Contribution of Adventure Recreation Infrastructure to Sustainable Rural Livelihood in Nyeri, Kenya

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ABSTRACT

It is becoming more common for governments to acknowledge adventure tourism as a strategy for responsible and sustainable economic growth that is beneficial to society. This form of tourism has the potential to improve rural livelihoods by providing smallholders with multiple alternatives and opportunities to increase non-farm income. The aim of this study was to assess the contribution of adventure recreation development to rural livelihoods in Nyeri County, Kenya. The specific objective of the study was to examine the effects of adventure recreation infrastructure development on rural livelihood in Nyeri County. The study adopted an exploratory research design. The target population was 248,050 household heads. The sample size was 384 respondents comprising rural household heads within Nyeri County. Cluster sampling was used for the study to divide the sample size into smaller groups (the Eight sub-counties in Nyeri County), while simple random sampling was used to distribute the sample size proportionally among the eight sub-counties. Primary data was collected through questionnaires where closed-ended questions were used. The questionnaire responses were collected using a 5-point Likert scale where 1 indicated strong disagreement, and 5 indicated strong agreement with each statement. Additionally, structured interviews were done for the respondents who had difficulties reading and writing. In this case, the questionnaire was used as an interview guide. The findings revealed that adventure recreation infrastructural development significantly (10.2%) contributed to rural livelihood. Therefore, to enhance the rural livelihoods in Nyeri County, there is a need for the national and county governments to develop more adventure recreation infrastructure and upgrade the existing ones.

APA CITATION


CHICAGO CITATION

INTRODUCTION

Tourism is now having an increasing impact on the economic fronts of countries, contributing to people’s economic, social, cultural, and environmental livelihoods. Tourism has the same global economic impact as agriculture or mining. When direct, indirect, and induced benefits were considered, travel and tourism contributed to 7.6% of the worldwide GDP in 2022. In addition to the 81.9% increase in international visitor expenditure and the 20.4% increase in domestic visitor spending, 22 million new jobs were created in 2022 (United Nations World Tourism Organisation [UNWTO], 2022). Tourism is such an important part of modern society that it requires significant research and consideration in order to reap the greatest benefit (Sharma, 2016). The fact that income earned in places of residence is spent in places “visited” is one of the key economic characteristics of the tourism industry (Song & Wu, 2022). The opportunity for job creation and revenue generation at the local level is the primary economic benefit of tourism for a region or country. Tourism also benefits regional and local economies by bringing money into rural areas, stimulating new business ventures, and promoting positive image of the tourism region. Tourism enhances cultural pride, a sense of ownership and control, and reduces vulnerability by diversifying economic activities (Song & Wu, 2022).

Governments are increasingly recognizing adventure tourism as a strategy for sustainable and responsible economic growth that benefits the society, given its demonstrable benefits to the environment, local people, and local economies (Padilha & Hoff, 2011). Nature-based recreation is regarded as a critical tool for enhancing rural areas throughout Europe, as it diversifies the economy through links to other sectors such as transportation and food production (Couto & Castanho, 2021). Outdoor recreation on public lands and waters generates an annual consumer expenditure of $887 billion, $65.3 billion in federal tax revenue, $59.2 billion in state and local tax revenue, and 7.6 million jobs in the United States. Outdoor recreation spending ($887 billion) includes both purchases of outdoor recreation products like gear, apparel, footwear, equipment, services, and vehicles ($184.5 billion) and trip and travel expenses like airfare, fuel, lodging, groceries, lift tickets, guides, and lessons ($702.3 billion) (Melkani & Kumar, 2021).

