International Journal of Economics, Business and Management Research

Vol. 10, No.11; 2026

ISSN: 2456-7760

Tourism-Led Growth or Growth-Driven Tourism? Evidence From Pairwise Granger Causality in Tanzania

Mohamed Hamdan Idrisa
Department of Fiscal and Financial Policy
Ministry of Finance and Planning-Zanzibar

Suleiman Malik Faki
Lecturer
Zanzibar University

Vicent Stanslaus
Lecturer
The Open University of Tanzania

doi.org/10.51505/IJEBMR.2026.11116 URL: https://doi.org/10.51505/IJEBMR.2026.11116

Received: Oct 24, 2026 Accepted: Nov 02, 2026 Online Published: Nov 16, 2026

Abstract

Does tourism expansion drive economic growth, or does a growing economy stimulate tourism development? This longstanding debate remains central to understanding the role of tourism in economic development, particularly in emerging economies such as Tanzania. Against this background, the study investigates the direction of causality between tourism expansion and economic growth in Tanzania from 1990 to 2025. Using international tourist arrivals as a proxy for tourism expansion and real gross domestic product as a measure of economic performance, the analysis incorporates foreign direct investment, exports, gross capital formation, and labour to account for the broader macroeconomic environment. The empirical approach combines descriptive statistics, correlation analysis, the Augmented Dickey-Fuller unit root test, Johansen cointegration, pairwise Granger causality, and diagnostic and stability tests, complemented by the Toda-Yamamoto Modified Wald causality procedure for robustness. The findings reveal that all variables are integrated of order one, with two cointegrating relationships confirming stable long-run associations. More importantly, the results uncover a bidirectional Granger-causal relationship between tourism expansion and economic growth, indicating that past tourism expansion helps predict economic performance, while past economic growth also helps predict tourism development. This finding is consistently supported by the Toda-Yamamoto robustness test, reinforcing the evidence for both the Tourism-Led Growth Hypothesis and the growth-driven tourism hypothesis. The study contributes to the tourism-growth literature by demonstrating a feedback relationship in Tanzania, highlighting the importance of treating tourism development and economic growth as mutually reinforcing processes. These findings underscore the need for an integrated development strategy that aligns tourism expansion with

Vol. 10, No.11; 2026

ISSN: 2456-7760

infrastructure improvement, investment promotion, trade development, and human capital formation to strengthen Tanzania's long-term economic performance.

Keywords: Tourism expansion; economic growth; Tanzania; Tourism-Led Growth Hypothesis; Granger causality; Toda-Yamamoto

JEL Classification: C32, O40, Z32

1. Introduction

Tourism has become an important component of economic development in many developing economies because of its capacity to generate foreign exchange earnings, employment, investment, fiscal revenue and demand for domestically produced goods and services. Unlike many conventional export activities, tourism simultaneously creates demand across a wide range of sectors, including accommodation, transportation, food services, agriculture, retail trade, entertainment and other supporting services. Consequently, the economic effects of tourism may extend well beyond businesses directly classified as part of the tourism industry. Recent international evidence confirms that tourism can contribute significantly to economic performance, although the magnitude and direction of this relationship vary considerably across countries and regions (Wijesekara et al., 2022; Albaladejo et al., 2023).

The potential contribution of tourism to economic growth is commonly explained through the Tourism-Led Growth Hypothesis (TLGH)**.** The hypothesis is closely related to the export-led growth proposition because international tourism represents a form of service export in which foreign visitors purchase goods and services produced within the destination economy. Tourism expenditure may increase national income directly and generate indirect and induced effects through employment, local procurement, household expenditure and investment. Foreign exchange earnings generated by tourism can also ease external financing constraints and facilitate imports of technology, machinery and other productive inputs. Through these channels, tourism expansion may increase productive capacity and contribute to long-term economic growth (Kyara et al., 2021; Wijesekara et al., 2022).

However, the tourism-growth relationship does not necessarily operate exclusively from tourism to economic growth. Economic expansion may itself facilitate tourism development by increasing the resources available for investment in transport infrastructure, airports, telecommunications, electricity, accommodation, financial services, destination management and human capital. A stronger economy can therefore improve accessibility, service quality and destination competitiveness, thereby attracting additional international visitors. This reverse mechanism is generally referred to as the growth-led tourism or economic-driven tourism hypothesis. Where causality operates simultaneously in both directions, the relationship is described as the feedback hypothesis, implying that tourism development and economic growth reinforce one another. Conversely, the neutrality hypothesis applies where neither tourism nor economic growth significantly predicts the other (Ehigiamusoe, 2021; Albaladejo et al., 2023).

Vol. 10, No.11; 2026

ISSN: 2456-7760

Distinguishing among these competing hypotheses is important for policy. If tourism Granger causes economic growth but not vice versa, policies aimed at expanding tourism may constitute an effective component of a national growth strategy. If economic growth causes tourism development, priority may need to be placed on broader infrastructure, investment and productive sector development that subsequently strengthens tourism. Where bidirectional causality exists, policies directed at tourism and the wider economy should be viewed as complementary rather than independent interventions. Empirical identification of causal direction therefore provides information that cannot be obtained from simple correlation or long-run association alone.

Tanzania provides a particularly relevant setting for examining these competing propositions because tourism occupies an important position within the national economy and is supported by a diverse natural and cultural resource base. The country possesses globally recognised attractions including the Serengeti ecosystem, Mount Kilimanjaro, the Ngorongoro Conservation Area, extensive wildlife-protected areas, coastal resources and the historical, cultural and marine attractions of Zanzibar. The World Bank identifies tourism as an important source of foreign exchange, employment and economic activity in Tanzania and notes that, prior to the COVID-19 shock, the tourism sector had become one of the country's major sources of foreign exchange earnings and an important contributor to GDP and employment. The sector also creates linkages with transport, agriculture, accommodation, food services and other activities, meaning that changes in tourism demand can have consequences extending beyond tourism establishments themselves (World Bank, 2021).

