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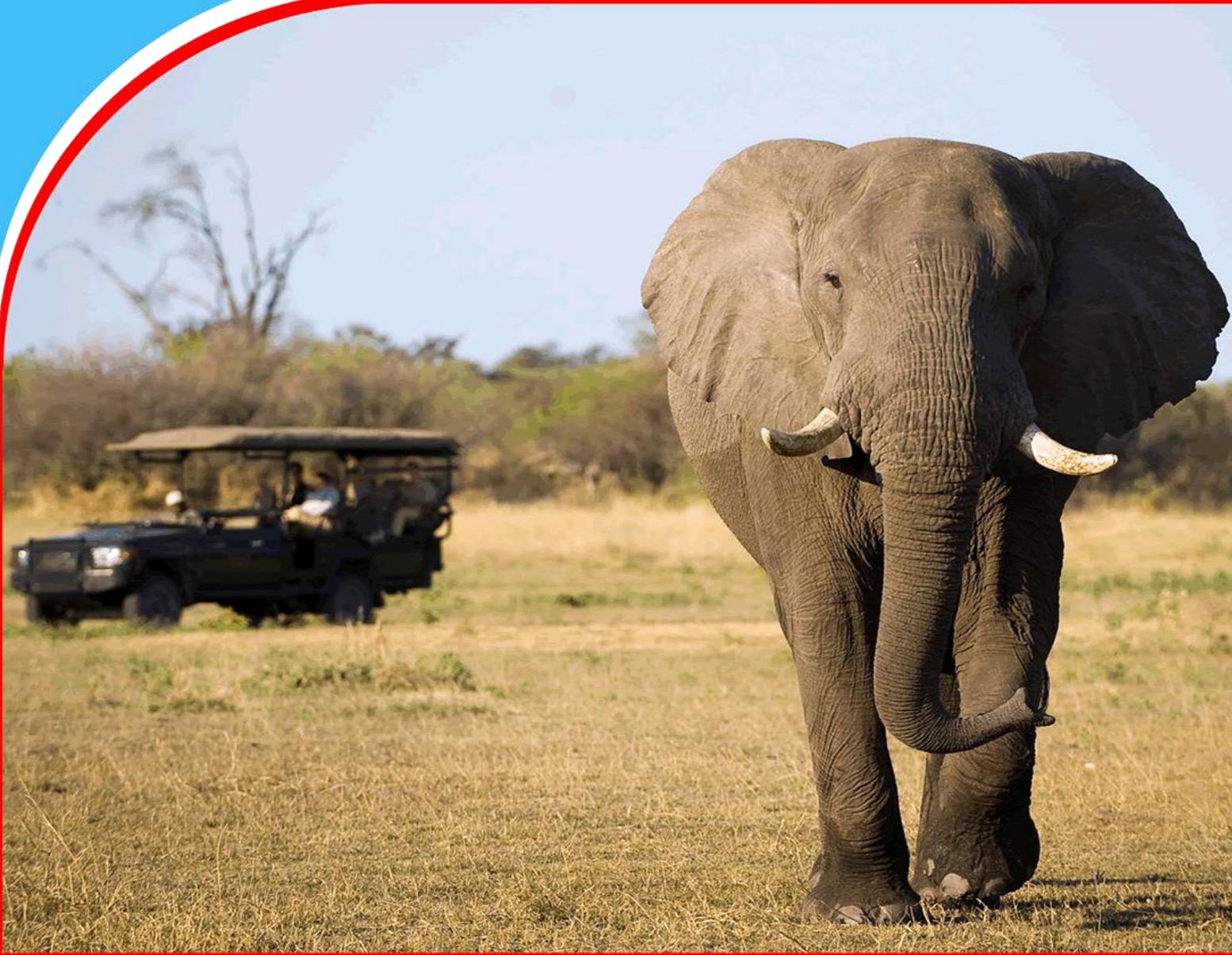
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Exploring the Relationship between Stochastic Events and Patterns of International Tourism in Kenya

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Abstract

Purpose: The purpose of this research was to investigate the fluctuations in international tourist arrivals in Kenya and identify the underlying factors contributing to these trends. The study aimed to gain a deeper understanding of the impact of stochastic events on tourist arrivals.

Methodology: The research focused on international tourist arrivals in Kenya across seven geographical areas. It utilized annual time series data from 1980 to 2020 and examined various variables, including tourism arrivals, terrorism, political instability, conferences, and natural disasters. Descriptive statistics, the Kruskal-Wallis test, Lepage change point detection, and a Vector Autoregressive Model (VAR) with Granger causality tests were employed to analyze the data.

Findings: The findings revealed significant fluctuations in preferred destinations, source markets, purpose of visits, and length of stay among international tourists in Kenya over the study period. Major stochastic events were observed to coincide with significant changes in net arrivals, source markets, or destinations. Notably, terrorism, conferences, and the combined impact of all factors had a significant influence on net arrivals. Political instability, pandemics, and natural disasters were also found to affect international tourism arrivals.

Recommendations: Based on the results, policymakers are advised to prioritize safety and security measures to mitigate the adverse effects of pandemics and political instability on the tourism industry in Kenya. Additionally, the study recommends the development of targeted marketing strategies to attract resilient source markets. Furthermore, promoting sustainable tourism practices is essential to mitigate the long-term impact of negative events on the industry. These recommendations aim to enhance the resilience and growth of the tourism sector in Kenya.

Keywords: *International Tourism, Change Point Detection, Pandemics, Political Instability, Natural Disaster*

1.0 INTRODUCTION

Tourism is one of the fastest-growing industries worldwide, contributing significantly to economic growth and development (Pai et al., 2014). In many countries, including Kenya, tourism is a crucial sector, generating employment opportunities, revenue for the government, fostering cultural exchanges and enhancing infrastructural development (Godbey et al., 2005; Goeldner & Ritchie, 2009; Reisinger, 2009; Walton, 2018). According to UNWTO, tourism worldwide has significantly increased since 1980 to date. In recent years, the international tourism industry has exhibited consistent growth (UNWTO, 2020). In 2014, the total number of overnight international tourist arrivals reached 1,138 million, surpassing the previous year by 51 million. This translated to a growth rate of 4.7%, maintaining a trend of above-average expansion for the fifth consecutive year following the economic downturn in 2009(https://www.unwto.org/archive/global/press-release/2015-01-27/over-11-billion-tourists-travelled-abroad-2014. However, the industry is highly sensitive to changes in the economic, social, and political environment, which can significantly impact the number of tourists visiting a particular destination (Ibrahim, 2013; Jiang et al., 2017; Kibara et al., 2012; Lim, 2002; Surugiu et al., 2015; X. Yang et al., 2015). Kenya has experienced fluctuations in the number of international tourist arrivals over time, indicating the need for an in-depth understanding of the factors influencing the industry.

Statistics indicate that international tourism arrivals in Kenya have been fluctuating but generally increasing overtime (Kenya National Bureau of Statistics, 2018; UNWTO,2017, 2019). In the past, the set targets for arrivals have not been met possibly due to challenges that adversely affect the tourism sector from time to time. Stochastic events have proven to significantly impact on tourism demand, tourism growth and trends. Fluctuations and seasonal reductions in tourist numbers occur in temporal and spatial dimensions, and exist within a socio-cultural-institutional framework (Hinch & Jackson, 2000). Stochastic events like political instabilities, pandemics, unfavorable weather conditions, natural disasters, terrorism, travel advisories and financial recession negatively affect tourism demand. For instance, the SARs pandemic in 2003, the September 2001 attack, various earthquakes, episodes of social unrest and pandemics like COVID-19 all impacted on tourism demand negatively (Ahmad et al., 2023; Aziz et al., 2022; R. Zhang et al., 2022). Currently, it is estimated that the COVID-19 pandemic severely impacted the tourism industry with projections showing a 20 – 30 percent decrease in tourism growth (Y. Yang et al., 2021). On the other hand, events like sporting events, special dignitaries or notable person visits and hosting of conferences could boost tourism demand (Grado et al., 1997; Kodila-Tedika & Khalifa, 2023).