As governments all over the world look for ways to improve rural livelihoods, the introduction of recreational activities and their elevation has become a common strategy for increasing rural revenue, with adventure recreation resources serving as key attractions. Adventure recreation has the potential to improve rural livelihoods by providing smallholders with multiple alternatives and opportunities to increase non-farm income. It increases employment, broadens the economic avenues, and revitalizes local crafts. This goes a long way in creating clusters and special economic zones in rural areas as well as leveraging economies of scale and increasing nonfarm employment (Couto et al., 2021).
Tourism necessities trigger the development of infrastructure utilities and amenities, which are not only used by the visitors but become valuable to the local population as well. The economic importance of tourism in the national economy can be appreciated with reference to its contribution to infrastructural improvement (Mathieson and Wall, 1982). Numerous developing economies rely on tourism to generate employment and income, enhance public health and sanitation, and serve as a teaching tool for nature conservation (Su et al., 2019). Tourism infrastructure is one of the key aspects of tourism development that has been noted as having great socio-economic contributions to destinations.

Mandić et al. (2018), in a study on the relationship between tourism infrastructure, recreational amenities, and tourism development, found out that infrastructure, i.e., a collection of tourism amenities dedicated to meeting the needs of visitors and residents, is an important component of today’s tourism destination. In addition, Hussain (2019) investigated the effects of transportation infrastructure development, particularly roads, on the livelihood of remote communities in Gilgit-Baltistan, Pakistan. The study revealed that transportation infrastructure development has been a critical component in people's mobility and diversification to different livelihood options.

**Adventure Tourism in Kenya**

In Kenya, the Ministry of Tourism and Wildlife has set out a plan to boost the country's already robust adventure tourism by developing a central hub for outdoor and exhilarating pursuits, tourist amenities, and culinary delights in and around Mount Kenya. This is aimed at creating and improving upon events centred on wildlife, nature, and scenic products, as well as building opportunities for adventure community-based tourism. In addition, the move seeks to expand and improve existing activities and associated facilities to promote mountain climbing, walking and hiking, mountain biking, canopy tours, equator experiences, arts and crafts, and up-close animal encounters (Chiyumba, 2015).

Among the high potential areas of Mount Kenya for adventure and recreation tourism is Nyeri County owing to the presence of such attractions the Aberdare Ranges, Mt Kenya, Nyeri Hills, Mau Chilumba hide-out caves in Naromoru, steep ridges and valleys, and hills such as Karima, among other resources. In this county, there has recently been an increase in adventure recreation activities, boosted by biking trails, the Chaka Ranch outdoor facilities, Mt Kenya treks, and the County Government’s initiatives to map, develop, and promote tourism sites, as well as coming up with incentives to promote leisure facilities including the training of mountain guides, porters and cooks (Makunyi, 2023). Despite these efforts, little has been done to assess the effects of adventure recreation on rural livelihoods within Nyeri County. As a result, the verifiable impacts of adventure recreation on the destination’s rural livelihoods are not formally documented. This concern formed the focus of this study as it sought to assess the effect of adventure recreation on rural livelihoods within this county. Specifically, the study sought to examine the effects of adventure recreation infrastructure development on rural livelihoods in Nyeri County.

The study was guided by the Null hypothesis that “there is no significant relationship between adventure recreation infrastructure development and rural livelihoods in Nyeri County”.

**MATERIAL STUDIED**

**Area Description**

The study was carried out in Nyeri County in Kenya and targeted individual households. There were a total of 759 164 people and 248 050 households in the county (KNBS, 2019). According to KNBS (2019), Nyeri County has Eight Sub Counties. They were: Kieni East, Kieni West, Mathira East, Mathira West, Nyeri Central, Mukurweini, Tetu and Othaya. The county boasts a sizable adventure tourism sector in the eight sub-counties named above and
offers adrenaline-pumping adventures such as hikes, kayaking and mountain climbing. The total area of land used for recreation in Nyeri County is 62.426 Ha. Road, rail, and air transport systems are all part of Nyeri County's infrastructure. In the county, paved roads make up about 17.4% of the total. In addition, there are four airstrips, namely Mweiga, Mt. Kenya, Nanyuki, and Nyaribo. The county is traversed by the 77.7 km long Nairobi-Nanyuki Railway line. There are three railway stations along the line, and they are situated in Kiganjo, Karatina, and Naromoru (Nyeri County, 2019).