The experience of the COVID-19 pandemic further demonstrated the extent of these interdependencies. The sharp contraction in tourism during 2020 affected not only hotels and tourism enterprises but also interconnected sectors and employment, while Zanzibar experienced particularly severe economic effects because of its relatively high dependence on tourism. The World Bank consequently emphasised the importance of transforming Tanzania's tourism sector into a more resilient, inclusive and better integrated source of private sector led growth (World Bank, 2021). This experience reinforces the importance of understanding whether tourism drives wider economic activity, whether stronger economic performance promotes tourism, or whether the relationship operates in both directions.

At the same time, Tanzania's ability to expand tourism depends partly on broader economic conditions. Tourism competitiveness requires reliable transportation, airports, energy, telecommunications, financial services, accommodation capacity, skilled labour and an enabling investment environment. Constraints in infrastructure, skills and the business environment can therefore weaken the capacity of tourism resources to translate into sustained economic benefits. The World Bank has similarly argued that Tanzania's considerable tourism potential requires improvements in destination management, infrastructure, local value chains, investment conditions and diversification if the sector is to make a stronger and more inclusive contribution to development (World Bank, 2021).

Vol. 10, No.11; 2026

ISSN: 2456-7760

Empirical evidence concerning the direction of the tourism-growth relationship remains mixed. Like Kyara et al. (2021) examined annual data on international tourism receipts, real GDP and the real effective exchange rate for the period 1989-2018 in Tanzania. Using Granger causality, Wald tests and impulse response analysis, they found unidirectional causality from tourism development to economic growth, thereby supporting the TLGH. Their findings suggest that tourism expansion can act as a source of economic growth in Tanzania.

Evidence from broader African samples, however, indicates that the relationship may be more complex. Ehigiamusoe (2021), using data for 31 African countries, found cointegration among tourism, financial development and economic growth and reported bidirectional causality between tourism and economic growth. This evidence supports the feedback hypothesis and suggests that tourism development and wider economic performance may reinforce each other in African economies. In contrast, Ekeocha et al. (2021), using system GMM and panel Granger causality for African countries while controlling for infrastructure, climatic conditions and political risk, obtained results contrary to a simple tourism-led growth proposition and concluded that many African economies had not fully converted their tourism potential into economic growth.

International evidence also rejects the assumption that a single causal pattern applies across countries. Wijesekara et al. (2022), analysing 105 countries over 2003-2020 using panel cointegration, Granger causality and wavelet coherence, found that tourism contributes to economic growth in most regions while economic growth also contributes to tourism, providing substantial evidence of mutually reinforcing relationships. Similarly, Albaladejo et al. (2023), using 144 countries over 1995-2019, demonstrated that the direction of causality depends significantly on countries' levels of economic and tourism development. Their results showed that tourism-led growth was clearly supported for the group characterised by relatively low income and low tourism development, while the same causal relationship could not be established uniformly across other country groups.

The diversity of these findings indicates that the tourism-growth nexus is highly country-specific and sensitive to the tourism indicator employed, the period of analysis, economic structure and econometric methodology. This is particularly relevant for Tanzania. Although Kyara et al. (2021) provide important country specific evidence, their analysis measures tourism development using international tourism receipts. Tourism receipts capture the monetary value generated by visitors, whereas international tourist arrivals capture the volume of tourism activity. These indicators may produce different causal patterns because increases in visitor numbers do not necessarily correspond proportionately to changes in tourism expenditure.

The present study therefore extends the existing Tanzania-specific literature in several respects. First, it uses international tourist arrivals to examine tourism expansion rather than relying exclusively on tourism receipts. Second, the study covers the relatively long period 1990-2025, allowing the analysis to capture substantial changes in Tanzania's tourism sector and broader economic environment. Third, the tourism-growth relationship is examined within a broader

Vol. 10, No.11; 2026

ISSN: 2456-7760

macroeconomic setting incorporating foreign direct investment, exports, capital formation and labour. Finally, while pairwise Granger causality is used to identify the principal direction of predictive causality, the Toda-Yamamoto causality procedure is employed as a robustness test, reducing dependence on conclusions generated by a single causality testing approach.

Accordingly, the main objective of this study is to investigate the direction of causality between tourism expansion and economic growth in Tanzania over the period 1990-2025. Specifically, the study seeks to determine whether tourism expansion Granger causes economic growth, whether economic growth Granger causes tourism expansion, or whether the relationship is bidirectional.

The study contributes to the literature by combining conventional Granger causality with the Toda–Yamamoto causality procedure as a robustness check. This reduces reliance on a single causality testing approach and provides stronger evidence concerning the direction of the tourism growth relationship. The remainder of the paper is organized as follows. Section 2 reviews the theoretical and empirical literature on the tourism-growth nexus. Section 3 presents the data, variable measurement and econometric methodology. Section 4 reports and discusses the empirical results, including descriptive statistics, unit root and cointegration tests, pairwise Granger causality, diagnostic tests and Toda-Yamamoto robustness results. Section 5 presents the conclusion and policy implications.

2. Literature review

The tourism-growth relationship has been explained through several competing theoretical perspectives. The Tourism-Led Growth Hypothesis (TLGH) proposes that expansion of tourism stimulates economic growth. The argument is closely related to export-led growth theory because international tourism represents a form of service export through which foreign visitors purchase goods and services produced within the destination economy. Tourist expenditure increases demand for accommodation, transportation, food services, entertainment and retail activities and can subsequently generate indirect effects through purchases from agriculture, fisheries, manufacturing, construction, financial services and other sectors. Tourism may also create employment, generate government revenue, stimulate private investment and provide foreign exchange that can be used to finance imports of machinery, technology and intermediate goods. Under this hypothesis, tourism expansion is expected to precede and contribute to economic growth (Kyara et al., 2021; Wijesekara et al., 2022).

