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Influence of Economic Factors and Government Initiatives on International Tourism Demand in Kenya

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Abstract

This study examined the influence of economic factors and government interventions on the demand for international tourism in Kenya. Using a correlational research design and data from the Kenya National Bureau of Statistics, Kenya Tourism Board, and World Development Indicators, the study analyzes various economic indicators and tourism-related data for the period 1980-2019. The analysis includes correlation analysis, regression analysis, cointegration testing, and Vector Error Correction Model (VECM) analysis. The findings reveal significant relationships between economic factors, government initiatives, and international tourism arrivals. GDP and tourism earnings exhibit strong positive correlations with arrivals, while variables such as the weighted exchange rate, trade openness, tourism product price, substitute product price, and tourism promotion funds show moderate to negative correlations. Regression analysis and VECM modeling provide insights into the relationships and dynamics among the variables, allowing for forecasting of future trends. The findings of this study suggest that government initiatives, particularly investment in tourism promotion, play a significant role in attracting international tourists to Kenya. The country's GDP and tourism earnings are also important factors influencing tourism demand. These findings can guide policymakers and tourism stakeholders in formulating strategies to further develop and promote the tourism industry in Kenya. Measures to enhance the country's political stability, diversify tourism offerings, and allocate sufficient funds for tourism promotion can contribute to sustained growth in international tourism arrivals.

Keywords: *Tourism Demand, Economic Factors, Government initiatives, Tourism Promotion Fund, Product Price, Substitute Product Price*

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Introduction

The tourism industry has emerged as a significant driver of the global economy, as evidenced by various studies (Khan et al., 2020; Kyrylov et al., 2020;Musavengane et al., 2019). In Africa, tourism has been recognized as a crucial sector for fostering shared economic growth and reducing poverty (Adu-Ampong, 2018; Muganda et al., 2010). African countries have witnessed a remarkable surge in tourism, with tourism receipts increasing by an average of 13.7% between 1995 and 2008 across 28 African nations (Fourie and Santana-Gallego, 2013). This growth is often attributed to tourism's potential to stimulate economic and social development, including poverty alleviation, employment generation, and promotion of small business entrepreneurship (Maski et al., 2020; Rasowo et al., 2020).

Understanding tourism as a human activity requires an economic approach and perspective, considering its unique characteristics in terms of demand and supply (Papatheodorou et al., 2010; Stabler et al., 2010). The success of tourism relies on factors such as product quality, government regulations, and customer satisfaction to maximize profitability (Henderson, 2016). Consumer decision-making in the context of tourism product consumption involves a complex process influenced by various factors, including economic considerations such as pricing, exchange rates, trade openness, income index, imports, and exports (Erjavec and Devčić, 2021; Khandaker and Islam, 2017; Martins et al., 2017; Nuraeni et al., 2015; Song et al., 2010).The neoclassical economic theory assumes a multi-stage budgeting process that is reflected in consumer decision-making (Mosalev, 2020). This theory suggests that commodities can be aggregated into broader product bundles when their prices move in parallel, and preferences within one bundle can be described independently of those in another bundle (Smeral and Weber, 2000). Moreover, decision-making at each stage can be viewed as a utility maximization problem, where the income effect and price effect play a role in empirical models(Keshavarzian and Wu, 2017; Kenebayeva, 2021).

According to demand theory, a tourist's budget is primarily influenced by their income and the price of tourism products or services (Jalilvand et al., 2017). Key determinants commonly considered include the income of the origin country or region, the price of the destination, and the substitute prices of alternative destinations (Song et al., 2009). Additionally, the marketing expenditures of tourism product or service providers at both destination and firm levels impact tourists' travel decisions. The push-pull theoretical framework, loosely associated with economic factors, also plays a significant role in shaping tourists' destination choices (Uysal et al., 2009; Chen and Chen, 2015). This theory explains why tourists select a particular destination, the desired experience they seek, and the activities they wish to engage in. Push factors represent internal motives that compel tourists to seek activities that fulfill their needs, while pull factors encompass destination-specific forces, information, and travelers' perceptions and expectations, such as novelty, anticipated benefits, and the marketed image of the destination (Chen and Chen, 2015; Li and Qi, 2019; Quintal et al., 2022; Tisdell and Elgar, 2003; Uysal et al., 2009).

The objective of this study is to examine the influence of economic factors on the demand for international tourism in Kenya while also investigating the role of government interventions in shaping this demand. Despite the importance of the tourism sector, there is currently a scarcity of research that explores the effects of economic factors on the industry in Kenya. This knowledge gap hinders our understanding of the potential for growth and development within the Kenyan tourism industry. To address this gap, this study aims to provide valuable insights through an empirical analysis that takes into account the unique economic factors and challenges faced by Kenya's tourism sector. By conducting a comprehensive examination, we intend to establish the

short and long-term relationships between these economic factors and the demand for international tourism, with the ultimate goal of forecasting future trends.

Through a thorough investigation of the economic factors that affect tourism demand, we hope to shed light on the key determinants that drive or hinder the growth of the Kenyan tourism industry. Additionally, we aim to explore the efficacy of government interventions in shaping this demand and identify potential areas for improvement. By understanding these factors and their interplay, policymakers, industry stakeholders, and researchers can make informed decisions to promote sustainable growth and maximize the economic benefits derived from international tourism in Kenya

Materials and Methods

Study area

The research was conducted in Kenya, a tropical country located in East Africa. Kenya is renowned for its diverse tourism landscape, consisting of seven distinct geographical regions, including the coastal region, rift valley, savanna, Northern Kenya, and the western region, home to Lake Victoria, the world's second-largest lake (Figure 1). Nairobi, the capital city, serves as the largest urban center, while Mombasa, situated along the picturesque Indian Ocean, is the second-largest city. Kisumu City, Kenya's third-largest city, is an inland port located on the shores of Lake Victoria.

Tourism plays a crucial role in Kenya's economy, ranking as the second-largest contributor to foreign currency earnings after agriculture (Valle and Yobesia, 2009). The country offers a wealth of captivating tourist attractions, including safaris in renowned national parks and game reserves, such as the expansive East and Tsavo West National Parks(Okello et al., 2009). The annual wildebeest migration at the Maasai Mara draws visitors from around the world(Bhandari, 2014;Kaltenborn et al., 2011). Other notable attractions include historical mosques and colonial-era forts found in Mombasa, Malindi, and Lamu, as well as the majestic Mount Kenya, the enchanting landscapes of the Great Rift Valley, the coastal beaches, and Kenya's rich cultural heritage and diverse wildlife(Wishitemi et al., 2015).

Data sources

To investigate the influence of economic factors and government initiatives on international tourism demand in Kenya, this study employed a correlational research design. The primary data source was the Kenya National Bureau of Statistics (KNBS), which provided abstracts and economic surveys containing valuable information on various economic indicators and tourism-related data(https://www.knbs.or.ke). These official records and reports served as comprehensive sources of data, offering insights into Kenya's economic landscape and the tourism sector. In addition, data abstracts and tourist registration forms from the Kenya Tourism Board (KTB) were accessed. The KTB plays a crucial role in promoting and regulating the tourism industry, making their data a valuable resource for this study. To provide a global perspective and facilitate comparative analysis, World Development Indicators from the World Bank were also incorporated, offering data on economic and development trends (https://databank.worldbank.org/source/world-development-indicators).