Method

An exploratory research design was used in the study. This is crucial in finding out what is happening and evaluating phenomena in a new light (Saunders et al., 2015). The study employed a survey method with a quantitative approach to gather the data. Surveys with a quantitative approach are suitable when quantified information is required concerning a specific population and when individuals' own accounts of their behaviour and/or attitudes are acceptable as a source of information (Veal, 2015).

The study targeted Nyeri county households. There were a total of 759,164 people and 248,050 households (KNBS, 2019). Following the steps of the Cochran’s formula below, the study obtained a sample size of 384.

\[ n_0 = \frac{Z^2pq}{e^2} \]

In this study, 0.05 was used as the desired level of precision (or the margin of error); p is the estimated percentage of the population that possesses the given attribute; q is 1 – p; z is value found in the z table at 1.96 and 0.5, 2, (0.5) (0.5).

\[ n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = 384 \text{ respondents} \]

Data was collected using questionnaires, given their potential for collecting precise data; the questionnaire was selected (Young, 2015). Closed-ended questions were used because they pose limited coding and analysis challenges. All responses on the questionnaire were collected using a 5-point Likert scale where 1 indicated strong disagreement and 5 indicated strong agreement with each statement. Additionally, structured interviews were done for respondents who had difficulties reading and writing. In this case, the questionnaire was used as an interview guide. Data was analyzed using descriptive statistics, such as mean, standard deviation, and frequency distribution. The mean represents the average of the range of the provided data values, while the variance represents the degree to which the data values deviate from the mean, and the standard deviation represents the degree of dispersion of the values in the provided data set (Olya, 2023). A regression model was used to do inferential statistics in order to evaluate how adventure infrastructure affects people’s livelihoods. A statistical technique for determining the nature and direction of a link between several variables is regression analysis (Dwyer et al., 2012). The regression findings showed that the association between the variables was really valid. The F-ratio was used to generate the ANOVA, which assesses how well a model fits the data. The nature of the relationship between the dependent and independent variables was determined using
bivariate analysis, which includes correlation and regression studies.

**RESULTS**

**Respondents Demographics**

A total of 335 questionnaires were completed and returned out of 384, representing a response rate of 87.23%. As noted by Mugenda & Mugenda (2003), a 50 per cent rate of response or higher is appropriate and sufficient for a researcher to conduct data analysis and reporting. The study revealed that male-headed households accounted for 76.4% of all households, while female-headed households accounted for 23.6%. This information revealed that men and women in a household setup played different roles and thus contributed differently to the household's livelihood. It also conformed to the assumption of traditional home setup, where the majority were headed by men. The majority of respondents (31%) were aged between 40 and 49 years, while the least proportion, 0.9% of the respondents, were aged 70 years and above. This showed that a great proportion of respondents were of middle age or younger, and they were more likely to have access to livelihood.

The majority of the respondents (23.6%) had resided in Nyeri County for a period of between 10 and 14 years, while 10.4% had lived there for less than 5 years. The results show that most respondents had resided in Nyeri County for more than five years and, therefore, conversant with how elements of adventure recreation affect the livelihood of Nyeri County residents and thus competent to respond to the research questions. In terms of source of livelihood, the majority of the respondents (28.3%) derived their income from the informal sector, 26.9% from farming, 25.4% held formal employment, and 19.4% of respondents were self-employed.