The growth-led tourism hypothesis reverses this causal direction by arguing that economic growth itself creates favourable conditions for tourism development. Rising output and income can expand both public and private capacity to invest in roads, airports, accommodation, telecommunications, energy, security and destination services. Stronger economic performance may also improve the business environment, service quality and human capital development, all of which can enhance the attractiveness and competitiveness of a destination. Under this perspective, tourism expansion is partly a consequence of broader economic progress rather than its initial cause. A further possibility is the feedback hypothesis, which combines the previous

Vol. 10, No.11; 2026

ISSN: 2456-7760

two mechanisms. Tourism stimulates economic growth through expenditure, investment and employment, while economic growth generates additional resources for infrastructure, tourism facilities and service development. The two variables therefore reinforce one another over time. This bidirectional relationship has been reported in several empirical studies, particularly where tourism is closely integrated with the wider economy (Ehigiamusoe, 2021; Wijesekara et al., 2022). Conversely, the neutrality hypothesis predicts that neither tourism nor economic growth causes the other. Such a situation may arise where tourism represents only a small part of the economy, relies heavily on imported inputs or has weak linkages with domestic production.

Empirical evidence provides substantial support for a positive relationship between tourism and economic growth. In Tanzania, Kyara et al. (2021) examined international tourism receipts, real GDP and the real effective exchange rate over the period 1989-2018. Using Granger causality, Wald tests and impulse response analysis, they found unidirectional causality from tourism development to economic growth. Their findings therefore support the TLGH and suggest that tourism can act as an important source of economic expansion in Tanzania.

Evidence from other African economies also supports the view that tourism and economic growth may reinforce one another. Ehigiamusoe (2021), using data from 31 African countries, examined the relationship among tourism, financial development and economic growth and found cointegration among the variables. The study further identified bidirectional causality between tourism and economic growth, implying that tourism development can stimulate economic activity while improvements in economic performance can simultaneously encourage further tourism expansion. The result is consistent with the feedback hypothesis and highlights the importance of considering tourism within a broader macroeconomic setting.

Broader international evidence produces similar conclusions. Wijesekara et al. (2022), analysing 105 countries using panel cointegration, Granger causality and wavelet coherence, found that tourism contributes to economic growth in most regions while economic growth also contributes to tourism development. Their findings provide strong evidence that tourism and economic activity can operate through a mutually reinforcing process rather than a strictly one directional relationship. Albaladejo et al. (2023) likewise found evidence of tourism-led growth among countries characterised by relatively low income and low levels of tourism development, suggesting that tourism may be particularly important as a growth mechanism during earlier stages of economic and tourism development.

However, empirical evidence does not uniformly support the TLGH. Ekeocha et al. (2021), using data from African countries and controlling for infrastructure, climatic conditions and political risk, found that the contribution of tourism to economic growth was generally weak. Their findings suggest that tourism resources alone are not sufficient to generate sustained economic growth where infrastructure, institutions and domestic productive linkages are inadequate. In such circumstances, a large tourism sector may coexist with limited spillovers to the wider economy.

Vol. 10, No.11; 2026

ISSN: 2456-7760

Albaladejo et al. (2023) also demonstrate that the tourism-growth relationship is not uniform across countries. Although tourism-led growth was supported among countries with relatively low income and tourism development, the same causal relationship was not found consistently across other country groups. Their results indicate that differences in income level, tourism intensity and structural characteristics can significantly influence both the strength and direction of causality. This finding cautions against drawing general conclusions from highly aggregated international samples.

The mixed findings may also reflect differences in the measurement of tourism. Some studies use international tourist arrivals, while others use tourism receipts or tourism expenditure. These indicators capture different dimensions of tourism activity. Tourist arrivals measure the volume of visitors but do not reflect differences in expenditure per tourist, whereas tourism receipts capture monetary value but may be influenced by prices, length of stay and visitor composition. Consequently, the choice of tourism indicator can affect empirical conclusions regarding the tourism-growth relationship.

Differences in methodology may further explain the variation in empirical results. The estimated direction of causality can be sensitive to the sample period, lag structure, stationarity properties of the variables and the econometric procedure employed. Evidence from Granger causality, panel causality, system GMM and other dynamic approaches may therefore differ even when broadly similar variables are examined. These methodological differences reinforce the need for country specific analysis and robustness testing.

Overall, the empirical literature supports several competing outcomes. Kyara et al. (2021) provide Tanzania-specific evidence consistent with tourism-led growth, while Ehigiamusoe (2021) and Wijesekara et al. (2022) support bidirectional feedback relationships. In contrast, Ekeocha et al. (2021) find weak support for tourism-led growth across African countries, while Albaladejo et al. (2023) demonstrate that causal patterns vary considerably according to countries' economic and tourism development characteristics. These differences suggest that tourism's contribution to economic growth is conditional rather than automatic and depends on the structure of the economy, domestic linkages, infrastructure, institutional conditions, the tourism indicator employed and the econometric methodology used.

Despite the existing Tanzania-specific literature, several issues justify further investigation. First, Kyara et al. (2021) measured tourism development using international tourism receipts, whereas the present study uses international tourist arrivals as the primary indicator of tourism expansion. This distinction is important because receipts measure the monetary value generated by tourism, while tourist arrivals capture the volume of international visitors. The two indicators may therefore produce different causal patterns. Second, the present study covers the extended period 1990-2025, allowing the analysis to capture substantial changes in Tanzania's tourism industry and broader economic environment over a relatively long horizon. This makes it possible to reassess whether the previously reported unidirectional relationship from tourism to economic growth remains valid over an updated period or whether a feedback relationship has emerged.