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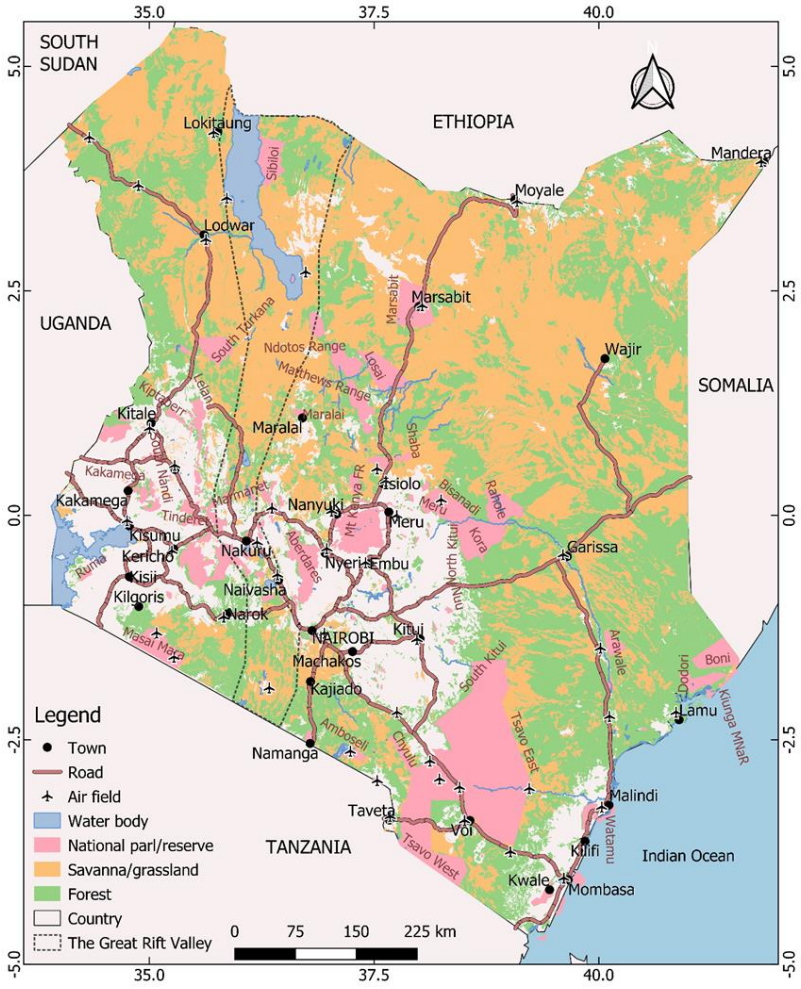

Figure 1. Major tourism attractions and infrastructure in Kenya. These include popular attractions such as national parks, game reserves, beaches, and cultural heritage sites, as well as transportation networks, accommodations, and other facilities that support

Correlation analysis

The analysis explored several variables to understand the relationship between economic factors, government initiatives, and international tourism demand. Key variables of interest included international arrivals, representing the number of tourists visiting Kenya from foreign countries. Additionally, tourism product price, substitute price, tourism promotion fund, GDP, tourism earnings, weighted exchange rate, and the proportion of exports in GDP were examined. These variables provided insights into the cost of tourism products, government support for tourism promotion, the overall economic conditions, and the economic benefits derived from the tourism sector.

This study utilized a correlation analysis to examine the relationships between various factors related to international tourism arrivals. The chosen method of analysis was Pearson's correlation, which is commonly used in statistical studies to measure the strength and direction of the association between two variables (De Leeuw, 1983). In this method, a correlation coefficient, denoted as (*r*), is calculated to determine the degree of correlation between the variables, with a

potential range from -1 to 1. A coefficient of 1 implies a perfect positive correlation, -1 implies a perfect negative correlation, and 0 suggests no correlation at all.

Test for Stationarity

The investigation of stationarity in our data series was conducted employing two key statistical tests: the Augmented Dickey-Fuller (ADF) test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test.

Augmented Dickey-Fuller (ADF) Test

The ADF test was applied as a tool to test for a unit root in an autoregressive model (Dickey and Fuller, 1979). The test builds upon the Dickey-Fuller test by increasing the number of lagged difference terms in the regression to eliminate autocorrelation in the residuals. In effect, the null hypothesis of the ADF test states that the time series is non-stationary (has a unit root), while the alternative hypothesis suggests that the time series is stationary.

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test

Conversely, the KPSS test was utilized as a complement to the ADF test. The KPSS test inspects the null hypothesis that a time series is trend-stationary (the time series is stationary around a deterministic trend) against the alternative hypothesis that the series has a unit root (non-stationary) (Kwiatkowski et al., 1992). The test serves as a check for stationarity around a deterministic trend, rather than just mean, providing a more comprehensive evaluation.

These two tests were judiciously employed in a complementary manner to conclusively infer the stationarity or non-stationarity of our data series, enhancing the reliability and validity of our results.

Regression Analysis and Diagnostic Checking

We further employed regression analysis to ascertain relationships among various variables. Our initial step involved performing a Multicollinearity Diagnostics Measures test to identify any potential multicollinearity issues within the dataset. This is a significant step as multicollinearity can affect the stability and interpretability of regression models. To assess multicollinearity, we computed the variance inflation factor (VIF) for each of these variables. VIF is a statistical measure that quantifies the severity of multicollinearity in an ordinary least squares regression analysis (Daoud, 2017; Shrestha, 2020). It provides an index that measures how much the variance (the square of the estimate's standard deviation) of an estimated regression coefficient is increased because of multicollinearity. Following the identification of non-collinear variables, we constructed a refined regression model. This step was taken to improve the model's accuracy and predictive capabilities. By focusing on variables that were not exhibiting multicollinearity, we were able to generate a model that was more statistically robust and provided more reliable insights into the relationships among these variables.

Cointegration Test

Prior to conducting the cointegration test, we ensured the stationarity of the series using a unit root test (for example, the Augmented Dickey-Fuller test or the KPSS test). The test's purpose was to verify that the time series data is stationary, a prerequisite for the cointegration test. After confirming the stationarity of the series and identifying the order of integration, the cointegration test was performed. In our study, the Johansen's Cointegration Test was chosen because it allows

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for the testing of multiple variables (Johansen, 1988). The null hypothesis of no cointegration was tested against the alternative of cointegration existing. The results of the cointegration test were evaluated based on the Trace Statistic and the Maximum Eigenvalue Statistic. If the calculated value exceeded the critical value, we rejected the null hypothesis and confirmed the presence of a cointegrating relationship. Cointegration implies a long-run equilibrium relationship between the variables, even though they might be individually non-stationary (Yu and Jin, 1992).

Vector Error Correction Model (VECM)

Model Specification

In this study, the Vector Error Correction Model (VECM) was specified to evaluate the relationships among the variables. This model was chosen due to its ability to capture both short-run and long-run dynamics of multiple time-series data. The formulation of VECM necessitates the existence of cointegration relationships among variables (Winarno et al., 2021). As a result, the Johansen cointegration test was performed to establish these cointegration relations, if any.

The VECM can be represented as follows:

$$\Delta Y\_t \;=\; \Pi Y\_(t-1) \;+\; \sum(\Gamma\_i\, \Delta Y\_(t-i)) \;+\; \mu \;+\; \varepsilon\_t$$

where Y_t is a vector of variables, Δ is the difference operator, Π and Γ_i are matrices of parameters to be estimated, μ is a vector of constants, and ε_t is a vector of error terms.

The matrix Π contains information about the long-run relationship (cointegration) among variables, while the matrices Γ_i capture the short-run dynamics.

Estimation and Testing

The parameters of the VECM were estimated using the maximum likelihood estimation (MLE) method. MLE is a popular method in econometrics that determines the parameter values which maximize the likelihood that the process described by the model produced the data that were actually observed. Once the model was estimated, diagnostic checks were performed to ensure the model's assumptions were satisfied. This involved several tests:

- Residual Serial Correlation Test (Portmanteau test): This test was carried out to check if the error terms in the regression model are correlated. If they are, this violates the assumption of no autocorrelation.
- Heteroskedasticity Test (ARCH tes): This test was done to verify the assumption of homoscedasticity, i.e., the variance of the error terms is constant across all levels of the independent variables.
- Normality Test (Jarque-Bera Test): This was performed to ensure that the residuals of the model are normally distributed, which is a critical assumption of the VECM.