**Table 1: Study Respondents’ demographics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>23.6</td>
</tr>
<tr>
<td>Male</td>
<td>76.4</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Less than 29</td>
<td>13.1</td>
</tr>
<tr>
<td>30-39</td>
<td>23.9</td>
</tr>
<tr>
<td>40-49</td>
<td>31</td>
</tr>
<tr>
<td>50-59</td>
<td>21.5</td>
</tr>
<tr>
<td>60-69</td>
<td>9.6</td>
</tr>
<tr>
<td>70 and above</td>
<td>0.9</td>
</tr>
<tr>
<td>Duration lived in the study area</td>
<td></td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>10.4</td>
</tr>
<tr>
<td>5-9</td>
<td>22.4</td>
</tr>
<tr>
<td>10-14</td>
<td>23.6</td>
</tr>
<tr>
<td>15-19</td>
<td>20.3</td>
</tr>
<tr>
<td>Over 20 years</td>
<td>23.3</td>
</tr>
<tr>
<td>Source of income</td>
<td></td>
</tr>
<tr>
<td>Farming</td>
<td>26.9</td>
</tr>
<tr>
<td>Formal employment</td>
<td>25.4</td>
</tr>
<tr>
<td>Self-employment (Business)</td>
<td>19.4</td>
</tr>
<tr>
<td>Informal sector</td>
<td>28.3</td>
</tr>
</tbody>
</table>

*Note: Respondents’ demographics and the percentage representing each characteristic.*

**Effect of Adventure Recreation Infrastructure Development and Rural Livelihoods**

The research objective was to examine the effects of adventure infrastructure development on rural livelihoods in Nyeri County. *Table 2* shows the analysis of adventure infrastructure development’s effect on the livelihood of the rural community living in Nyeri County. The findings revealed a
A mean of 4.83 and a standard deviation of 0.47 for the effect of increasing the local community's income. The average number of local jobs created was 4.32, with a standard deviation of 0.777. In addition, the average increase in tourism-related investment was 4.22 per cent, with a standard deviation of 0.735 per cent. In addition, support for local farm produce sales had a mean score of 4.40 and a standard deviation of 0.564, while improved food security had a mean score of 4.34 and a standard deviation of 0.659. According to Table 2, there was consensus among respondents on all of the issues under consideration.

**Table 2: Respondents perspectives on adventure recreation infrastructure development**

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Std. Error</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adventure recreation infrastructure enhances the income of the local community</td>
<td>335</td>
<td>4.83</td>
<td>.026</td>
</tr>
<tr>
<td>The available Adventure recreation infrastructure creates employment for the local community</td>
<td>335</td>
<td>4.32</td>
<td>.042</td>
</tr>
<tr>
<td>The available Adventure recreation infrastructure brings investment in businesses that support the community</td>
<td>335</td>
<td>4.22</td>
<td>.040</td>
</tr>
<tr>
<td>The available Adventure recreation infrastructure supports the sale of local farm produce</td>
<td>335</td>
<td>4.40</td>
<td>.031</td>
</tr>
<tr>
<td>The available Adventure recreation infrastructure has led to improved food security</td>
<td>335</td>
<td>4.34</td>
<td>.036</td>
</tr>
</tbody>
</table>

**Note:** CI. Livelihood aspects affected by adventure recreation infrastructure

The study revealed that some infrastructure within the chosen sites needed to be upgraded to benefit both tourists and the local community. Further, the study indicated that when a region develops tourism, the local infrastructure is improved to fulfil the region's development needs.

**Regression Analysis of Infrastructure Development and Rural Livelihood**

Regression analysis was performed to establish the link between rural livelihood and infrastructure for adventurous leisure. As indicated in Table 3, the R-value of 0.324 demonstrated a connection between the development of infrastructure for adventure recreation and rural livelihood. The adjusted R² value was 0.102, implying that with every other parameter assumed to be constant, the adventure recreation infrastructure explains 10.2% of the improvement in rural livelihood, with the remaining 89.8% being explained by other variables not considered in the current study.

**Table 3: Adventure Recreation Infrastructure Development Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>Adjusted R²</th>
<th>Std. Error of the Estimate</th>
<th>R² Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.324</td>
<td>.105</td>
<td>.102</td>
<td>.36914</td>
<td>.105</td>
<td>39.126</td>
<td>1</td>
<td>333</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Note:** Predictors: (Constant), Adventure Recreation Infrastructure Development, Dependent Variable: Rural Livelihoods

The model was significant with a p-value of .000, which is less than .05, and an F ratio of 39.126, as shown in Table 4 below. This suggests that, when examined separately, adventure recreation infrastructure has a significant impact on rural livelihood improvement.