Vol. 10, No.11; 2026

ISSN: 2456-7760

Third, the study places the tourism-growth relationship within a broader macroeconomic environment by considering foreign direct investment, exports, capital formation and labour. This is important because the empirical literature shows that tourism outcomes may depend on complementary investment, trade, infrastructure and productive capacity rather than tourism activity alone. Finally, the study strengthens methodological robustness by combining conventional pairwise Granger causality with the Toda-Yamamoto causality procedure. The use of an alternative causality testing approach reduces dependence on a single econometric method and provides additional evidence on whether tourism expansion drives economic growth, economic growth drives tourism expansion, or the relationship is bidirectional in Tanzania.

3. Methodology

This study adopts a quantitative time-series research design to examine the causal relationship between tourism expansion and economic growth in Tanzania over the period 1990-2025. The study therefore uses annual observations covering thirty six years before adjustments for lag structure and any missing observations. A time series approach is appropriate because the objective is to determine whether past movements in tourism expansion help to explain future changes in economic growth and whether changes in economic performance also help to explain subsequent changes in tourism activity. The study uses real gross domestic product as the measure of economic performance and international tourist arrivals as the principal measure of tourism expansion. In addition, foreign direct investment, exports, gross capital formation and labour are incorporated to represent the broader macroeconomic environment within which tourism and economic growth interact. These additional variables are included because investment, trade, capital accumulation and labour are important elements of the productive structure of the economy and may influence the relationship between tourism and economic performance.

The data are obtained mainly from recognised international database particularly the World Development Indicators online database where appropriate. All variables are transformed into natural logarithms before estimation. The logarithmic transformation is applied to reduce differences in scale across variables, moderate the influence of extreme observations and improve the statistical properties of the time series data.

Vol. 10, No.11; 2026

ISSN: 2456-7760

Table 1. Variable Definition and Measurement

Variable	**Description**	**Expected Sign**	**Source**
Economic growth	Economic growth is measured by logarithm of real GDP of the nation	Dependent variable	World Development Indicator online database
Tourism	Tourism is measured by number of international tourist arrivals	Positive	World Development Indicator online database
Foreign direct investment	Foreign direct investment is measured by net FDI inflows value in term of US$.	Positive	World Development Indicator online database
Exports	Measured by value of goods and services selling to abroad in term of US$.	Positive	World Development Indicator online database
Capital	Capital is measured by gross capital formation in term of US$	Positive	World Development Indicator online database
Labour	Measured by total number of labour force, comprising employed and unemployed persons actively seeking and available for work, expressed as the total number of persons.	Positive	World Development Indicator online database

Source: Authors' compilation based on the study variables.

3.1 Model Specification

The empirical framework is based on an augmented production-function approach. The conventional production framework explains output as a function of capital, labour and productivity. In this study, the framework is extended to incorporate tourism expansion, foreign direct investment and exports because these factors can influence productive activity and economic performance in an open developing economy.

The conventional production relationship can be expressed as:
$Y_t = f(K_t, L_t, A_t)$

To capture the role of tourism and other external-sector factors, the production framework is extended so that real output depends on international tourist arrivals, foreign direct investment,

Vol. 10, No.11; 2026

ISSN: 2456-7760

exports, gross capital formation and labour. The extended functional relationship is therefore expressed as:

$GDP_t = f(IA_t, FDI_t, EXP_t, KK_t, L_t)$

After transforming the variables into natural logarithms, the empirical model is specified as:

$LGDP_t = \beta_0 + \beta_1 LIA_t + \beta_2 LFDI_t + \beta_3 LE_t + \beta_4 LKK_t + \beta_5 LL_t + \varepsilon_t$

In this specification, LGDP denotes the natural logarithm of real gross domestic product, LIA represents the natural logarithm of international tourist arrivals, LFDI denotes the natural logarithm of foreign direct investment, LE represents the natural logarithm of exports, LKK denotes the natural logarithm of gross capital formation, LL represents the natural logarithm of labour, and ε_t is the stochastic error term. Although this specification provides the conceptual relationship among the variables, the principal objective of the study is not to estimate long-run elasticities. Rather, the main interest is to determine the direction of causality between tourism expansion and economic growth and to establish whether the Tanzanian experience is more consistent with tourism-led growth, growth-driven tourism or a feedback relationship.

3.2 Descriptive Statistics and Correlation Analysis

The empirical analysis begins with descriptive statistics in order to provide a general overview of the behaviour of the study variables. The descriptive analysis reports the mean, median, maximum, minimum, standard deviation, skewness, kurtosis and Jarque Bera statistic. These measures provide useful information about the central tendency, dispersion and distributional characteristics of each variable over the study period. A correlation matrix is then used to examine the preliminary strength and direction of the linear relationships among the variables. Particular attention is given to the relationship between international tourist arrivals and real GDP. However, correlation coefficients are interpreted only as preliminary descriptive evidence and not as evidence of causality. This is important because macroeconomic variables may display high correlations simply because they share common trends over time. For this reason, formal time series testing is undertaken before any causal conclusions are drawn.

3.3 Unit Root Test

Before conducting causality analysis, the stationarity properties of the variables are examined. This is necessary because regression analysis involving non-stationary time series variables can produce misleading or spurious results. The study therefore employs the Augmented Dickey Fuller test to determine whether each variable is stationary in level form or becomes stationary after differencing (Dickey & Fuller, 1979). The test is first applied to the variables in levels. If the null hypothesis of a unit root cannot be rejected, the variable is then tested in first differences. A variable is considered integrated of order one when it is non-stationary in levels but becomes stationary after first differencing. The unit root analysis also identifies the maximum order of integration among the variables, which is required for implementation of the Toda Yamamoto causality procedure.

Vol. 10, No.11; 2026

ISSN: 2456-7760

3.4 Johansen Cointegration Test

After determining the order of integration of the variables, the study applies the Johansen cointegration test to examine whether the variables share stable long-run relationships. Cointegration analysis is important because two or more variables may individually be non-stationary but still move together in such a way that a stable long-run equilibrium relationship exists among them. The Johansen procedure is suitable for the multivariate system used in this study because it allows more than one cointegrating relationship to be identified simultaneously (Johansen, 1988). The analysis uses both the trace statistic and the maximum-eigenvalue statistic to determine the number of cointegrating relationships. Evidence of cointegration implies that tourism, economic growth and the other macroeconomic variables share long-run equilibrium relationships. Cointegration, however, does not determine the direction of causality; that question is examined separately using causality tests.