Tourism is a vital sector that has a territorial dimension characterized by uneven spatial distribution between and within countries, leading to confined impacts depending on the available resources. Tourism performance has been documented in various countries, and such performance is attributed to the characteristics of the tourist-generating region, destination features, and other environmental factors (Ageeva & Foroudi, 2019; Awuah & Reinert, 2011; Chan & Wong, 2006; Vengesayi et al., 2009). However, the unbalanced distribution of tourists in time, space, and other variables is one of the bottlenecks of tourism development, often resulting in relative competitiveness among different regions within a country.

The highly variable and seasonal nature of tourism is currently a significant concern in the international tourism industry (Sikveland et al., 2022; Stojčić et al., 2022). Although studies on the spatial and temporal distribution trends and change point detection of tourism exist, their applicability to other countries may not be conclusive. Additionally, studies in Kenya are limited

due to the unique tourism destinations and uneven distribution of tourism resources. Thus, this study sought to establish the spatial and temporal patterns of international tourist arrivals in Kenya and identify significant shifts in trends. The study also aimed to determine whether stochastic events, namely terrorism, political instability, conferences, and natural disasters, significantly affect international tourist arrivals.

Statement of the Problem

The tourism industry in Kenya, a vital contributor to economic growth, faces challenges due to its susceptibility to changes in the economic, social, and political environment. Fluctuations in international tourist arrivals indicate a need to understand the factors influencing the industry. Stochastic events such as political instabilities, pandemics, natural disasters, terrorism, travel advisories, and financial recessions have negatively impacted tourism demand, while special events can boost it. The highly variable and seasonal nature of tourism adds complexity to the industry. Limited research exists on the unique tourism destinations in Kenya. Therefore, this study aims to identify significant shifts in trends of international tourist arrivals and establish the relationship between these trends and stochastic events. The findings will inform the development of strategies and policies to mitigate the negative effects of these events and promote sustainable tourism growth in the country.

2.0 LITERATURE REVIEW

Theoretical Framework

This research is grounded in the push and pull theory, which provides a fundamental framework for understanding tourist travel decisions. This theory acknowledges that tourists are driven by internal motivations (push factors) and are attracted to external features (pull factors) of a destination(Jang et al., 2009; Mohammad and Som, 2010; Bansal and Eiselt, 2004). Push factors encompass personal interests, the desire for relaxation or adventure, cultural experiences, and the need for escape. On the other hand, pull factors encompass the appealing characteristics of a destination, including its natural beauty, cultural heritage, wildlife, infrastructure, hospitality services, and special events(Jang et al., 2009). By employing the push and pull theory, the study examines the interaction between tourists' motivations and the allure of Kenya as a destination. It also investigates how changes in push and pull factors, influenced by stochastic events, impact the number of international tourist arrivals. Through this framework, the research aims to develop a comprehensive understanding of the factors that drive fluctuations in tourist numbers, providing valuable insights to enhance Kenya's tourism industry.

3.0 METHODOLOGY

Study area

Kenya's tourist circuits are divided into seven geographical areas: Nairobi, Mombasa, Masai Land, Central, Western, Nyanza, and Northern Kenya (Figure 1). Nairobi is Kenya's capital and biggest city, while Mombasa is its second largest city. Kisumu City is the third-largest city in Kenya and an inland port on Lake Victoria. Following agriculture, tourism is Kenya's second greatest source of foreign currency earnings. The main tourist attractions are safaris through the national parks and game reserves (particularly the expansive East and Tsavo West National Parks), the wildebeest migration at the Maasai Mara, historical mosques and colonial-era forts at Mombasa, Malindi, and Lamu; Mount Kenya, the Great Rift Valley, and coastal beaches (KTB, 2017; MoT, 2018).
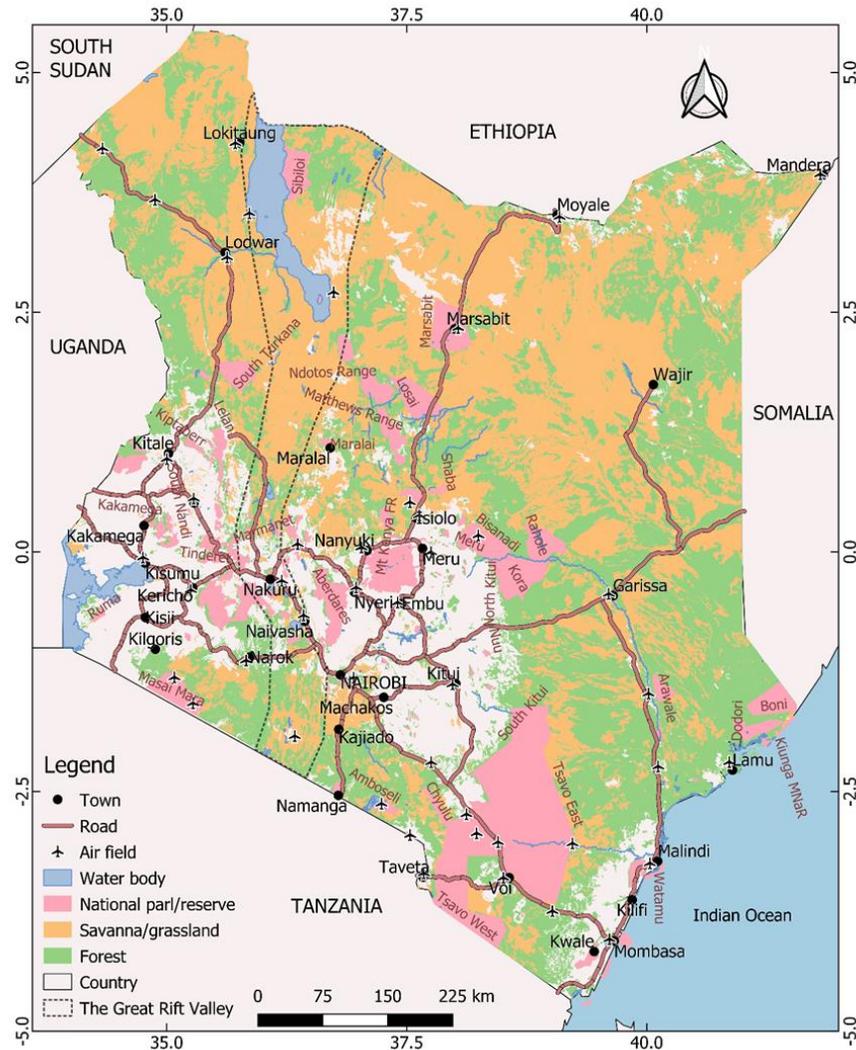
Figure 1: Major Tourism Attraction and Infrastructure in Kenya. These Include Popular Attractions Such As National Parks, Game Reserves, Beaches, and Cultural Heritage Sites, As Well As Transportation Networks, Accommodations, and Other Facilities That Support Tourism

Data Sources

This study utilized annual time series data spanning from 1980 - 2020 for variables of international tourism arrivals, terrorism, political instability, conferences, and natural disasters. Data on international tourist arrivals were obtained from the Kenya National Bureau of Statistics Economic survey report (https://www.knbs.or.ke). The arrivals data was further categorized into source markets (origin of tourists) which was divided into five continents (Europe, Asia, Africa, Middle East and America); data on destination visited which included the Kenya tourist circuits (Nairobi, Mombasa, Maasai land, Nyanza, Western, Central, and Northern Kenya), finally, data based on purpose of travel (holiday, business, on transit and other unspecified purposes and length of stay as a proxy for destinations visited (0-14, 15-28 and Over 28 days).

Terrorism data spanning the study period was obtained from the Global Terrorism Database (LaFree & Dugan, 2007). Terrorism incidence was proxied by the number of fatalities. Political instability, mainly projected as election related violence, coup attempts and ethnic strife, also proxied by the number of fatalities, was collected from published literature (Thiong'o et al., 2022). Major conference held in Kenya were derived from respective conference publications and represented as binary (0 and 1 for no conference and occurrence of a conference in a year respectively) (Habitat, 1976; Weiss, 1992; Holst, 2016; United Nations Conference on Trade and Development (UNCTAD), 2016; GoK, 2018). Data on natural disasters as a function fatality was obtained from the Emergency Events Database (EM-DAT) (https://www.emdat.be/).