Impulse Response Function (IRF)

To gain insights into the dynamic effects of shocks within the system, we employed Impulse Response Functions (IRF). By tracking how a one-unit shock to one variable reverberates through the system over time, the IRF enabled us to analyze the direction, magnitude, and persistence of these effects (Kumar and Petersen, 2012).

Variance Decomposition

Subsequently, a Variance Decomposition (Isakin and Ngo, 2020) was conducted to dissect the forecast error variance of each variable into proportions attributable to shocks from every other variable in the system.

Forecasting with Vector Error Correction Model (VECM)

Following the IRF and Variance Decomposition analyses, the forecast was carried out using the estimated VECM. This approach was chosen due to its ability to encompass both the long-term and short-term dynamics of the variables under investigation, thus potentially providing more accurate forecasts.

The R statistical programming language (R Core Team, 2023) was utilized for all analyses. The above methodologies provided an empirical framework for understanding the interplay of the variables within the system. The results of these methodologies are presented and interpreted in the succeeding sections of the study.

Results and Discussion

Economic variables trends

In examining the data, a steady upward trend in Gross Domestic Product (GDP) over time is evident. The GDP grew from KES 53.9 billion to KES 9.7 trillion (Figure 2). This is hardly surprising, given that economies are generally expected to grow over time (McConnell et al., 1999; Tyler, 1981). This upward trajectory is indicative not only of economic growth but also of broad economic expansion (Fatmawati, 2022). This sense of growth is further supported by the gradual increase in arrivals. The improvement in transportation, infrastructural enhancements, and the continuous march of globalization could all be potential contributors to this trend (Dieke, 2003; Tisdell and Elgar, 2003). However, it is worth noting that there are years where this upward trend buckles, demonstrating a decrease in arrivals. This suggests that tourism might be impacted by other, unaccounted factors in this dataset. Perhaps political stability, the occurrence of natural disasters, or even global economic shifts could all play a part in shaping these trends (Akama, 1999). On the other hand, the dynamics of imports and exports as a proportion of GDP paint a complex image, likely indicating changes in trade strategies, the waxing and waning of globalization, domestic production capabilities, and the general state of the global economy (Dieke, 2003).

The weighted exchange rate offers a fascinating snapshot of a country's currency strength in relation to the global economy, fluctuating in response to various factors over time. Its movement potentially influences the influx of foreign tourists, as it affects the relative affordability of travel to that country. Examining the weighted exchange rate over time, a broad trend of increasing value becomes apparent, albeit with periods of instability. For instance, between 1980 and 1986, the rate nearly doubled from 78 to 137, an indication of a strengthening currency. It's important to note, however, that this growth was not consistent. The rate dipped in 1983 and 1984 before it

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rebounded and continued its climb. In 1993, the exchange rate spiked drastically to 600, an unprecedented high in this dataset, only to fall to 420 the following year. The underlying causes of this dramatic rise and fall warrant deeper exploration, as they may point to significant economic events during those years. The pattern from the mid-1990s to the early 2000s shows fluctuating but generally rising exchange rates, suggesting an overall strengthening of the currency against other currencies worldwide. Yet, there was a surprising dip in 2007, with the exchange rate dropping to 88, an unexpected shift compared to the growth seen in previous years. According to De Vita and Kyaw (2013) and Eilat and Einav (2004), the ebb and flow of a country's currency value can significantly impact tourism. When a country's currency depreciates, its tourism sector may gain a competitive edge, possibly boosting tourist arrivals due to more affordable travel costs. Conversely, as per De Vita (2014), a strengthening currency might dampen tourist inflow due to higher travel expenses.

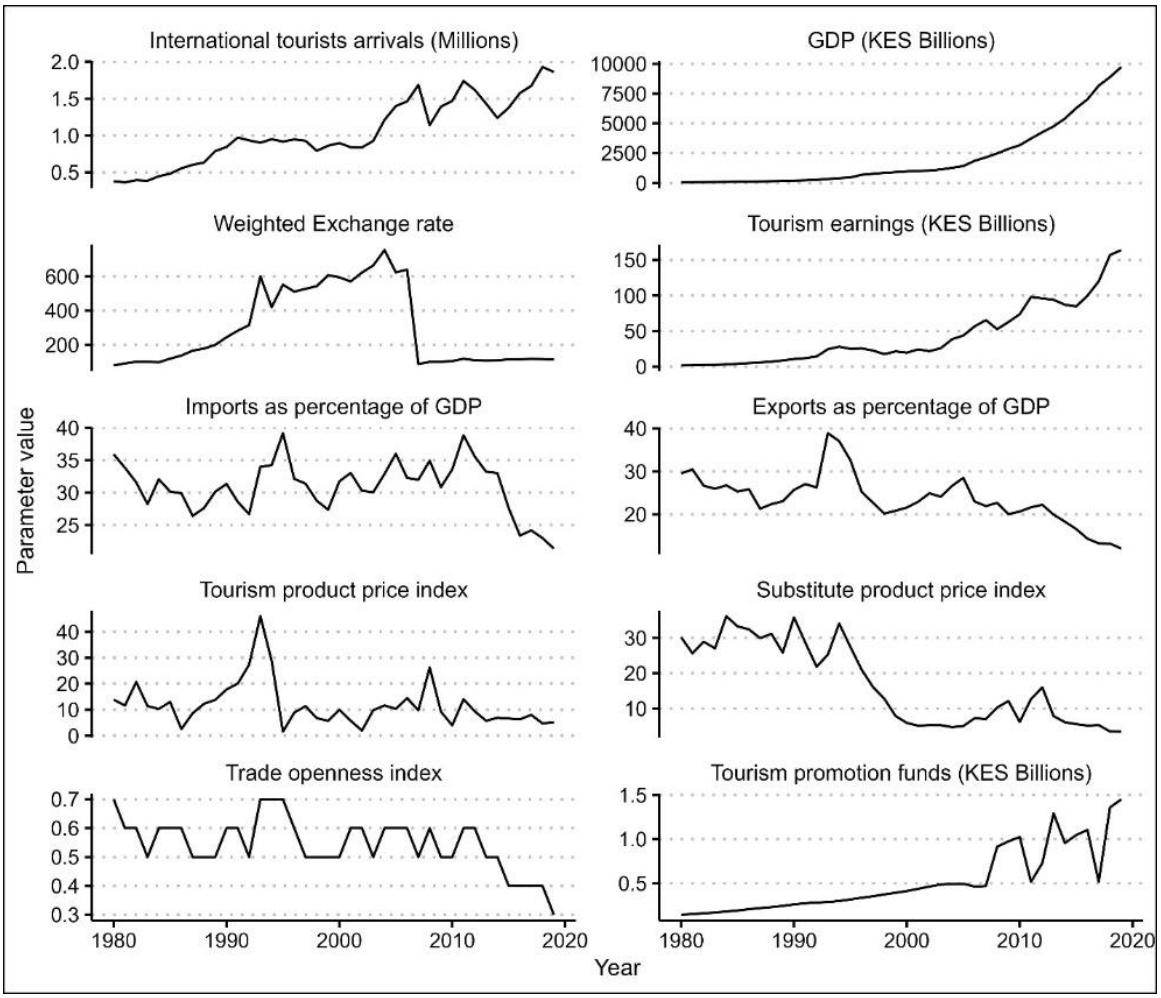

Figure 2. Trends in economic variables and government initiatives impacting international tourism arrivals in Kenya.

Closely related the weighted exchange rate are tourism product price and substitute product price indices. It's observed that tourism product price index shows a variable trend, initially increasing from 14 in 1980 to a peak of 46 in 1993, and then fluctuating in subsequent years (Figure 2). Despite this fluctuation, a general trend of increase is evident with the price index reaching 14 in

2006, a considerable rise from the initial years. This trend could affect the tourism sector's competitiveness, as higher prices may deter potential tourists, especially if substitute products are more affordable. Indeed, the substitute product price index, trend appears to decline over time, starting from 30 in 1980 to a low of 3 by 2019. This decline indicates that substitute products have become more affordable over time, which could attract potential tourists away from the country's tourism products (Habib and Rahim, 2009; Martin and Witt, 1988; Song et al., 2019).