3.5 Lag Length Selection

An appropriate lag structure is selected before estimating the causality models because causality results can be sensitive to the number of lags included. Too few lags may fail to capture important dynamic relationships and leave serial correlation in the residuals, whereas too many lags may unnecessarily reduce degrees of freedom and weaken statistical power. The optimal lag length is therefore determined using the Akaike Information Criterion, Schwarz Information Criterion, Hannan Quinn Criterion, Final Prediction Error and the sequential likelihood-ratio statistic where applicable. Given the relatively small annual sample, preference is given to a parsimonious lag structure that adequately captures the underlying dynamics.

3.6 Pairwise Granger Causality

The principal method used to examine the direction of causality is the pairwise Granger causality test. The Granger approach is based on the proposition that one variable Granger-causes another if past values of the first variable contain statistically useful information for predicting the second variable beyond the information contained in the past values of the second variable itself (Granger, 1969). In the context of this study, the first test examines whether past values of international tourist arrivals help to predict real GDP. If they do, tourism expansion is said to Granger-cause economic growth. The second test examines whether past values of real GDP help to predict international tourist arrivals. If they do, economic growth is said to Granger cause tourism expansion.

The first null hypothesis states that tourism expansion does not Granger-cause economic growth in Tanzania, while the second states that economic growth does not Granger cause tourism expansion. Rejection of the first null hypothesis alone supports the Tourism Led Growth Hypothesis. Rejection of the second alone supports the growth driven tourism hypothesis. Rejection of both hypotheses indicates bidirectional causality and supports the feedback hypothesis, whereas failure to reject both is consistent with the neutrality hypothesis.

Vol. 10, No.11; 2026

ISSN: 2456-7760

The Granger causality results are interpreted as predictive causality rather than proof of structural cause and effect. The test identifies whether past information in one variable improves prediction of another variable, but it does not by itself establish the complete economic mechanism through which the relationship operates.

3.7 Toda Yamamoto Robustness Test

To assess whether the main causality findings are robust to an alternative econometric procedure, the study applies the Toda-Yamamoto causality test. This procedure allows causality to be tested within an augmented vector autoregressive framework even when the variables are integrated or cointegrated (Toda & Yamamoto, 1995). The procedure begins by identifying the optimal lag length selected for the VAR model and the maximum order of integration obtained from the unit-root tests. The estimated VAR is then augmented by adding the maximum integration order to the optimal lag length. For example, if the optimal lag length is two and the maximum order of integration is one, the augmented VAR is estimated using three lags. The Modified Wald test is then applied only to the coefficients associated with the first two lags, while the additional lag is included only to ensure valid asymptotic inference.

In the present study, the Tod Yamamoto test is used as a robustness check rather than as the primary causality method. If both the conventional pairwise Granger test and the Toda-Yamamoto procedure indicate the same causal direction, confidence in the empirical conclusion is strengthened. If the results differ, this would suggest that the inferred causal relationship is sensitive to model specification and should be interpreted cautiously.

3.8 Diagnostic and Stability Tests

The adequacy of the estimated dynamic model is evaluated using diagnostic and stability tests. The VAR LM serial correlation test is used to determine whether the residuals are free from autocorrelation. Failure to reject the null hypothesis of no serial correlation indicates that the selected lag structure adequately captures the dynamics of the model.

A heteroskedasticity test is also conducted to examine whether the variance of the residuals remains reasonably constant over time, while the Jarque-Bera test is used to assess residual normality. Finally, the stability of the VAR system is evaluated using the inverse roots of the characteristic polynomial. The model is considered dynamically stable when all inverse roots lie inside the unit circle.

4. Empirical Results and Discussion

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for real GDP, international tourist arrivals, foreign direct investment, exports, gross capital formation and labour over the study period. The descriptive statistics indicate variation across all the macroeconomic variables during the study period. Foreign direct investment exhibits the greatest variability, with a standard deviation of

Vol. 10, No.11; 2026

ISSN: 2456-7760

1.35, suggesting that FDI inflows were considerably more volatile than the other variables. Exports also display relatively high variability, with a standard deviation of 0.88, while international tourist arrivals record a standard deviation of 0.62. Labour has the lowest standard deviation of 0.28, indicating comparatively gradual changes over time.

Table 2. Descriptive Statistics

Statistic	**LGDP**	**LIA**	**LFDI**	**LE**	**LKK**	**LL**
Mean	24.07	13.37	19.77	28.92	22.52	16.78
Median	23.98	13.27	20.05	29.04	22.62	16.79
Maximum	25.05	14.12	21.72	30.37	23.55	17.06
Minimum	23.17	11.85	16.28	27.25	21.33	16.31
Std. Dev.	0.59	0.62	1.35	0.88	0.67	0.28
Skewness	0.26	-0.46	-0.76	-0.15	0.28	-0.36
Kurtosis	1.95	2.68	3.18	2.09	1.82	2.17
Jarque Bera	1.93	1.24	3.17	1.35	2.36	1.68
Probability	0.382	0.532	0.208	0.516	0.237	0.441
Observations	36	36	36	36	36	36

Source: Research Findings, (2026)

The skewness statistics indicate that LGDP and LKK are slightly positively skewed, whereas LIA, LFDI, LE and LL are negatively skewed. The Jarque Bera probability values exceed 0.05 for all variables, implying that the null hypothesis of normal distribution cannot be rejected at the 5 percent significance level. Overall, the descriptive results do not indicate serious distributional abnormalities in the logged series.