Data Analysis

In this study, we employed descriptive statistics and graphical representations to describe the important characteristics of the time series data. To explore disparities in parameter values across research categories, we performed the Kruskal-Wallis test. We also utilized the Lepage change point detection to identify the point or points in the time series of international tourist arrivals where significant changes or shifts occurred. The Lepage change point detection is a statistical test that splits the time series data into two or more segments and examines whether there is a significant difference between the segments. It is worth noting that the Lepage-type statistic used in this test is a hybrid of the Wilcoxon and Mood statistics, as described by Murakami, (2012) and Yonetani (1993).

In situations where substantial changes in the time series data were identified, we made an effort to correlate such times with noteworthy stochastics events that might impact travel trends. Moreover, we conducted a Vector Autoregressive Model (VAR) and Granger causality test to investigate the causal relationships between various stochastic events and changes in international tourism arrivals. The VAR(p) model was formulated as follows:

$$Y_t = c + A1Y_{(t-1)} + A2Y_{(t-2)} + \ldots + Ap * Y_{(t-p)} + \varepsilon_t$$

Where:

Y_t: is a vector of endogenous variables, representing the variables that are dependent on each other over time. In the context of the study, this could represent the time series data of international tourism arrivals or other related variables.

c: is a vector of constant terms, which can be thought of as a fixed or baseline level for each of the endogenous variables.

$A1, A2, \ldots, Ap$: are matrices of coefficients for lags 1 to p. These matrices represent the coefficients of each of the endogenous variables from the previous time periods, up to the pth lag. In other words, they represent the impact of the past values of the endogenous variables on the current values.

$Y_{(t-1)}, Y_{(t-2)}, \ldots, Y_{(t-p)}$: are lagged values of the endogenous variables. They represent the past values of the variables, up to the pth lag.

ε_t: is a vector of white noise errors, which are assumed to be independently and identically distributed. White noise errors represent the part of the endogenous variables that cannot be explained by their past values and the other variables in the model.

We chose the lag order p based on information criteria, such as the Akaike Information Criterion (AIC) or the Bayesian Information Criterion (BIC). After estimating the VAR model, we performed diagnostic tests to ensure that the model is well-specified and valid.

To examine whether the four predictor variables (terrorism, political instability, conferences, and natural disasters) significantly predicted the net arrivals of international tourists in a multivariate dataset, we conducted a Granger causality test using a VAR model. We used the Portmanteau Test to determine if the time series data had significant autocorrelation or heteroscedasticity at different lags. Additionally, we used the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to check for stationarity.

4.0 FINDINGS

International Tourism Arrivals Trend Analysis and Stochastic Events

Kenya's international tourist population has grown dramatically over time, with the lowest (364,940) and highest (1,930,723) figures reported in 1982 and 2018, respectively. The consistent upward trend is broken up by spikes or drops in arrivals, which can be attributed to stochastic events that caused instability in the country and thus hampered travel. In 1986, 1990, and 2004, the Lepage test algorithm revealed a significant change in the arrivals trend (Figure 2). In the same years, there was a 13.15, 19.65, and 23.56 percent change from the previous year, respectively. While there were fluctuations during these periods, the stated years experienced significant increases in 1986 and 1990 as a result of international conferences held, and a decrease in 2004 that began in 2002 possibly as a result of the al Qaeda attack, flood, landslides, and two rocket propelled grenades on Israeli planes in Mombasa airport that were experienced at the time.
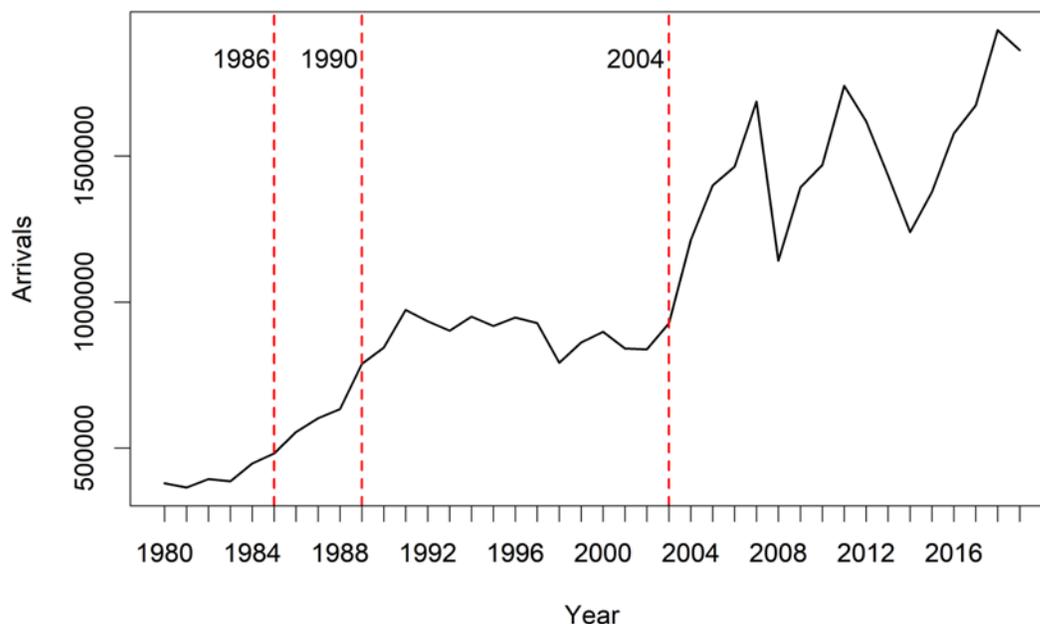

Figure 2: Trends of International Tourism Arrivals in Kenya. The Red Dash Lines Indicate Years When Significant Changes in Arrivals Trends Were Detected

International Tourism Demand in Tourist Destinations

Kruskal-wallis chi-square was used to analyze if there were any significant differences in arrivals to destinations and from source markets over time. Trend analysis revealed variations in arrivals at various destinations and times (χ^2 = 289.25, df = 7, p-value < 2.2e-16), indicating adjustments in preferred destinations. Despite having the highest proportion of total bed occupancy, Mombasa and Nairobi's proportionate contribution to destination visits have dropped over time (Figure 3). Masai region and Central Kenya's proportional occupancy declined steadily over time before rebounding in 2000. The proportion of occupation in Western, on the other hand, remained largely stable until 2007 when it began to rise steadily. On the other hand, no discernible patterns in relative bed occupancy were discovered at the Northern Kenya destination.
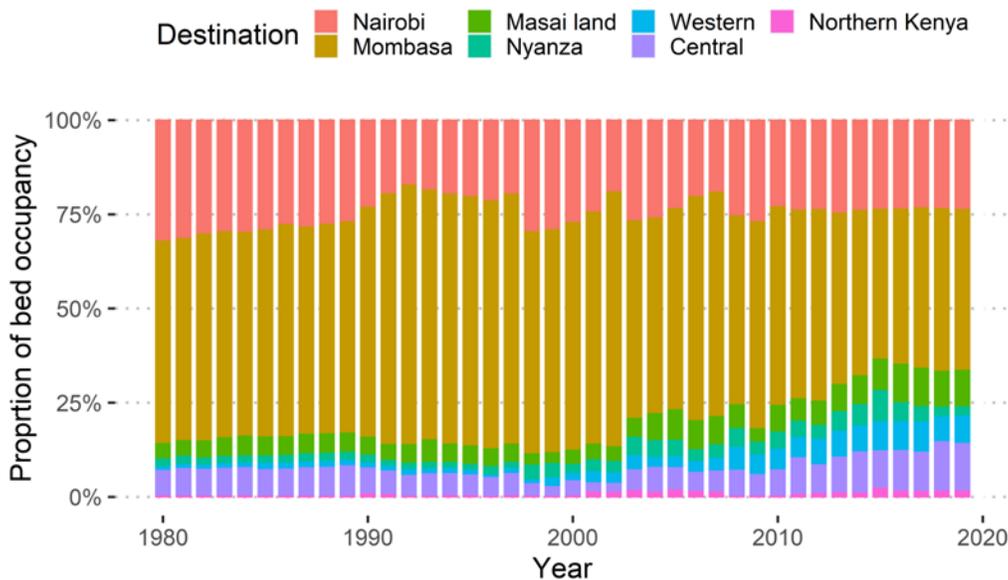