Trade openness, reflected here as the sum of exports and imports as a percentage of GDP, shows a clear trend. From 1980 to 1995, it appears to fluctuate between 30% and 70%, with no clear direction. However, starting from 1995, there is a steady decrease in trade openness. In 1995, the combined imports and exports as a percentage of GDP was about 71.2% (39.15 + 32.59), which significantly dropped to 33.4% (21.37 + 12.03) by 2019. This shows a clear trend of a shrinking global trade interaction. The implications of this trend in trade openness can be quite vast and may have influenced other variables. For instance, a decrease in trade openness could suggest an increased reliance on domestic production and consumption. This could be a response to various external factors such as global economic instability, trade wars, or policies promoting domestic industries (Adeola et al., 2018).

The shift towards a more closed economy might also have implications for the tourism sector. As the dataset indicates, a country's weighted exchange rate, tourism product price, and substitute product price can affect the volume of arrivals. For instance, a decrease in trade openness might lead to a higher exchange rate, making travel to the country more expensive for foreign tourists. This could, in turn, affect the demand for tourism and hence the number of arrivals (Hussain, 2023; Okafor et al., 2023; Thi et al., 2023).

Government initiatives evolution

Tourism promotion funds, they have generally increased over time (Figure 2). In the initial years, from 1980 to 1982, the funds were relatively low, with values hovering around KES 0.14 - 0.15 billion. They consistently increased, reaching KES 0.37 billion in 1998 and KES 0.49 billion in 2004. From 2004 to 2006, the funds remained somewhat stagnant but saw a significant increase from KES 0.46 billion in 2006 to KES 0.91 billion in 2008. This uptick coincided with a drop in the country's weighted exchange rate, from 87.6 in 2007 to 99.07 in 2008. However, the most significant spike was observed between 2008 and 2010, where the tourism promotion funds increased from KES 0.91 billion to 1.02 billion. The years following 2010 showed some fluctuation, with a significant drop to KES 0.51 billion in 2012, followed by a sharp rise to KES 1.29 billion in 2013. This volatility could possibly be linked to external factors such as global financial crises or political events (Akama, 1999; Okafor et al., 2023).

In recent years, from 2016 to 2019, the funds have maintained at a level above 1, indicating an enduring emphasis on promoting tourism. The increase in tourism promotion funds in this period might be correlated with the steady rise in the number of arrivals, which went from 1.37 million in 2015 to 1.86 million in 2019. The implication of these trends is that as the country invested more resources in tourism promotion, it likely became a more popular destination for tourists. These investments might have been instrumental in enhancing the visibility and attractiveness of the country as a tourism hotspot, thereby contributing to the growth in tourist arrivals (Akama, 2002; Chiawo et al., 2023).

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Relationship between international tourism arrivals, economic factors and government initiatives

The correlation analysis, depicted in Figure 3, was conducted to examine the relationships between variables used in this study. Notably, GDP exhibited a strong positive correlation with international tourism arrivals (*r = 0.82*), indicating a significant relationship between a country's GDP and the number of arrivals. A higher GDP tends to coincide with a greater number of arrivals. Likewise, tourism earnings demonstrated a very strong positive correlation with arrivals (*r = 0.91*), emphasizing the robust relationship between the two variables. Interestingly, the only government initiative studied, tourism promotion funds, exhibited a strong positive correlation with international tourists arrivals *(r = 0.79*).

It is worth noting that tourism serves as a significant foreign exchange earner for many countries, ranking second after agriculture in Kenya (Boit and Doh, 2014). This explains the strong positive correlations observed between tourism arrivals, tourism earnings, and GDP. These findings align broadly with previous studies on the economic impact of international tourism on countries. Grynspan, (2022); Odunga et al., (2020); Skerritt and Huybers, (2005) observed that international tourism contributes favorably to the development of African countries with a moderate level of tourism. The allocation of resources to the tourism sector was found to increase the GDP per capita, mainly driven by positive marginal factor productivity differences outweighing negative net externalities.

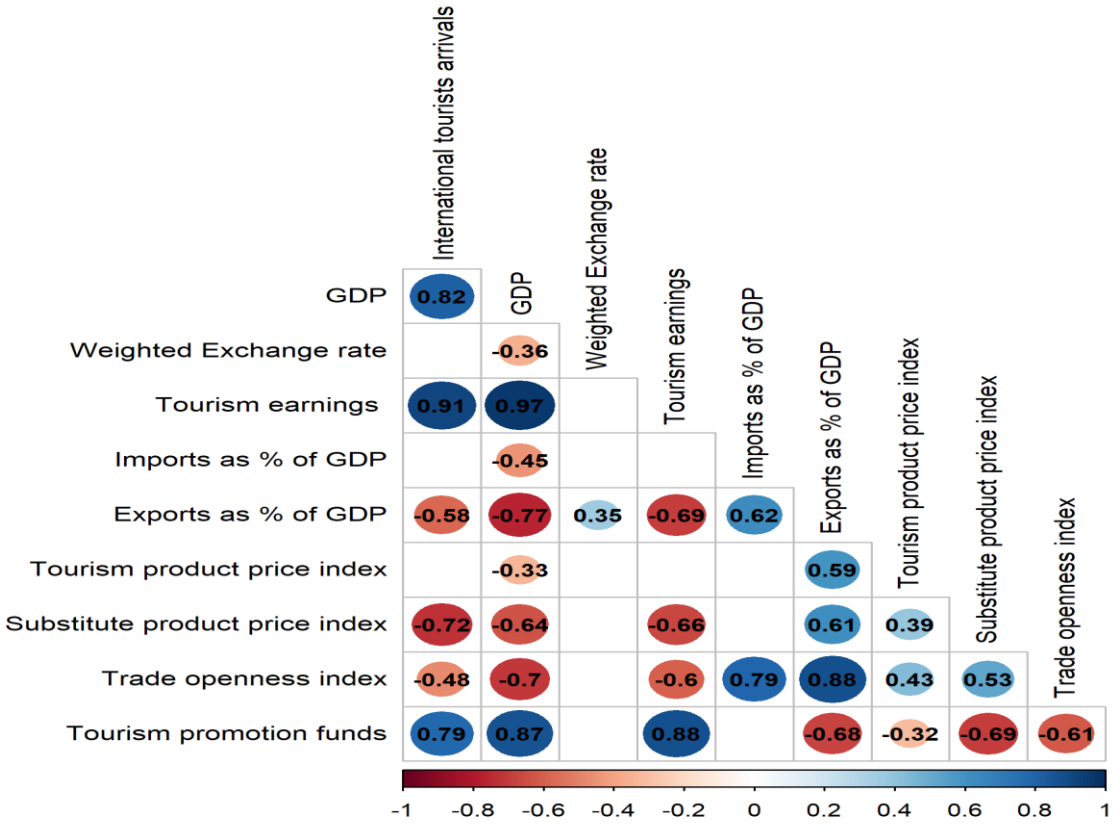

Figure 3. Correlation plot illustrating the pairwise associations among variables. The intensity of color denotes the magnitude of correlation, with darker shades indicating stronger relationships. Insignificant correlations are presented as blank spaces.

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Conversely, other variables, including weighted exchange rate (*r = -0.09*), imports as a percentage of GDP (*r = -0.15*), exports as a percentage of GDP (*r = -0.58*), tourism product price (*r = -0.20*), substitute product price (*r = -0.72*), and trade openness (*r = -0.48*), showed moderate to negative correlations with international tourism arrivals. These negative correlations indicate that as these variables decrease, the number of arrivals tends to increase. This may be attributed to weak correlations with economic growth, resulting in negative correlations when using fixed-effects estimators. Additionally, as an export sector, international tourism faces external competition and productivity constraints, leading to increased investment, higher earnings, and accelerated economic growth (Ighodaro and Ovenseri-Ogbomo, 2018). The competitive nature of the market fosters innovation, adaptation, and efficient resource management, ultimately enhancing productivity. The diffusion of these ideas from the tourism sector to the broader economy serves as a positive externality, potentially boosting overall productivity and catalyzing growth in other industries (Voyer et al., 2017). Consequently, this can impact competitive pricing in tourism and reduce overall export GDP, influencing investment in the sector and trade in other industries (Buhalis and Leung, 2018).