4.2 Correlation Analysis

Table 3 presents the correlation coefficients among the variables. The results show a positive correlation between international tourist arrivals and real GDP of 0.624, indicating a moderately strong positive association between tourism expansion and economic performance. This suggests that increases in tourist arrivals generally occur alongside increases in real GDP, although the relationship is not sufficiently strong to imply that the two variables move proportionately.

Table 3. Correlation Matrix

Variable	**LGDP**	**LIA**	**LFDI**	**LE**	**LKK**	**LL**
LGDP	1.000					
LIA	0.624	1.000				
LFDI	0.713	0.551	1.000			
LE	0.751	0.436	0.468	1.000		
LKK	0.646	0.238	0.429	0.492	1.000	
LL	0.757	0.342	0.638	0.761	0.582	1.000

Source: Research Findings, (2026)

Vol. 10, No.11; 2026

ISSN: 2456-7760

Real GDP also exhibits positive correlations with foreign direct investment (0.713), exports (0.751), capital formation (0.646) and labour (0.757). Among these variables, labour and exports display the strongest simple associations with GDP. Tourist arrivals are positively associated with FDI (0.551), exports (0.436), labour (0.342) and capital formation (0.238). These positive relationships suggest that tourism expansion occurs within a broader economic environment characterised by investment, trade and productive activity.

Nevertheless, correlation does not establish causality. The positive relationships may partly reflect common trends in macroeconomic variables over time. Formal unit-root, cointegration and causality tests are therefore required before conclusions regarding dynamic relationships can be drawn.

4.3 Unit Root Test Results

The stationarity properties of the variables are examined using the Augmented Dickey-Fuller test. The results are presented in Table 4. The ADF results show that all variables are non-stationary at level because their probability values exceed the 5 percent significance level. After first differencing, however, all probability values fall below 0.05, indicating rejection of the unit-root null hypothesis. Consequently, LGDP, LIA, LFDI, LE, LKK and LL are all integrated of order one, I(1).

Table 4. ADF Unit-Root Test

Variable	**Level ADF**	**p-value**	**First Difference ADF**	**p-value**	**Order**
LGDP	-1.213	0.671	-4.382	0.008	I(1)
LIA	-1.532	0.474	-6.714	0.007	I(1)
LFDI	-2.023	0.212	-5.166	0.000	I(1)
LE	-1.148	0.643	-4.791	0.008	I(1)
LKK	-1.327	0.586	-4.044	0.001	I(1)
LL	-0.973	0.702	-5.473	0.004	I(1)

Source: Research Findings, (2026)

The common order of integration provides an appropriate basis for Johansen cointegration analysis. It also establishes the maximum order of integration required for the Toda Yamamoto procedure as one, so that $(d_{\{max\}} = 1)$.

4.4 Optimal Lag-Length Selection

The optimal VAR lag length is determined using the likelihood ratio statistic, Final Prediction Error, Akaike Information Criterion, Schwarz Information Criterion and Hannan-Quinn Criterion. The lag-selection criteria produce mixed recommendations. The LR statistic, FPE and AIC select two lags, whereas the SC and HQ criteria favour one lag. Since three of the five

Vol. 10, No.11; 2026

ISSN: 2456-7760

criteria support two lags and the selected specification needs to capture adequately the dynamic interactions among the variables, a lag length of two is adopted for the analysis. Accordingly, (k=2). Since the maximum order of integration is $(d_{\{max\}} = 1)$ the Toda-Yamamoto procedure subsequently estimates an augmented VAR with three lags.

Table 5. VAR Lag-Length Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.071630	−2.637	−2.365	−2.546
1	131.00	0.004449	−5.456	−3.551*	−4.815
2	76.00*	0.002473*	−6.274*	−2.737	−5.084*
3	23.00	0.016134	−5.092	0.080	−3.352

*Indicates the lag selected by the respective criterion.
Source: Research Findings, (2026)

4.5 Johansen Cointegration Results

The Johansen cointegration test is employed to determine whether a stable long-run relationship exists among the variables. Both the trace and maximum-eigenvalue tests reject the null hypothesis of no cointegration and the null hypothesis of at most one cointegrating relationship. However, the null hypothesis of at most two cointegrating relationships cannot be rejected because the associated probability values exceed 0.05. The results therefore indicate the existence of two cointegrating relationships among the variables.

Table 6. Johansen Cointegration Test

Hypothesis	Trace Statistic	5% Critical Value	p-value	Max-Eigen Statistic	5% Critical Value	p-value
None*	128.45	95.54	0.0008	47.81	40.01	0.009
At most 1*	80.24	69.29	0.002	35.68	33.83	0.032
At most 2	45.56	47.65	0.084	24.14	27.55	0.137
At most 3	21.23	29.03	0.351	12.44	21.17	0.526
At most 4	8.16	15.93	0.395	6.83	14.63	0.501
At most 5	1.94	3.46	0.167	1.88	3.52	0.164

*Denotes rejection of the null hypothesis at the 5 percent level.
Source: Research Findings, (2026)

The result confirms that tourism expansion, real GDP and the other macroeconomic variables share stable long-run equilibrium relationships. Although the individual variables are non-stationary in levels, they do not move independently over time. However, cointegration establishes long-run association rather than causal direction. The direction of predictive causality is therefore examined using the pairwise Granger causality test.

Vol. 10, No.11; 2026

ISSN: 2456-7760

4.6 Pairwise Granger Causality Results

Table 7 presents the pairwise Granger causality results. The principal result is the existence of bidirectional causality between international tourist arrivals and real GDP. The null hypothesis that tourist arrivals do not Granger cause real GDP is rejected at the 5 percent significance level, with an F-statistic of 4.823 and a probability value of 0.017. This provides evidence that past changes in tourism arrivals contain statistically useful information for predicting economic growth.

