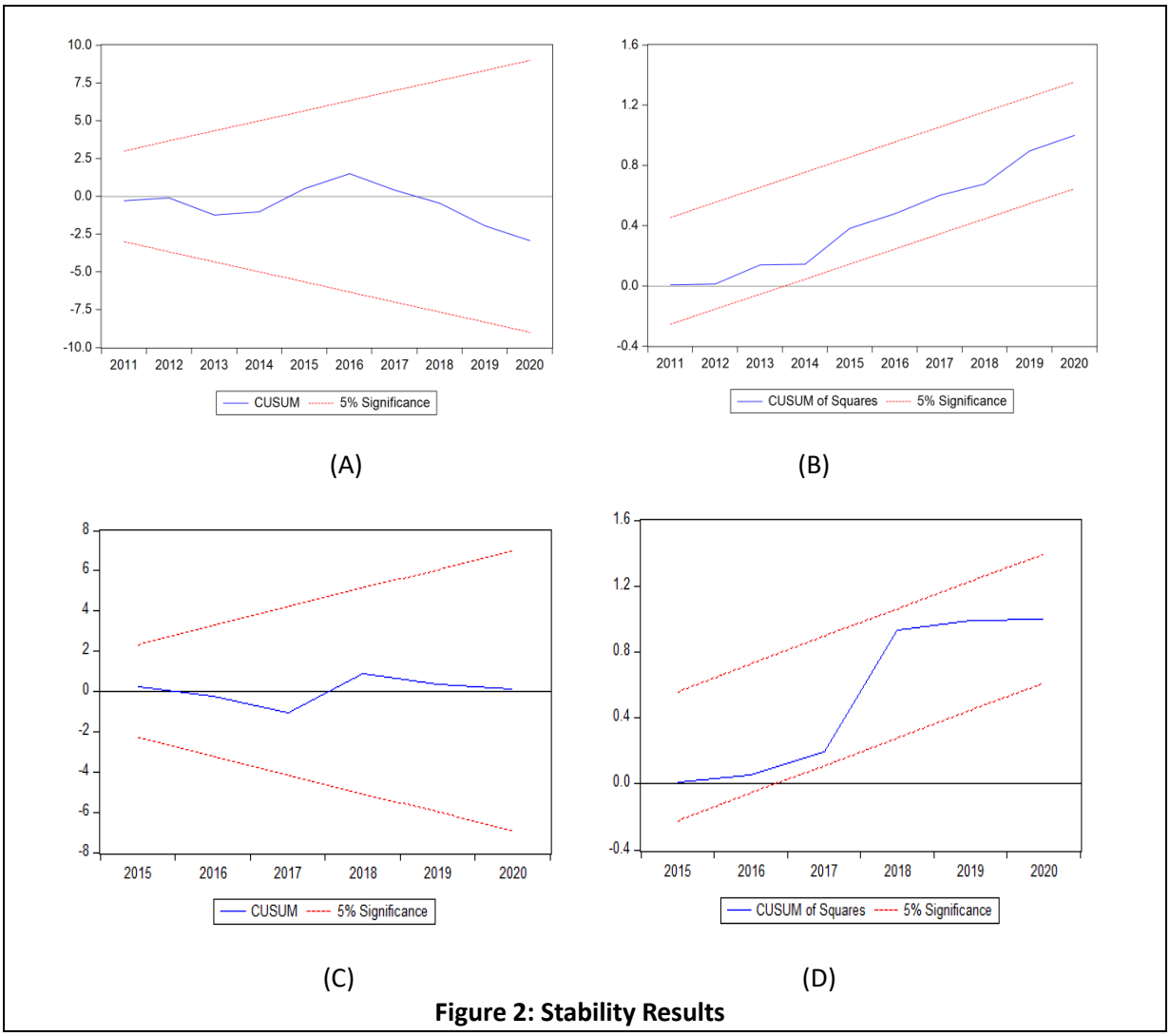

Figure 2: Stability Results

Figure 2 presents the results of stability diagnostics for both estimated models with the inclusion of dummy variables. In the first model, where GDDP is the dependent variable and R the independent variable, a dummy variable for the year 2014 was included to account for significant shifts during that period. The CUSUM plot in Panel A and the CUSUM of Squares plot in Panel B both indicate that the model parameters remained stable over time with the inclusion of this dummy variable. Similarly, in the second model, which relates **GDDPP** to **R,** a structural break dummy was introduced for the year 2010 to account for significant policy and economic shifts. Panel C shows the CUSUM plot for this specification, while Panel D displays the corresponding CUSUM of Squares. In all four panels of Figure 4, the plots remain within the 5% significance bounds, suggesting no evidence of parameter instability. This further demonstrates that both **Models** achieve stability only when the breakpoint dummy is included; excluding it would undermine parameter constancy and invalidate the results. Thus, the models are suitable for empirical investigation and policy analysis.

ISBN code 978-93-83302-82-6.

Concluding Remarks

The findings highlight a noteworthy connection between the revenue growth of PAL and the economic development of Haridwar. The positive relationship observed between PAL revenues and both GDDP and the GDDP of the Primary Sector (GDDPP) suggest that the company plays a significant role in fostering economic expansion in this region. The business model of PAL, which emphasizes organic and Ayurveda-based products, contributes not only to economic growth but also to the promotion of sustainable agricultural practices, which benefit local farmers and support broader national sustainable development objectives. The research further suggests that while corporate success can drive regional prosperity, external factors and policy shifts may pose challenges that potentially moderate growth. In sum, PAL's achievements highlight the potential of businesses to influence both regional and national economic trajectories, reinforcing the company's position as a key contributor to India's aspirations of becoming a developed economy by 2047.

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