The number of international tourism arrivals exhibited a significant positive correlation (*r (38) = 0.79, p < 0.05*) with the amount of tourism promotion funds. Tourism promotion of a country can be used to increase tourism demand (Muryani et al., 2020). The government of Kenya through the Kenya Tourist Board (KTB) has been marketing the country and generating foreign exchange through tourist visits (Odunga et al., 2011). The board, in collaboration with tour operators, conducts market research on potential tourist markets and reports back to tour operators on their consumption preferences. Kenya has a variety of tourist attractions including wildlife and beach safaris that have been promoted by the government in international exhibitions, media, and even through sports (Wishitemi et al., 2015). Such actions have put Kenya as the best tourism destination in East Africa and increased the tourism demand and international arrivals in the country. Dwyer and Forsyth (1997) used a tourism demand and supply model to conduct an economic analysis of tourism promotion and reported that a country as a whole can benefit from advertising, but not to the level that proprietors of tourism resources benefit. However, the study also revealed that while promotion can benefit an individual country, the global consequences on well-being were unclear.

Forecasting of international tourism demand

Economic aspects as well as government initiatives were studied in order to create a relationship that could be effective in projecting international tourism demand. Before being used for prediction, the time series variables were checked for stationarity, skewness, kurtosis, and normality.

Test for stationarity

The Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests reveal non-stationary characteristics in variables like international tourism arrivals, GDP, tourism earnings, imports as a percentage of GDP, exports as a percentage of GDP, substitute price, trade openness, and tourism promotion funds (Table 1). In contrast, the Tourism product price and Import % of GDP variables show conflicting results between the ADF and KPSS tests, indicating possible inconsistencies in stationarity. This highlights the importance of using multiple tests for accurate results.

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Table 1. Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Stationarity Test Results

Variable	ADF pvalue	ADF	KPSS pvalue	KPSS
Arrivals	0.32	FALSE	0.01	FALSE
GDP	0.99	FALSE	0.01	FALSE
Tourism earnings	0.99	FALSE	0.01	FALSE
Import % of GDP	0.90	FALSE	0.10	TRUE
Export % of GDP	0.26	FALSE	0.02	FALSE
Tourism product price	0.21	FALSE	0.10	TRUE
Substitute price	0.67	FALSE	0.01	FALSE
Trade openness	0.73	FALSE	0.03	FALSE
Tourism promotion funds	0.41	FALSE	0.01	FALSE
Technology	0.68	FALSE	0.01	FALSE

Normality test

Among the variables examined, international tourism arrivals demonstrate relatively normal distribution characteristics, as evidenced by a skewness of 0.25, kurtosis of 2.06, and a non-significant test statistic (1.90, $p = 0.39$) Table 2. Conversely, GDP and tourism earnings deviate significantly from normality, with high skewness values (1.50 and 1.19, respectively) and significant test statistics (17.27 and 10.04, $p < 0.001$ and $p = 0.01$, respectively). Imports as percentage of GDP, exports as percentage of GDP, substitute price, and trade openness display relatively normal distributions, with non-significant test statistics and acceptable skewness and kurtosis values. However, the tourism product price shows pronounced departures from normality, indicated by a highest statistic (68.19, $p < 0.001$) and significant skewness (2.00) and kurtosis (7.99). Similarly, tourism promotion funds demonstrate a moderate departure from normality, with a significant test statistic (8.93, $p = 0.01$) and a skewness of 1.15.

Table 2. Results of Jarque Bera Test

	Skewness	Kurtosis	statistic	P value
Arrivals	0.25	2.06	1.90	0.39
GDP	1.50	4.16	17.27	0.00
Tourism earnings	1.19	3.61	10.04	0.01
Import %GDP	-0.33	3.00	0.72	0.70
Export %GDP	0.35	3.81	1.91	0.39
Tourism product price	2.00	7.99	68.19	0.00
Substitute price	0.32	1.48	4.57	0.10
Trade openness	-0.38	3.10	0.96	0.62
Tourism promotion funds	1.15	3.17	8.93	0.01

Regression analysis

The original regression model exhibited multicollinearity problems, as highlighted by the Multicollinearity Diagnostics Measures. In the variables tourism product price, substitute price, and tourism promotion funds, the variance inflation factors (VIFs) were 1.184, 2.042, and 1.932

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respectively, signaling no multicollinearity issues. Hence, to enhance accuracy, a refined model emphasizing non-collinear variables was constructed, as depicted in Table 3. Table 3's regression analysis, utilizing non-collinear variables, reveals that the baseline effect remains significant as shown by the intercept coefficient (*t = 5.24, p < 0.001*). Tourism product price doesn't significantly impact tourism demand (estimate =6930, *t = 1.318, p = 0.19575*). On the contrary, Substitute price negatively influences tourism demand (*estimate = -14869, t = -2.892, p = 0.00646*), suggesting that lower substitute prices lead to a decrease in demand. Furthermore, Tourism promotion funds positively affect tourism demand (*estimate = 688019, t = 4.385, p < 0.001*), indicating that enhanced promotion funds elevate tourism demand. The overall model is satisfactory, evidenced by a considerable multiple R-squared value (0.6923) and a significant F-statistic (*p = 2.512e-09*).

Table 3. Regression analysis of without collinear variables on international tourism arrivals.

Parameter	Estimate	Std Error	t value	Pr(>|t|)	
(Intercept)	857659	163688	5.24	7.21E-06	***
Tourism product price	6930	5257	1.318	0.19575	
Substitute price	-14869	5142	-2.892	0.00646	**
Tourism promotion funds	688019	156888	4.385	9.65E-05	***

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, Residual standard error: 257300 on 36 degrees of freedom, Multiple R-squared: 0.6923, Adjusted R-squared: 0.6667, F-statistic: 27 on 3 and 36 DF, p-value: 2.512e-09

To ensure the validity and reliability of the vector error correction model (VECM) analysis, variables that did not exhibit multicollinearity were specifically chosen (Derek, 2017; Kim, 2019). Multicollinearity refers to the presence of high correlation among independent variables, which can distort the model estimates and hinder accurate interpretation of the results (Daoud, 2017;Shrestha, 2020). By excluding variables with multicollinearity, we aimed to eliminate the potential for biased coefficients and improve the precision of the VECM analysis. This careful consideration of variable selection allows for a more robust and meaningful examination of the relationships and dynamics among the chosen variables in the VECM framework.

Johansen's Cointegration

Table 4 presents the key results of the Johansen cointegration analysis, which examines the long-term relationship among the variables in the model. Two test types were conducted: the trace statistic and the maximal eigenvalue statistic. For the trace statistic test, the eigenvalues indicate the presence of cointegration relations. The test statistics for different levels of significance (10%, 5%, and 1%) are compared against critical values. Based on the results, we find evidence of cointegration up to three relationships (*r <= 3*). However, when considering up to two relationships (*r <= 2*), the evidence strengthens, suggesting a stronger long-term connection among the variables. Furthermore, considering only one relationship (*r <= 1*) provides even stronger evidence of cointegration.

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Table 4. Johansen Cointegration test results using the trace statistic and maximum eigen value

Rank	Trace statistic		Eigen value statistic	
	test	5pct	test	5pct
r <= 3	2.54	9.24	2.54	9.24
r <= 2	10.58	19.96	8.04	15.67
r <= 1	35.27	34.91	24.69	22
r = 0	69.84	53.12	34.57	28.14

Based on the Johansen procedure normalized cointegration results, the cointegrating equation was hence expressed as:

$$Arrivals = -0.4723 * TPP + 0.4105 * TPS - 0.4141 * TPF$$

Where $Arrivals$ = International tourism arrivals, TPP = Price of tourism products, TPS = Price of substitute product and TPF = Tourism promotion fund.