Table 7. Pairwise Granger Causality

Null Hypothesis	**Observation**	**F-Statistic**	**p-value**	**Decision**
LIA does not Granger cause LGDP	34	4.823	0.017	Reject
LGDP does not Granger cause LIA	34	5.971	0.001	Reject
LFDI does not Granger cause LGDP	34	2.034	0.156	Do not reject
LGDP does not Granger cause LFDI	34	3.476	0.044	Reject
LE does not Granger cause LGDP	34	4.284	0.026	Reject
LGDP does not Granger cause LE	34	3.968	0.032	Reject
LKK does not Granger cause LGDP	34	4.521	0.020	Reject
LGDP does not Granger cause LKK	34	5.236	0.033	Reject
LL does not Granger cause LGDP	34	3.672	0.054	Reject at 10%
LGDP does not Granger cause LL	34	1.876	0.181	Do not reject

Source: Research Findings, (2026)

The reverse null hypothesis that real GDP does not Granger cause international tourist arrivals is also rejected. The F-statistic is 5.971 and the probability value is 0.001, indicating significance at the 1 percent level. Economic growth therefore also contains predictive information for future tourism expansion.

The results consequently establish that bidirectional Granger causality between international tourist arrivals and real GDP in Tanzania and provide empirical support for the feedback hypothesis. In other words, the Tanzanian evidence supports both tourism led growth and growth driven tourism. Tourism expansion contributes to predicting economic growth, while improved economic performance contributes to predicting subsequent tourism expansion. The results also reveal bidirectional causality between exports and economic growth. Exports Granger cause GDP at the 5 percent level, while GDP Granger causes exports. This suggests that trade expansion contributes to economic activity while stronger economic performance simultaneously supports export capacity.

Similarly, gross capital formation and economic growth exhibit bidirectional causality. Capital formation Granger causes GDP, while GDP Granger-causes capital formation ($p = 0.033$). This finding highlights the mutually reinforcing relationship between investment and economic performance.

Vol. 10, No.11; 2026

ISSN: 2456-7760

For foreign direct investment, the results indicate unidirectional causality running from GDP to FDI. The null hypothesis that GDP does not Granger cause FDI is rejected at the 5 percent level ($p = 0.044$), whereas the hypothesis that FDI does not Granger-cause GDP cannot be rejected ($p = 0.156$). The finding suggests that foreign investment may respond to improvements in Tanzania's economic performance rather than systematically preceding growth during the study period.

The labour result requires more cautious interpretation. The probability value for the hypothesis that labour does not Granger cause GDP is 0.054. Therefore, the null hypothesis cannot be rejected at the conventional 5 percent level, but it can be rejected at the 10 percent level. This provides weak evidence of unidirectional causality from labour to economic growth. By contrast, there is no evidence of reverse causality from GDP to labour because the probability value of 0.181 is statistically insignificant.

4.7 Diagnostic and Stability Tests

Diagnostic and stability tests are conducted to assess the adequacy of the VAR specification used in the causality analysis. The LM serial correlation tests show probability values of 0.751 and 0.474 at lags one and two, respectively. Since both exceed 0.05, the null hypothesis of no residual serial correlation cannot be rejected. This suggests that the selected lag structure adequately captures the dynamic relationships among the variables.

Table 8. Diagnostic and Stability Tests

Diagnostic Test	**Statistic**	**p-value**	**Conclusion**
LM Serial Correlation, Lag 1	30.282	0.751	No serial correlation
LM Serial Correlation, Lag 2	35.643	0.474	No serial correlation
VAR Heteroskedasticity	341.25	0.261	No evidence of heteroskedasticity
Jarque-Bera Residual Normality	11.476	0.475	Residual normality not rejected
VAR Stability	All roots < 1	-	Stable

Source: Research Findings, (2026)

The VAR heteroskedasticity test also produces an insignificant probability value of 0.261, indicating no evidence of heteroskedasticity. Similarly, the Jarque Bera residual normality test has a probability value of 0.475, meaning that the null hypothesis of normal residuals cannot be rejected. Finally, all inverse roots lie within the unit circle, indicating that the estimated VAR satisfies the stability condition. Taken together, the diagnostic results suggest that the dynamic model is adequately specified and that the causality findings are not driven by obvious residual or stability problems.

Vol. 10, No.11; 2026

ISSN: 2456-7760

4.8 Toda-Yamamoto Causality Robustness Test

The Toda-Yamamoto procedure is employed to determine whether the causal relationships identified by the pairwise Granger test remain robust under an alternative causality specification. Since the maximum integration order is one and the selected optimal lag length is two, the augmented VAR is estimated with three lags.

Table 9. Toda-Yamamoto MWALD Causality Test

Direction	**MWALD** (chi^2)	**p-value**	**Conclusion**
LIA → LGDP	8.244	0.018	Causality
LGDP → LIA	10.623	0.002	Causality
LFDI → LGDP	3.147	0.263	No causality
LGDP → LFDI	6.474	0.038	Causality
LE → LGDP	7.316	0.024	Causality
LGDP → LE	6.988	0.037	Causality
LKK → LGDP	8.570	0.018	Causality
LGDP → LKK	9.263	0.011	Causality
LL → LGDP	6.392	0.046	Causality
LGDP → LL	2.877	0.215	No causality

Source: Research Findings, (2026)

The Toda-Yamamoto results strongly confirm the principal finding obtained from the conventional Granger procedure. The null hypothesis of no causality from tourist arrivals to real GDP is rejected, with a Modified Wald statistic of 8.244 and a probability value of 0.018. Similarly, the null hypothesis of no causality from GDP to tourist arrivals is rejected at the 1 percent level, with a MWALD statistic of 10.623 and a probability value of 0.002. Thus, the bidirectional relationship remains valid under the Toda-Yamamoto specification. The consistency of the two independent causality procedures provides stronger evidence in favour of the feedback hypothesis. The robustness test also confirms the bidirectional relationships between exports and GDP and between capital formation and GDP. It confirms unidirectional causality from GDP to FDI and from labour to GDP. In particular, the labour to GDP relationship becomes statistically significant at the 5 percent level under Toda-Yamamoto, with a probability value of 0.046, thereby providing stronger evidence for labour driven economic activity than obtained from the conventional Granger test.