Figure 3: Temporal Patterns Indicating International Tourist Visits in Kenya's Tourist Destinations/ Circuits

Kenya is a peculiar and attractive tourist destination in East Africa and the world. It accounts for about 6% of international tourists in Africa continent (Akama & Ondimu, 2001). Despite this, for a period of time, tourism activities seem to be concentrated on some circuits. For example, Mombasa and Nairobi has had higher international tourist demand compared to other areas. This could be attributed to the attractiveness characteristics of the two locations that has made up tourist strength in these areas. Studies (Mutinda & Mayaka, 2012) revealed that Mombasa was the most popular tourist destination with an 81.48 percent return visit rate, compared to 52.3 percent for Nairobi due to its destination attractors including unique natural features, social and cultural characteristics, and historical monuments among others. The popularity of Nairobi as a tourist destination could be due to its proximity to major national parks and game reserves that have often attracted international tourist. Other areas like Central, Maasai land, and Western have however had a progressive increase over time. These areas have some unique natural features including mountains, cultural diversity, and game reserves but not frequently visited probably due to poor infrastructure. Northern Kenya and Nyanza still lag behind due to the few tourist's attraction sites in the regions.

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The competitiveness of a tourism location has been theorized to be influenced by destination appeal. According to (Huang et al., 2020), spatial temporal patterns enables in relative competitiveness analysis of both the destination and tourism typologies, The Ritchie and Crouch Calgary Model of Competitiveness in tourism defines destination's attractiveness to include both destination attractors and deterrents. According to the model, geographical features, climatic conditions, cultural and social traits, general infrastructure, basic services infrastructure, tourism superstructure, access and transportation options, attitudes toward tourists, cost and price ranges, economic and social ties, and uniqueness are the major components that make up attractions: On the other hand, destination deterrents are factors that affect a place's security and safety, such as political unrest, health and sanitation issues (M. Ndivo & N. Waudo, 2012). Kenya's tourist activities vary widely from one destination to another in terms of natural and manmade attractions, infrastructures and superstructures, cultures as well as landscapes. This could in part explain the varying tourist activity and destinations observed in the study findings.

There have been fluctuations in bed occupancy over the years, with an increasing trend in most of the tourist destinations in Kenya (Figure 4). Most tourist activities in Kenya are rural based apart from Nairobi which is the capital city and a major regional economic hub. This is expected to form a key base for diversified tourism in the country, however, this has not been the case. Several characteristics have been recognized as factors that improve destination appeal. Crouch and Ritchie (1999) mention marketing strategies as one of the aspects that have the ability to increase a destination's perceived attraction. Furthermore, Dwyer and Kim (2003) identify destination management variables capable of increasing the attractiveness of core destination resources and attractors, improving the quality and effectiveness of these key factors and resources, and better adapting to situational conditions.
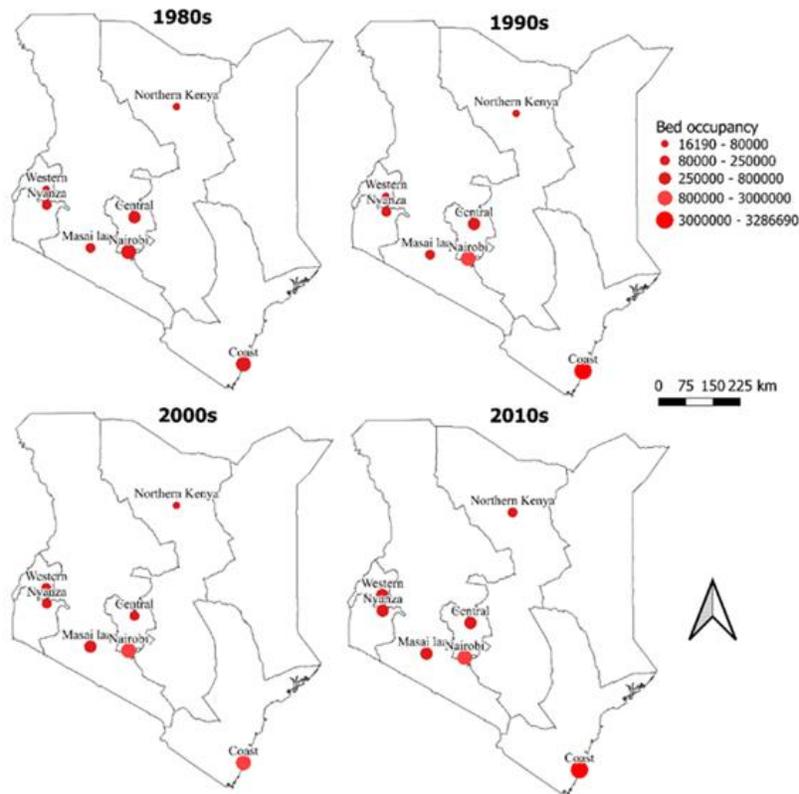
Figure 4: Depiction of Changes over Time in Bed Occupancy Rates across the Primary Tourism Destinations of Kenya

Demand for International Tourism from Source Markets

The number of tourists from the source markets studied differed considerably ($\chi^2 = 207.95$, df = 5, p-value 2.2e-16). The great majority of international tourist trips to Kenya in the 1980s came from Europe followed by Africa, America, and Asia (Figure 5). Middle Eastern visitors made up the smallest percentage of all visitors in Kenya but with a considerable rise since 1993. Overall, international tourists from Europe and Asia have a significant influence on total arrivals in Kenya (p<0.05). The advanced economies (Europe, the Americas, and Asia and the Pacific) have traditionally been the source of international tourists in Kenya. However, arrivls from emerging nations such as China and Germany have increased dramatically in recent years due to rising income levels (UNWTO, 2016). From 1992 until 2009, the proportion of European tourists climbed, then gradually decreased, as African visitors took the lead in the same years. The observed drop in the tourist visit from Europe to Kenya could be attributed to the political instability and terrorism witnessed in the country over the years.
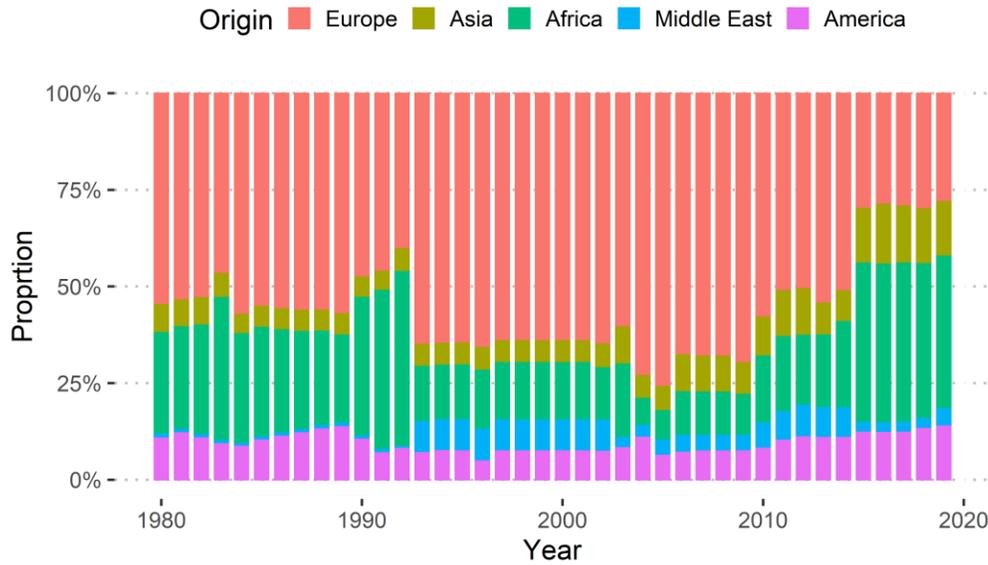
Figure 5: Proportion of International Tourist Arrivals in Kenya from Various Source Markets over Time