Vector Error Correction Model (VECM)

The results presented in Table 5 demonstrate the estimated coefficients of the Vector Error Correction Model (VECM), providing insights into the relationships and dynamics among the variables. Starting with the Error Correction Term (ECT), we observe a coefficient of -0.6649 (*p = 0.3896*), indicating the speed of adjustment towards the long-term equilibrium. This suggests that a deviation from the equilibrium will be corrected by approximately 66.49% in the next period. The intercept term, with a coefficient of 0.7355 (*p = 0.3468*), represents the expected value of the dependent variable when all other variables are zero. It signifies the baseline level of international tourism arrivals. Examining the lagged variables, we find significant coefficients for international tourism arrivals -1 (*0.4340, p = 0.3253*), tourism product price -1 (*-0.1819, p = 0.4729*), and price of substitute product -1 (-0.0166, p = 0.1362). These coefficients indicate the impact of the previous period's values of these variables on the current value of each variable. For example, an increase in international tourism arrivals -1 leads to a positive effect on the current international tourism arrivals. Furthermore, the coefficients for tourism product price -2, tourism promotion funds -2, international tourism arrivals -3, and tourism promotion funds -4 are statistically significant, suggesting the presence of long-term relationships and interdependencies among the variables.

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Table 5. Estimated Coefficients of the Vector Error Correction Model (VECM) for the Relationship between international tourism arrivals, tourism product price (TPP), substitute product price (TPS), and tourism promotion funds (TPF) with Lagged Variables (Lags: 1-4)

	ECT	Intercept	Arrivals-1	TPP-1	TPS-1	TPF-1	Arrivals-2	TPP-2	TPS-2	TPF-2	Arrivals-3	TPP-3	TPS-3	TPF-3	Arrivals-4	TPP-4	TPS-4	TPF-4
Arrivals	-0.66 (0.39)	**0.74 (0.35)***	0.43 (0.33)	-0.01 (0.26)	0.43 (0.54)	-0.07 (0.14)	0.70 (0.47)	-0.17 (0.22)	0.53 (0.63)	0.09 (0.11)	0.38 (0.53)	-0.07 (0.18)	-0.25 (0.69)	0.21 (0.11).	-0.27 (0.39)	-0.06 (0.15)	-0.78 (0.69)	-0.10 (0.10)
TPP	-0.18 (0.47)	-0.15 (0.42)	**0.84 (0.39)***	0.05 (0.32)	-1.63 (0.66)*	-0.21 (0.17)	0.07 (0.57)	-0.49 (0.27).	-0.36 (0.76)	-0.01 (0.14)	0.78 (0.64)	-0.03 (0.21)	1.14 (0.84)	0.16 (0.14)	**1.12 (0.48)***	-0.38 (0.18).	-1.51 (0.84).	0.19 (0.13)
TPS	-0.02 (0.14)	-0.04 (0.12)	0.09 (0.11)	0.11 (0.09)	-0.29 (0.19)	-0.01 (0.05)	0.05 (0.16)	0.04 (0.08)	-0.21 (0.22)	0.02 (0.04)	0.02 (0.19)	**0.13 (0.06)***	0.09 (0.24)	0.02 (0.04)	0.04 (0.14)	-0.00 (0.05)	0.28 (0.24)	0.04 (0.04)
TPF	**2.68 (0.65)*****	**-1.57 (0.58)***	**-2.24 (0.54)*****	**1.44 (0.44)****	**2.01 (0.90)***	0.07 (0.23)	**-3.35 (0.78)*****	**0.94 (0.37)***	**2.79 (1.05)***	**-0.84 (0.19)*****	-1.48 (0.88)	0.22 (0.30)	**2.64 (1.16)***	-0.23 (0.19)	**-1.59 (0.65)***	-0.11 (0.23)	0.37 (1.15)	**-1.03 (0.17)*****

Note: The numbers in parentheses represent the standard errors of the coefficients, and asterisks () denote statistical significance levels (** for highly significant, ** for moderately significant, * for marginally significant).

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Among the variables, tourism promotion funds show particularly interesting dynamics. Its coefficient of *2.6803 ($p < 0.001$)* highlights its strong influence on the system. This implies that a unit increase in tourism promotion funds leads to a significant positive effect on the current and future values of the international tourism arrivals, tourism product price, and tourism promotion funds. It is worth noting that some coefficients, such as price of substitute product -2 and tourism promotion funds -3, are not statistically significant ($p > 0.05$). These non-significant coefficients indicate a weaker relationship or influence between the respective variables. It is important to note that the equations presented here are based on the provided VECM output. Additional analysis, model diagnostics, and robustness checks should be performed to validate the model's suitability and draw accurate conclusions.

Model Diagnostics

The adequacy of the VECM was assessed through various diagnostic tests. The Portmanteau test was conducted to examine residual autocorrelation, and the results showed that the residuals of the VECM did not exhibit significant autocorrelation patterns ($p = 0.1321$). This indicates that the VECM adequately captures the dynamic relationship between the variables, making it suitable for analyzing and forecasting the relationship between international tourism arrivals, tourism product price, substitute product price, and tourism promotion funds. Furthermore, an ARCH test was performed to assess residual autocorrelation and heteroscedasticity. The results indicated that there was no significant evidence of residual autocorrelation or heteroscedasticity in the VECM ($p = 1$). This implies that the model accurately captures the temporal dynamics and volatility patterns among the variables of interest, enhancing the reliability of the estimated coefficients and the overall goodness of fit. Additionally, normality tests, including the Jarque-Bera (JB) test, skewness test, and kurtosis test, were conducted to assess the normality of the residuals. The results revealed departures from normality assumptions, with the JB test indicating a rejection of the null hypothesis of normality ($p = 0.0004$). However, the skewness test suggested approximate symmetry in the residuals ($p = 0.5547$), while the kurtosis test indicated higher kurtosis, suggesting heavier tails or a sharper peak compared to the normal distribution ($p = 4.319e\text{-}05$). It is worth noting that the normality assumptions in the VECM refer to the residuals' distribution, and violations of normality do not invalidate the model's results..

Policy scenario analysis

Impulse response functions (IRF)

The estimated contemporaneous impact matrix reveals the short-term effects of each variable on the others (Figure 4). For example, an increase in international tourism arrivals has a positive impact on tourism promotion funds (0.43841) and a negative impact on substitute product price (-0.12221). Meanwhile, tourism product price has a negative impact on both international tourism arrivals (-0.04849) and substitute product price (-0.18481). The standard errors associated with these estimates provide an indication of their precision. Moving on to the estimated long-run impact matrix, it captures the equilibrium relationship among the variables in the VECM. The coefficients in this matrix represent the long-run effects of changes in one variable on the others. Notably, international tourism arrivals have a positive long-run impact on tourism product price (1.2634) but a negative impact on substitute product price (-0.1061). However, it is important to

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note that the standard errors associated with the long-run impact matrix are large, suggesting a degree of uncertainty in these estimates.