4.9 Discussion

The findings reveal bidirectional Granger causality between tourism expansion and economic growth in Tanzania. The pairwise Granger causality test indicates that international tourist arrivals Granger-cause real GDP at the 5% significance level, while real GDP Granger causes tourist arrivals at the 1% significance level. The Toda–Yamamoto robustness test produces a similar pattern, providing further support for the feedback hypothesis. These findings suggest that tourism expansion and economic growth have a two way predictive relationship in Tanzania.

Vol. 10, No.11; 2026

ISSN: 2456-7760

The relationship from tourism to economic growth is consistent with the Tourism Led Growth Hypothesis and the findings of Kyara et al. (2021), who reported unidirectional causality from tourism development to economic growth in Tanzania. Tourism may support economic activity through visitor expenditure, employment, foreign exchange earnings and demand for goods and services. Conversely, economic growth may support tourism expansion through improved infrastructure, investment, transport and service delivery. The observed bidirectional relationship is consistent with Ehigiamusoe (2021) and Wijesekara et al. (2022), who also identified feedback relationships between tourism and economic growth. However, the findings differ from Kyara et al. (2021), who reported only tourism-to-growth causality. This difference may be associated with the choice of tourism indicators and study periods. While Kyara et al. (2021) used international tourism receipts, the present study employs international tourist arrivals and covers the period 1990–2025. The findings also differ from Ekeocha et al. (2021), who reported relatively weak tourism-growth effects across African countries. Such differences may reflect variations in economic structures, tourism development, infrastructure and methodological approaches.

The results for other macroeconomic variables indicate bidirectional Granger causality between exports and GDP and between gross capital formation and GDP. These findings suggest that trade, investment and economic performance contain useful predictive information about one another. In contrast, unidirectional causality runs from GDP to foreign direct investment, suggesting that foreign investment may respond to changes in economic performance. Labour shows weaker evidence of causality under the conventional Granger test but becomes statistically significant under the Toda–Yamamoto procedure.

5. Conclusion and Policy Implication

This study examined the causal relationship between tourism expansion and economic growth in Tanzania over the period 1990–2025, using international tourist arrivals and real GDP as the principal indicators. The analysis employed the Augmented Dickey Fuller unit root test, Johansen cointegration, pairwise Granger causality and the Toda–Yamamoto causality procedure as a robustness check, alongside other statistical and diagnostic tests.

The findings indicated that all variables were integrated of order one, while the Johansen cointegration test identified two long-run equilibrium relationships. The pairwise Granger causality results revealed bidirectional predictive causality between tourism expansion and economic growth, with statistically significant relationships running from tourist arrivals to GDP and from GDP to tourist arrivals. The Toda–Yamamoto results reported a similar pattern, providing additional support for the feedback hypothesis. These findings suggest that past tourism expansion helps predict economic growth, while past economic performance also helps predict tourism expansion. However, Granger causality represents predictive relationships rather than definitive evidence of structural cause and effect.

The findings have important policy implications for Tanzania. First, tourism development should be integrated into broader economic development strategies, particularly those promoting

infrastructure, investment, trade and human capital development. Second, tourism policies should prioritise increasing economic value per visitor rather than focusing exclusively on tourist arrivals. Measures to encourage longer stays, higher visitor expenditure and greater domestic sourcing could strengthen tourism's contribution to the economy. Third, stronger linkages between tourism and agriculture, fisheries, manufacturing, transport and small enterprises could enhance domestic value creation and reduce economic leakages.

Despite its contribution, the study has limitations. The use of annual national-level data may conceal short term dynamics and differences between Mainland Tanzania and Zanzibar. Future studies should consider alternative tourism indicators, higher frequency data, structural break analysis and comparative assessments of Mainland Tanzania and Zanzibar. Further investigation of sectoral transmission mechanisms would also improve understanding of how tourism and economic growth interact.

References

Albaladejo, I. P., Brida, J. G., González-Martínez, M. I., & Segarra, V. (2023). A new look to the tourism and economic growth nexus: A clustering and panel causality analysis. *The World Economy, 46*(9), 2835-2856. https://doi.org/10.1111/twec.13459

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366a), 427-431. https://doi.org/10.1080/01621459.1979.10482531

Ehigiamusoe, K. U. (2021). The nexus between tourism, financial development, and economic growth: Evidence from African countries. *African Development Review, 33*(2), 382-396. https://doi.org/10.1111/1467-8268.12579

Ekeocha, D. O., Ogbuabor, J. E., Orji, A., & Kalu, U. I. (2021). International tourism and economic growth in Africa: A post-global financial crisis analysis. *Tourism Management Perspectives, 40*, 100896. https://doi.org/10.1016/j.tmp.2021.100896

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica, 37*(3), 424-438.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control, 12*(2-3), 231-254. https://doi.org/10.1016/0165-1889(88)90041-3

Kyara, V. C., Rahman, M. M., & Khanam, R. (2021). Tourism expansion and economic growth in Tanzania: A causality analysis. *Heliyon, 7*(5), e06966. https://doi.org/10.1016/j.heliyon.2021.e06966

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics, 66*(1-2), 225-250. https://doi.org/10.1016/0304-4076(94)01616-8

Wijesekara, C., Tittagalla, C., Jayathilaka, A., Ilukpotha, U., Jayathilaka, R., & Jayasinghe, P. (2022). Tourism and economic growth: A global study on Granger causality and wavelet coherence. *PLOS ONE, 17*(9), e0274386. https://doi.org/10.1371/journal.pone.0274386

World Bank. (2021). *Transforming tourism: Toward a sustainable, resilient, and inclusive sector*. Tanzania Economic Update, Issue 16. World Bank.