An analysis of shift points in the trajectory of arrivals from various source markets is shown in Figure 6. African and Asian visitors to Kenya have been gradually rising mainly due to the rise in middle class citizens with increased disposable incomes for travel and leisure (Assefa & Mollick, 2017). Additionally, globalization and opportunities for international trade in Kenya has also made it possible for Africans and Asians to travel to boost business developments in their regions. However, Europe still remains the world's top source region, accounting for over half of all international arrivals (UNWTO, 2016).
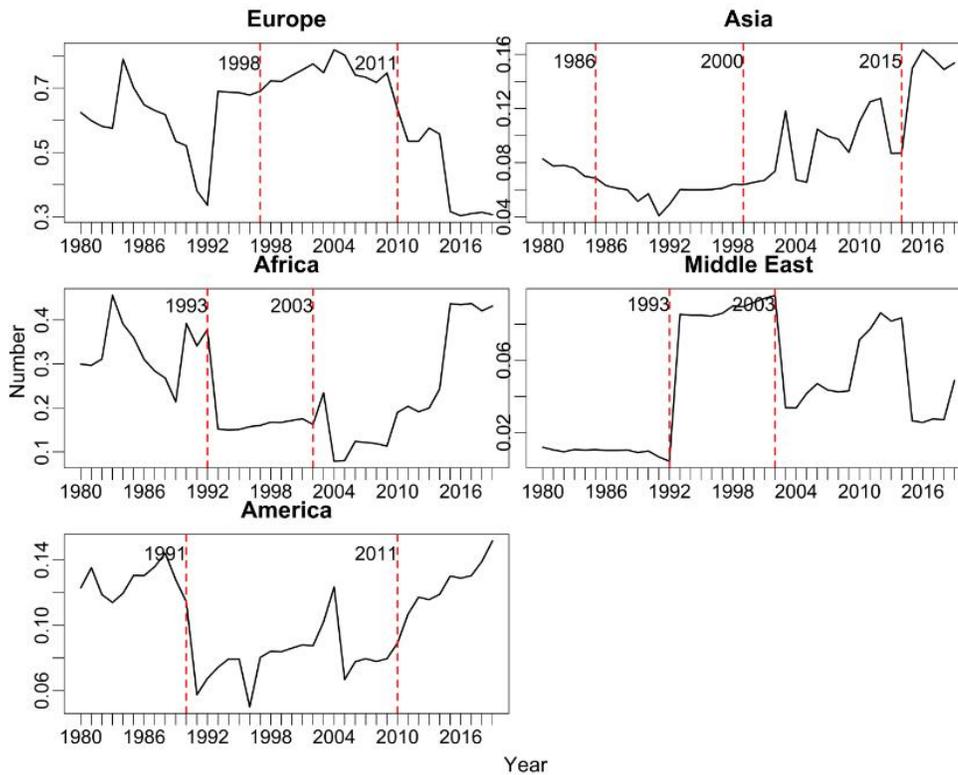
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Figure 6: Trend Analysis of the Share of International Tourists Arriving in Kenya from Various Source Markets

Traveler's Characteristics

Purpose of Travel

The number of tourists visiting for various purposes differed significantly ($\chi^2 = 170.1$, df = 4, p-value < 2.2e-16). The vast majority of overseas visitors to Kenya during the research period were on holiday. The proportion of this type of tourist peaked around 1990 and then began to decline around 2003, as seen in Figure 7. The proportion of international arrivals for business and those in transit has fluctuated throughout time. Prior to 1990, international tourism arrivals were split evenly between business and transit travelers. However, the proportion of transit travelers climbed between the 1990s and 2003, while the number of business travelers decreased in the same years. In 2003, the proportion of persons traveling for business increased while the number going for other reasons including visiting friends and relatives, sports, religion and health decreased. In 1997 and 2002, the proportion of international arrivals for various purposes underwent significant changes.
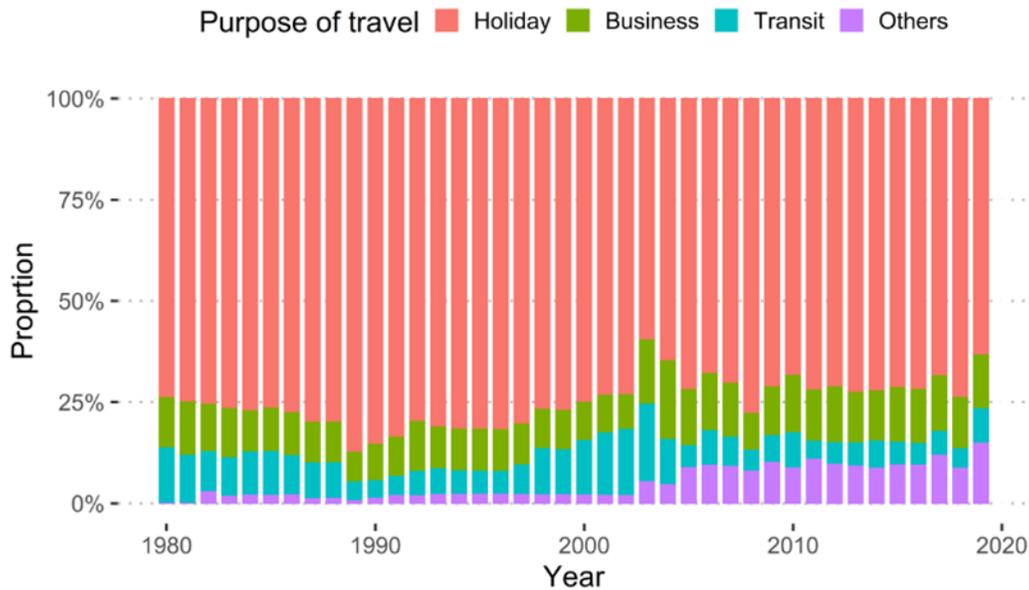
Figure 7: Trends of International Tourist Arrivals in Kenya Categorized by Purpose of Travel

Tourists travel to various destinations for personal satisfaction therefore their decisions are based on evaluation of utility (Figure 8). Kenya is known for its serene environment with a tourism destination developed as a beach and wildlife safari and limited business tourism. The beach and wildlife safari thus makes a more attractive holiday destination as compared to a business destination. Bowen and Whalen (2017) reported that holiday is the most significant category of tourism at the moment and it dominates in terms of participation. Due to the stress brought on by the implementation of dynamic economic processes in modern times, a section of the population is particularly stressed out, especially those living in large economic centers hence the need to go for holidays.
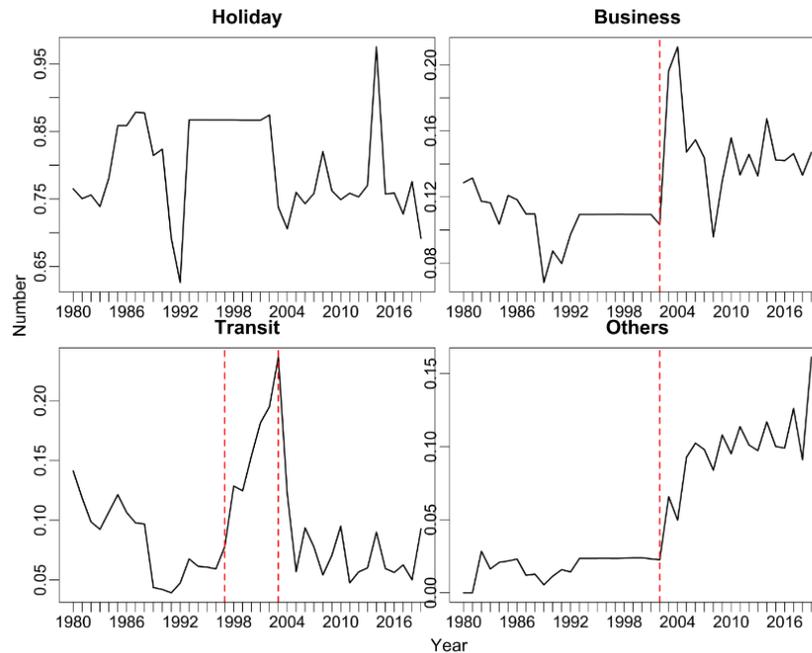
Figure 8: Trend Analysis of the Share of International Tourists Arriving In Kenya Characterized By Purpose of Travel. The Red Dashed Lines Represent Years When Arrivals For Different Purposes Changed Significantly.