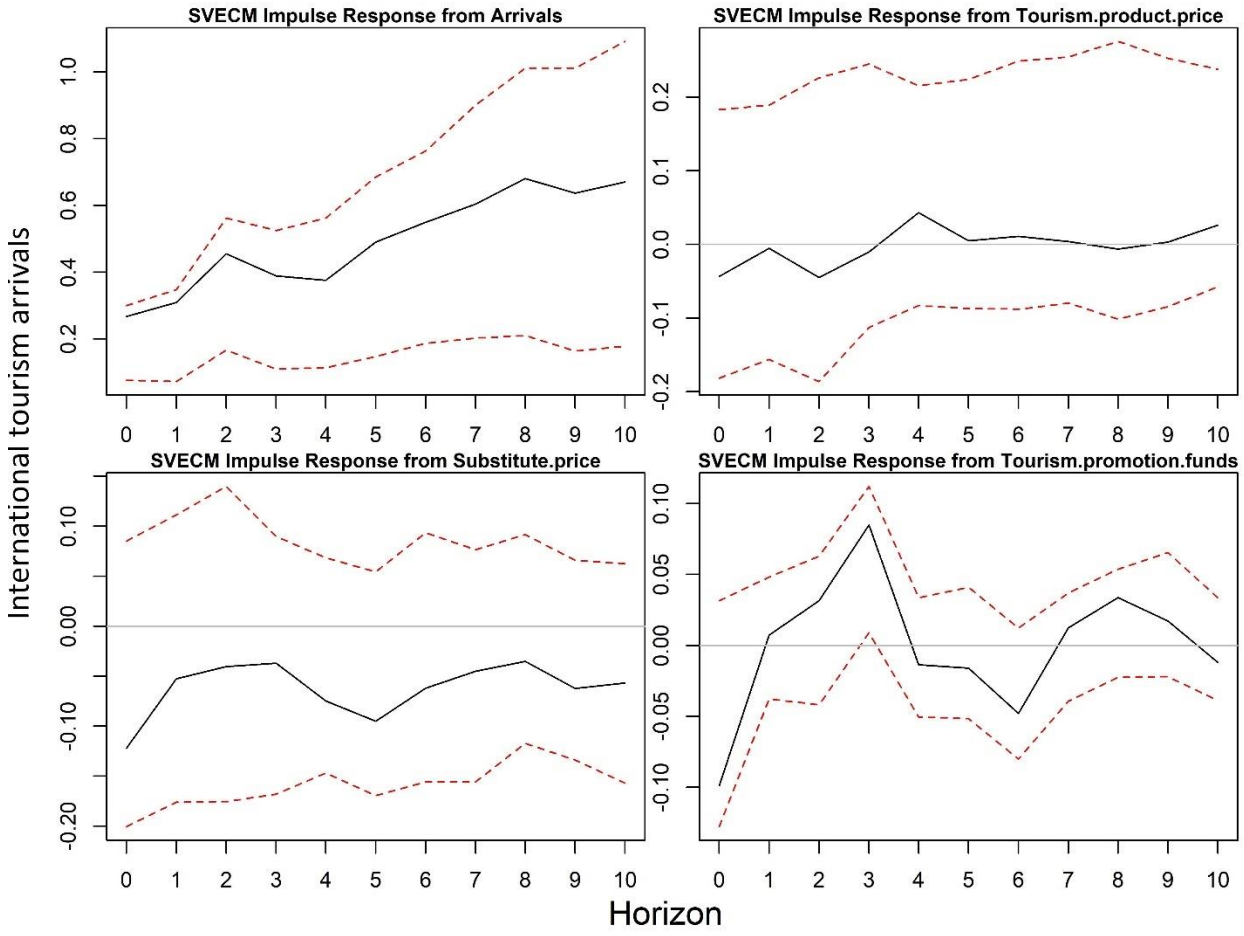

Figure 4. Impulse Response Functions forecast of international tourism demand factors in Kenya.

Variance decomposition

The variance decomposition plot, as shown in Figure 5, shows the contribution of each variable to the overall variability of the system in a 10-step ahead forecast horizon. Initially, international tourism arrivals dominate the system's variance, accounting for 100% of the variability in the first step. However, as time progresses, their contribution gradually decreases, reaching around 78% by the 5th step. This indicates that while international tourism arrivals significantly shape the system's dynamics, their impact diminishes over time. In contrast, tourism product price consistently exhibits a substantial influence on the overall variance throughout the forecast horizon. The initial shock to tourism product price explains almost 97.5% of the variability in the first step. As we advance in the forecast, its contribution remains relatively high, highlighting the sustained impact of pricing changes in tourism products on the system's variability. Similarly,

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substitute product price also makes a substantial contribution to the overall variance. The initial shock to substitute product price accounts for approximately 83% of the variability in the first step. Over the forecast horizon, its contribution ranges from around 28% to 44%, indicating its lasting influence on the system. The initial shock to tourism promotion funds explains roughly 92% of the variance in the first step. However, its contribution diminishes over time, reaching approximately 50% by the 7th step. This suggests that while promotional funding plays a significant role in the initial stages, its effect gradually weakens.

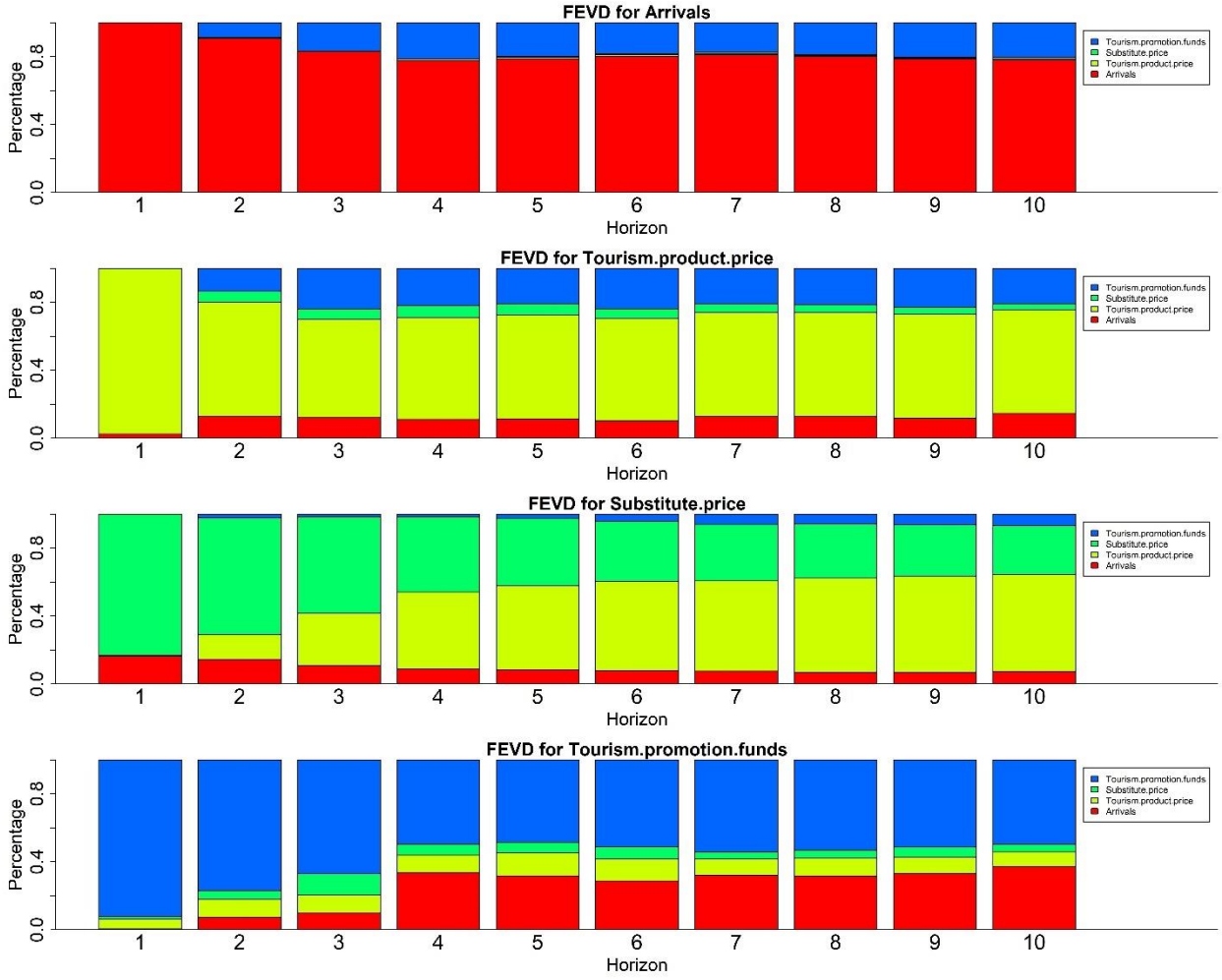

Figure 5. Forecast Error Variance Decomposition of variables used in the forecast tourism in Kenya