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Further analysis was carried out to determine whether to reject or fail to reject the null hypothesis.

**Table 5: Coefficients of the model for Adventure Recreation Infrastructure Development**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>(Constant)</td>
<td>3.011</td>
<td>.214</td>
<td>.140</td>
<td>14.082</td>
<td>.000</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>.301</td>
<td>.048</td>
<td>.324</td>
<td>6.255</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. a. Dependent Variable: Rural Livelihoods

As presented in Table 5, \( \beta = 0.301 \) at a \( p \) value of .000, which is less than 0.05. This shows that Adventure Recreation Infrastructure development had a significant effect on the improvement of rural livelihoods. The model bivariate linear regression equation generated is;

\[
Y = 3.011 + 0.301 (X_1) + e \tag{1}
\]

Where:

3.011 is the constant for the point at which the regression equation crosses the Y-axis and \( X_1 \) is the Adventure Recreation Infrastructure Development index.

This implies that for every additional increase in the unit of Adventure Recreation Infrastructure Development, rural livelihood is expected to increase by 0.301. The null hypothesis, \( H_{01} \), is rejected based on Table 1.3 since there is a substantial correlation between the development of adventure recreation infrastructure and improvements in rural livelihoods.

**DISCUSSION**

This research sought to examine the effects of adventure recreation infrastructure development on rural livelihoods in Nyeri County. From the study, increment of income, food security, sustainable use of natural resources, support for local businesses, increased investments, access to market for local farm produce (crops and livestock), engagement of local labour as well as training and capacity building are key aspects in enhancing rural livelihood. In addition, the study established that developing and improving the elements of adventure recreation infrastructure, such as reliable power supply, health centres, good motorable roads, waste disposal, fire stations, clean portable water, security posts, and telecommunication services, is critical in enhancing the ability of the adventure recreation infrastructure to enhance rural livelihood.

The study results indicated that the enhancement of rural livelihood is dependent on the development of adventure recreation infrastructure. Significant results were obtained at the 5% significance level (\( r = .324, p\)-value = 0.000), indicating that there was a significant relationship between infrastructure development and rural livelihood, and thus, the null hypothesis was rejected because a positive correlation was found between these variables. The adjusted \( R^2 \) value of 0.102 indicated that adventure recreation infrastructure explained 10.2% of rural livelihood when all other factors were held constant.
The study results corroborate with Hussain (2019), who found that the reaction of the rural community to the construction of new roads is considered a crucial element in their livelihood and survival plans. The construction of roads created a number of employment opportunities that would otherwise not have been feasible in such a remote location. The development of road infrastructure has completely changed the community's way of life and is now seen as a crucial component of that way of life. The now available hospitals and schools would not have been possible without roads. In addition, transportation infrastructure development is a crucial element in people's mobility and diversification to different livelihood options.

The study results also agree with the findings of Mandić et al. (2018), who found that infrastructure development is an essential component of today's tourist destinations, which is focused on meeting the requirements of both tourists and locals. The tourism infrastructure is considered a resource for the common good. Most of the time, it is a service offered by government agencies with the goal of assisting the local community and its development.

CONCLUSION AND RECOMMENDATIONS

The study revealed that rural livelihood could be improved through the development of adventure recreation infrastructure. To fully improve rural livelihood through the development of adventure recreation infrastructure, there was a need for different stakeholders, such as local and county governments, to invest in portable water for the locals and improve the state of feeder roads. The national and county governments need to develop more infrastructure and upgrade the existing, especially in regions with high natural capabilities and low per capita income, so as to encourage more adventure recreation in the locality by enhancing mobility to magnificent adventure sites. Investing in new infrastructure, such as roads, water and electricity supply, sanitation, and communications, can support tourism development, especially in rural destinations. With good planning, such infrastructure can also benefit the underprivileged by offering them access to essential services and by creating new, quicker routes to marketplaces. Developing infrastructure encouraged by adventure tourism will help the area’s poor, either directly or indirectly, by providing support to other industries.

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