Length of Stay

The length of stay for international tourists in Kenya has shifted dramatically over time (Figure 9). The number of tourists who stayed for 0-14 days, 15-28 days, and more than 28 days differed considerably ($\chi^2 = 108.76$, df = 3, p-value 2.2e-16). There was a shift to shorter stay visits over time. In Kenya, the observed changes in the duration of stay trends correspond to general election years. The length of stay is inversely proportional to the individual's expenditure (Barros and Machado, 2010). In essence, empirical research demonstrates that those with medium-high and high incomes are more likely to take vacations and stay longer at a tourist destination (Almeida et al., 2021). This finding supports the view that, on average, tourism exhibits positive demand-income elasticity, increasing consumption as income rises. This is a common hypothesis in tourism demand models, in which price, income, and budget limits dictate the limit of travel consumption options (Nemec Rudež, 2018).
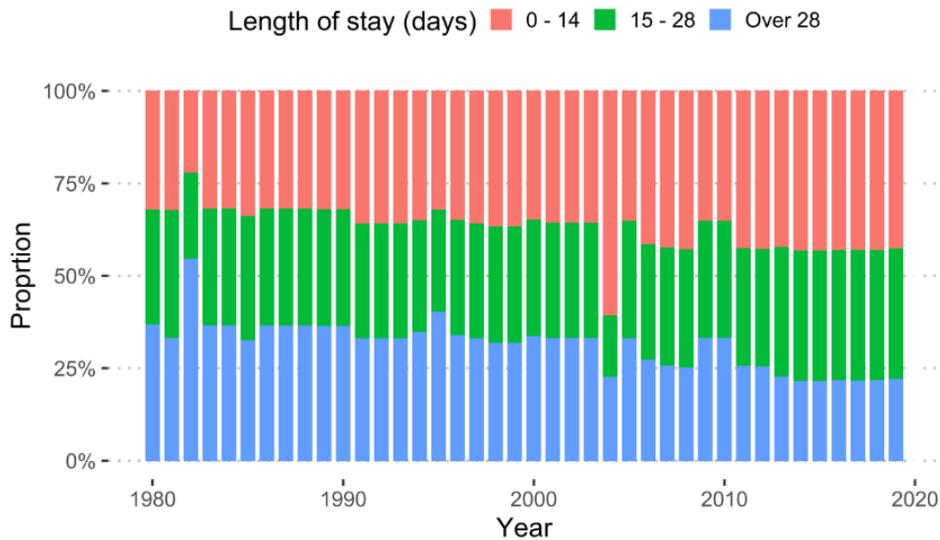
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Figure 9: International Tourism Arrival Trends in Kenya, Broken Down by Duration of Stay

Figure 10 depicts the change points for length of stay trends. The share of visitors staying in Kenya for more than 28 days has progressively decreased in recent years, and they are presently the smallest component of international visitors. On the other hand, the percentage of tourists staying for a short period (0-14 days) has progressively increased through time, while the percentage of visitors staying for 15 to 28 days has remained relatively consistent. Studies noted that sociodemographic characteristics, destination attributes, previous visits, and expenditure affects the length of stay at a destination (Oklevik et al., 2021). These factors could in part explain the variation in the length of stay observed although they were not taken into consideration in the current study. Length of stay is crucial to the management of the tourism industry.

For instance, hotels want to minimize fixed expenses, increase occupancy rates, and optimize yield and G.O.P. (gross operational profit). To do this, one technique is to draw visitors who want to remain longer, including repeat visitors, as the duration of stay is influenced by prior visits, especially during off-peak seasons (Barros & Machado, 2010). Additionally, understanding how visitors choose their stay time is crucial for policy reasons (Oklevik et al., 2021). Short-term visitors typically stay in the city centers and limit their sightseeing to the main tourist sites. In contrast, visitors who remain longer see a wider variety of attractions, travel to more remote areas and have a wider range of negative effects on the economy, society, and environment. Families with kids also frequently stay longer to reduce the overall cost of the package (Barros & Machado, 2010).
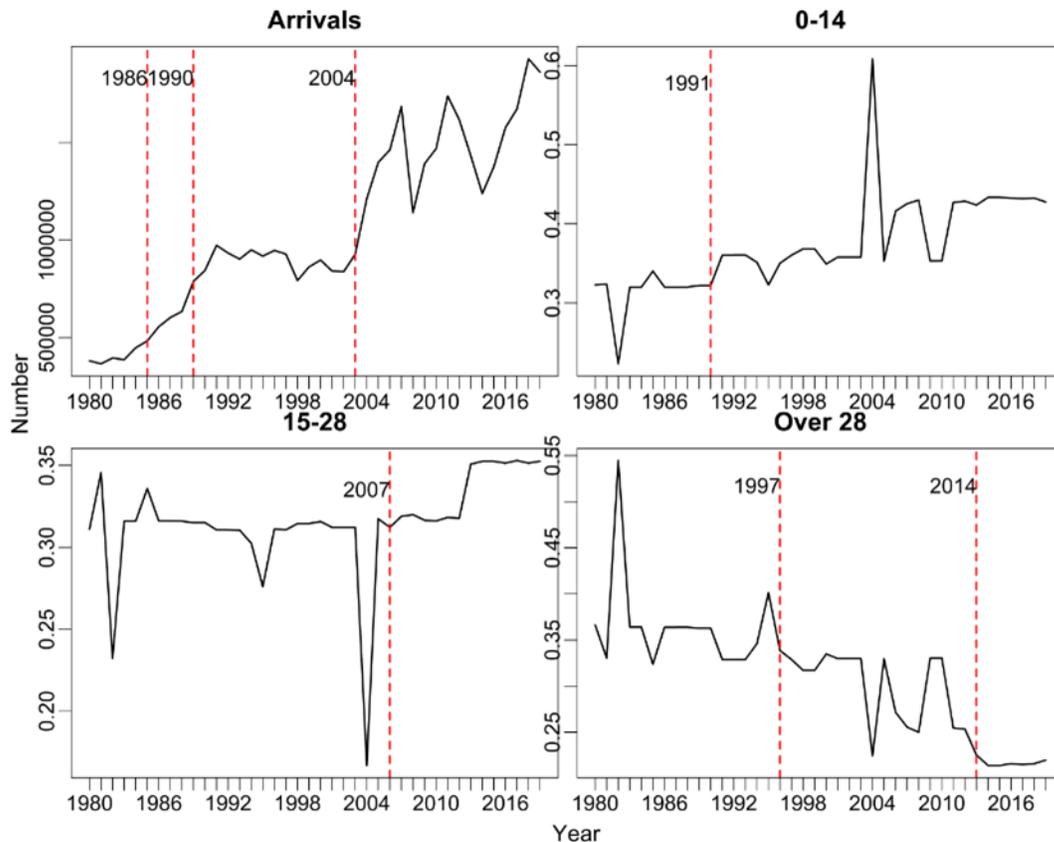
Figure 10: Trend Analysis of the Proportion of International Tourists Who Arrive in Kenya and Are Classified According to Their Length of Stay

Relationship between International Tourism Arrivals and Stochastic Events

Cointergration

This section presents the results of a Johansen-Procedure test for cointegration among the variables in a model. The test was conducted using a trace statistic without a linear trend and constant in cointegration. The test results suggest that there is at least one cointegrating relationship among the variables in the model.

The estimated cointegration equation for the first relation is:

$$Net\ arrivals.l4 - 21970.059 Terrorism.l4 + 1.2560698e + 07 Political\ instability.l4$$
$$- 1.3932889e + 07 Conferences.l4 + 2087.154 Natural\ disasters.l4$$
$$+ 827941.050 * constant = 0$$

Where $l4$ denotes the fourth lag of the variable. The cointegration equation represents the long-run equilibrium relationship among the variables, and indicates how the variables respond to deviations from the equilibrium in the long run.