Forecasting using VECM

In this section, we present and discuss the results of the forecast obtained using the VECM. The forecast was generated for a horizon of 20 time periods, with a confidence level of 95%. The

forecasted values for international tourism arrivals suggest a general upward trend, indicating an expected increase in the number of visitors. However, the wide range of values within the confidence interval highlights the inherent uncertainty in the forecast. This emphasizes the need for caution when interpreting the exact magnitude of the expected growth. In terms of tourism product prices, the forecast indicates a slightly decreasing trend initially, which is followed by fluctuations. Towards the end of the forecast period, there is a possibility of an increasing trend in prices. This information can be useful for stakeholders in the tourism industry to anticipate and plan for potential changes in pricing strategies. The forecast for substitute prices, which refers to the prices of alternative tourism destinations or products, suggests a general decrease over the forecast period. The forecasted values for tourism promotion funds exhibit an overall upward trend, indicating an expected increase in resources allocated to tourism promotion activities. This can be seen as a positive signal for the industry, as higher promotion funds can support destination marketing efforts and attract more visitors. However, it is essential to consider the potential budgetary constraints and the effectiveness of promotional campaigns in achieving the desired outcomes. While these forecast results provide valuable insights, it is crucial to acknowledge the inherent uncertainty associated with them. Factors such as changes in economic conditions, geopolitical events, natural disasters, and global pandemics can significantly impact the tourism industry and alter the forecasted patterns (Akama, 1999; Chiawo et al., 2023; Okafor et al., 2023; Song et al., 2019). Therefore, it is advisable to regularly update and validate the forecasts based on the latest data and incorporate additional information to enhance their accuracy and reliability.

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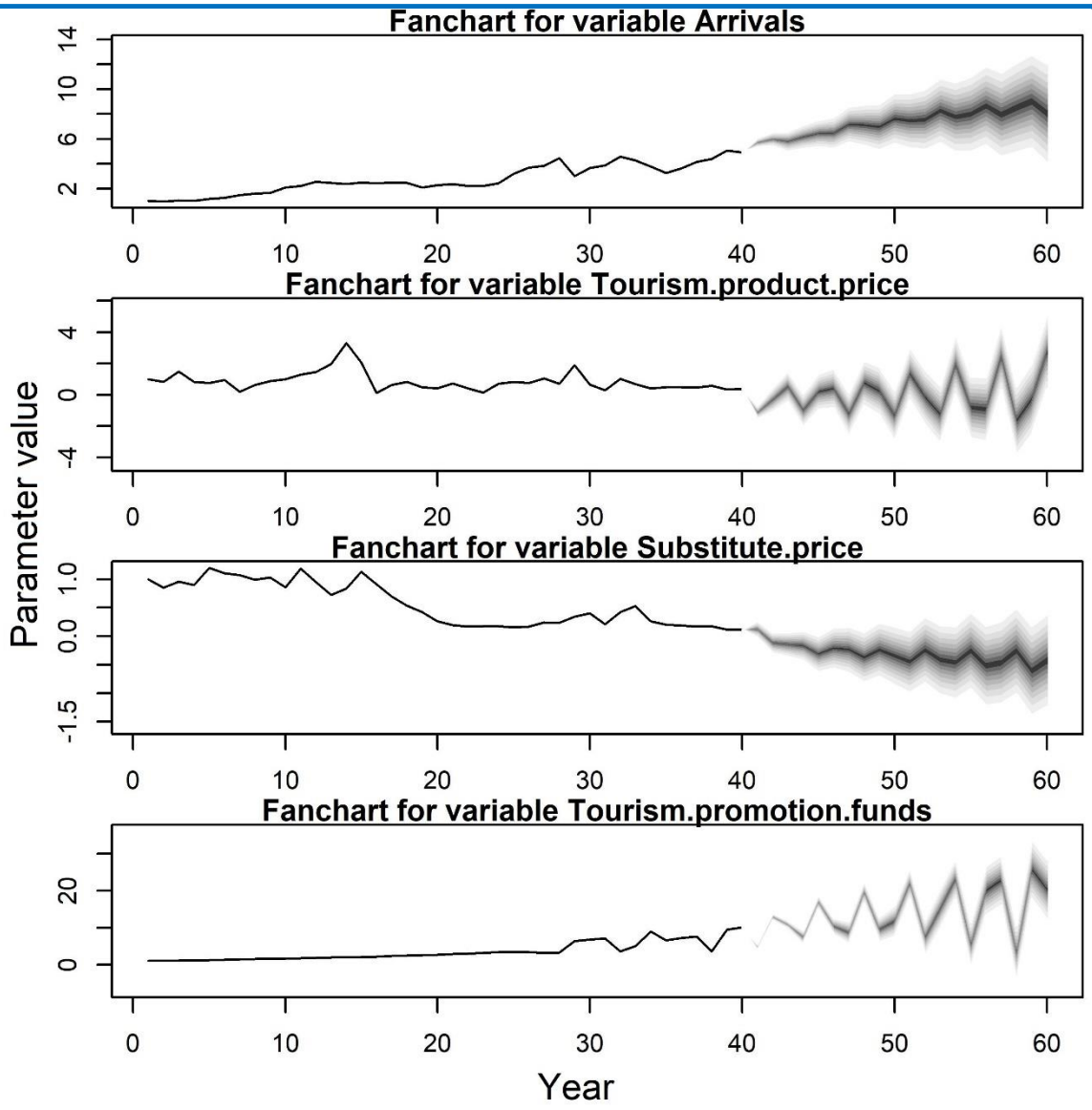

Figure 6. Forecasting of international tourism demand variables in Kenya.

Conclusion and recommendation

The analysis of economic variables and government initiatives in relation to international tourism arrivals in Kenya yielded several key findings. Between 1980 and 2019, the country's GDP and earnings from foreign tourism experienced exponential growth. The GDP increased from KES 53.9 billion in 1980 to KES 9.7 trillion in 2019, while tourism earnings rose from KES 1.6 billion to KES 164 billion during the same period. The weighted exchange rate initially saw a sharp increase but stabilized thereafter. The percentage of imports in relation to GDP and trade openness remained steady until 2012, followed by a rapid decline. On the other hand, exports as a percentage of GDP displayed a consistent increase over time. The continuous upward trend in GDP can be

attributed to the country's stable political situation in the 1980s and the implementation of the Kenya Tourism Act in 2011, which spurred government investment and revitalized the tourism industry. Kenya's diverse tourism offerings, including coastal sandy beaches, wildlife, natural scenic attractions like the Great Rift Valley, and a rich cultural experience, have also played a role in attracting tourists.

Correlation analysis revealed significant relationships between international tourism arrivals and economic factors. GDP and tourism earnings exhibited strong positive correlations with arrivals, indicating a significant relationship between a country's GDP and the number of arrivals. Importantly, tourism promotion funds showed a strong positive correlation with international tourism arrivals, highlighting the role of government initiatives in attracting tourists.

The VECM analysis indicated the presence of cointegration among the selected variables. The cointegrating equation revealed the long-term relationship between arrivals and variables such as tourism product price, substitute price, and tourism promotion funds.

The findings of this study suggest that government initiatives, particularly investment in tourism promotion, play a significant role in attracting international tourists to Kenya. The country's GDP and tourism earnings are also important factors influencing tourism demand. These findings can guide policymakers and tourism stakeholders in formulating strategies to further develop and promote the tourism industry in Kenya. Measures to enhance the country's political stability, diversify tourism offerings, and allocate sufficient funds for tourism promotion can contribute to sustained growth in international tourism arrivals.

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