VAR Model

The Vector Autoregression (VAR) model was estimated with five endogenous variables: net arrivals, terrorism, political instability, conferences, and natural disasters. The model also included

one deterministic variable, constant. The sample size used in this estimation was 39. The log-likelihood of the model was -1037.197, and the roots of the characteristic polynomial were: 1.035, 1.035, 0.848, 0.6604, 0.6604, 0.5843, 0.5843, 0.3015, 0.3015, and 0.1243.

The Portmanteau Test had a χ^2 value of 193.11 with 200 degrees of freedom, and a p-value of 0.6237. The p-value indicated that there was no significant autocorrelation in the residuals at the tested lags. This suggests that the VAR model may be a good fit for the data, as the residuals do not exhibit any significant patterns or trends that are not accounted for by the model.

Results of an ARCH (autoregressive conditional heteroskedasticity) test had χ^2 value of 360 with 3375 degrees of freedom and a p-value of 1 indicating that there was no evidence of significant ARCH effects in the residuals, and the data appears to follow a homoskedastic process. Therefore, it suggests that the VAR model is an appropriate fit for the data, and the residuals are not exhibiting any significant volatility clustering or time-varying volatility patterns.

The results for the equation of net arrivals indicate that past values of net arrivals, Cconferences, terrorism, and the constant variable significantly affect net arrivals in the current period. Meanwhile, past values of political instability and natural disasters do not have a significant effect on the current value of net arrivals. The R-squared value for this equation is 0.8185, suggesting that the independent variables explain about 81.85% of the variation in net arrivals. These findings may have important implications for policymakers and stakeholders concerned with the relationship between tourism and security issues. The estimated model could be used to predict the impact of events such as natural disasters or political instability on tourism arrivals or terrorism.

Granger Causuality

A Granger causality test was conducted to examine whether the four predictor variables (terrorism, political instability, conferences, and natural disasters) significantly predicted the net arrivals of international tourists in a multivariate dataset, using a VAR model. The F test and Wald χ^2 test results are reported in Table 1, which shows that the predictor variables had significant Granger causality effects on the response variable of Net Arrivals. Specifically, Conferences and Natural Disasters had significant effects on Net Arrivals at the $p < 0.001$ level, while Terrorism had a significant effect at the $p < 0.01$ level. In addition, the table shows that the lagged values of all predictor variables had a significant impact on Net Arrivals ($p < 0.01$), indicating that a combination of the four predictor variables provided a better prediction of Net Arrivals than the lagged values of Net Arrivals alone.

Table 1: Granger Causality Test Results for a VAR Model on Net Arrivals and Stochastic Events

	F	df1	df2	p		χ^2	df	p
Net.arrivals <= Terrorism	3.58	2	28	0.041	*	7.15	2	*
Net.arrivals <= Political.instability	1.70	2	28	0.201		3.40	2	
Net.arrivals <= Conferences	9.06	2	28	<0.001	***	18.13	2	***
Net.arrivals <= Natural.disasters	1.18	2	28	0.322		2.36	2	

Net.arrivals <= ALL	2.81	8	28	0.020	*	22.49	8	**

The asterisks indicate statistical significance levels (p<0.05, ** p<0.01, *** p<0.001).*

These results suggest that the occurrence of conferences, terrorism, and natural disasters significantly impacted the number of international tourist arrivals, providing important insights for policy-makers and tourism industry stakeholders.

Terrorism has increasingly become a more serious danger to the tourism industry. Previously, international terrorism mostly targeted foreign interests in Kenya (Njoya et al., 2022). Meetings, incentives, conferences, and exhibitions (MICE) are important for tourism growth and economic development of a particular country or region. Despite the fact that several conferences were held in Kenya during the study period for instance United Nations Conference on Human Settlements (Habitat I) 1976. Kenya still showed fluctuations in tourist arrival which could be attributed to a lack of emphasis on the development, marketing, and promotion of conferences as tourism products in the country. This is supported by research conducted by Odunga et al. (2011) who reported on the sustainable tourism development in Kenya and attempted to stimulate dialogue by analyzing the impacts and future potentials of tourism in Kenya.

Forecasting of International Tourism Arrivals and Stochastic Events

The VAR model was used to forecast the endogenous variables for the next 20 years. For each variable, the output provided the forecasted values, lower and upper bounds of the 95% confidence interval, and the width of the confidence interval (CI) (Figure 11). The predicted trend for net arrivals variable shows a decreasing trend in the short-term with a decrease in arrivals over the first three forecast periods, followed by a small increase in the fourth period, and then a substantial increase in the remaining forecast periods. The predicted trend for terrorism variable shows a fluctuating pattern with a slight increase in the first period, followed by a sharp decline in the second period, and then a gradual increase in the third period. The fourth and fifth periods show a decline in terrorism, followed by a gradual increase in the remaining forecast periods. The predicted trend for political instability variable shows a steady increase over the entire forecast horizon, with a sharp increase in the first period followed by a gradual increase in the remaining periods.
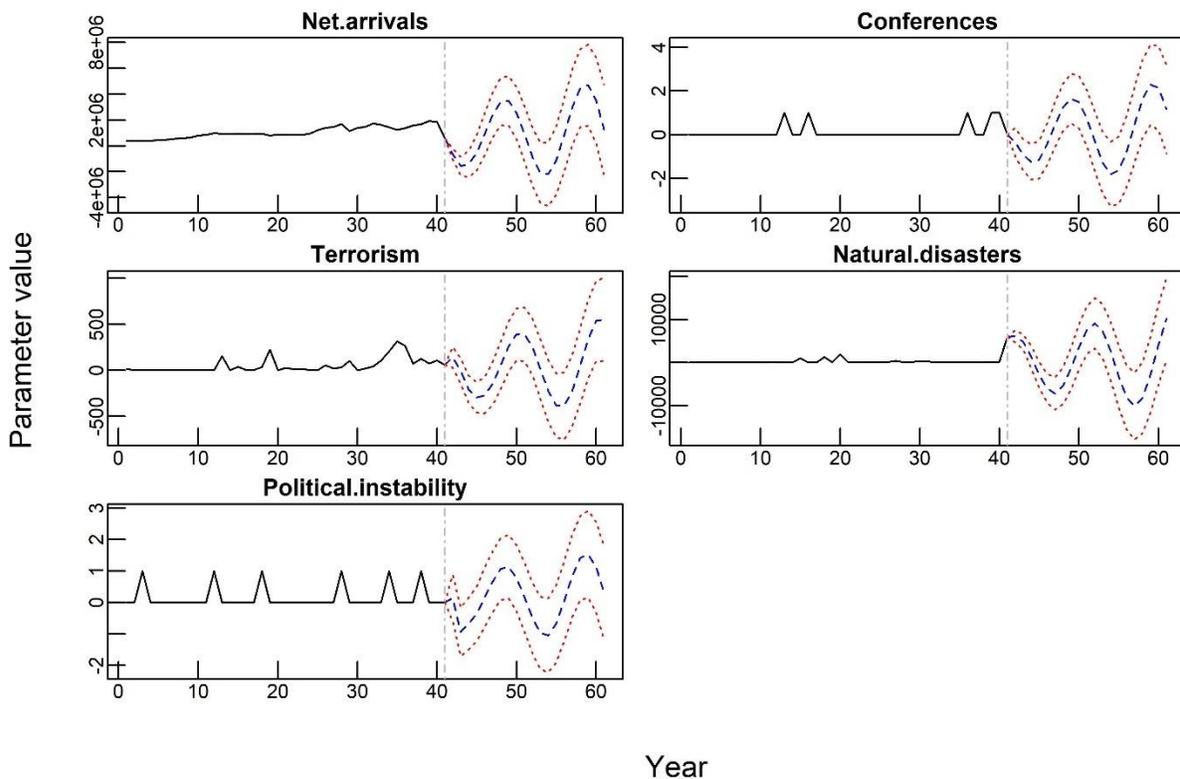
Figure 11: Forecast of the Next 20 Periods Based on a Vector Autoregression (VAR) Model. The Forecast Values are Shown as a Blue Dashed Line, While the Red Dotted Lines Represent the 95% Prediction Intervals. The Model was Estimated Using a Level Specification, and the Forecast Values Represent the Expected Behavior of the Variables in the Absence of Any Shocks or Unexpected Events

Impulse Response Functions (IRF)

Based on the impulse response coefficients and their confidence intervals, it appears that political instability has a negative impact on net arrivals, while terrorism has a more mixed impact on net arrivals (some positive and some negative effects at different lags).

Given these findings, it may be helpful for policymakers to take steps to address political instability, such as promoting peaceful conflict resolution, fostering stable democratic institutions, and reducing corruption. On the other hand, policies to address terrorism are more complex and context-specific, but could include measures such as improving border security, increasing intelligence and surveillance, and working with international partners to disrupt terrorist networks.

Variance Decomposition

The FEVD breaks down the forecast error variance of each variable into contributions from its own shocks as well as the shocks of other variables (Figure 12). For example, in the first plot, we see that the forecast error variance of net arrivals is entirely due to its own shocks. In the second row, we see that 0.14% of the forecast error variance of net arrivals is due to the shock from

terrorism, 0.57% is due to the shock from political instability, 8.78% is due to the shock from Conferences, and 3.92% is due to the shock from natural disasters.
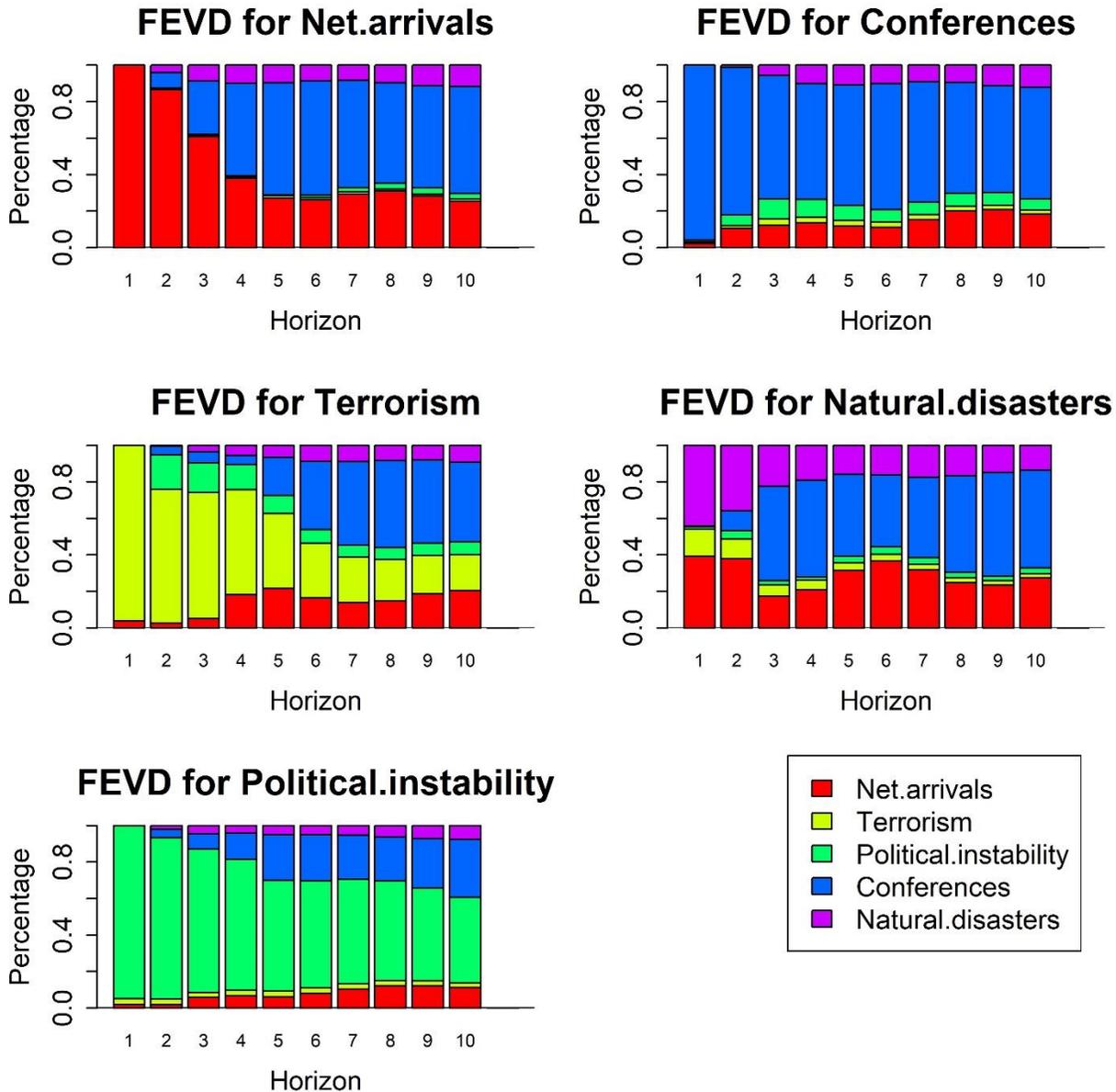

Figure 12: Forecast Error Variance Decomposition (FEVD) Plot for a Vector Autoregression (VAR) Model of International Tourism Arrivals and Stochastic Events Affecting Tourism in Kenya. The Plot Shows the Percentage of the Forecast Error Variance of Each Variable in the VAR Model That Can Be Attributed to Shocks to That Variable or to Shocks to Other Variables in the System

Overall, the FEVD provides information about the relative importance of each variable's own shocks and the shocks from other variables in explaining forecast error variance over time.

Stochastic events could result into both positive and negative impacts which could have a diversified impact on visitor arrivals to the region (H. Zhang et al., 2022). Stochastic events such

as political issues, terrorism, pandemics, and travel advisories have had a negative impact on international tourist arrivals in Kenya, causing fluctuations in the industry. Multipartyism, for example, resulted in -4.22 percent, -3.47 percent, and -2.00 percent decreases in arrivals in 1992, 1993, and 1997, respectively. These trends can also be seen following the general elections in 2001 (-6.79 percent), 2002 (-0.35 percent), 2008 (-47.73 percent), 2013 (-12.95 percent), and 2017 (-17.5 percent). During the 2007–2008 era, there was a noticeable fall in arrivals with inbound visitor arrivals thought to have decreased by 61.6%. Additionally, when Kenya intervened militarily in the Somalia conflict in October 2011 the recovery that had been observed from 2008 to 2011 was again halted by a rise in terrorist activity in the country (Buigut, 2018; Buigut et al., 2017). These observations are in agreement with (Fletcher & Morakabati, 2008) study in 2008 which revealed that international tourist arrivals and receipts to Kenya and Fiji have been affected by political instability and terrorist events.

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

This study provides a comprehensive analysis of the fluctuations in international tourism arrivals to Kenya, taking into account various factors such as source markets, destinations, purpose of visits, and stochastic events. The findings of this study suggest that the tourism industry in Kenya is highly sensitive to various external factors, including terrorism, pandemics, political instability, and natural disasters. However, the study also identified some resilient source markets that could be targeted by policymakers to minimize the negative impacts of these factors. Overall, this study provides valuable insights for policymakers, tourism industry players, and other stakeholders interested in the sustainable development of the tourism industry in Kenya.

Recommendation

The study recommends that policymakers prioritize measures that enhance safety and security for visitors and promote sustainable tourism practices to reduce the impact of negative events on the industry in the long term.

Study Limitations

This study has some limitations that should be acknowledged. Firstly, the analysis is limited to the factors that were included in the dataset and may not account for other factors that could impact international tourism arrivals to Kenya. Additionally, the study only focuses on international tourism and does not consider domestic tourism. Despite these limitations, this study provides a valuable contribution to the understanding of the factors that impact international tourism arrivals to Kenya and offers practical recommendations for policymakers and stakeholders interested in the sustainable development of the tourism industry.

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