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MOBILE-APPLICATION USAGE POTENTIAL FOR NATURE INTERPRETATION AND VISITOR MANAGEMENT AT MASAI MARA NATIONAL RESERVE, KENYA; WILDLIFE VIEWERS' PERSPECTIVES

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Abstract: Visitor management is a vital aspect of destination management, and several ways are used to balance conservation goals and tourist satisfaction. In this regard, nature interpretation has been used to achieve this delicate balance of conservation and tourist satisfaction. Various nature interpretation approaches have been used, with each strategy having differing expense, knowledge, and human resource requirements. Indeed, advancement and extensive usage of cellphones and the internet present new opportunities to be exploited for smart nature interpretation practicalities. Thus, this study attempted to evaluate the potential for using mobile Applications for environmental interpretation in Kenya's Masai Mara National Reserve. 570 people were surveyed, including 413 tourists and 157 tour guides. The study indicated that while nature (plants and animals) draws people to the reserve, other elements of the suggested Mobile Application are crucial. Correlational statistics revealed that the proposed features were less affected by the respondents' demographic factors. The study revealed that smartphone Applications might sustainably distribute environmental interpretation information in natural environments.

Keywords: wildlife tourism, visitor management, nature interpretation, wilderness navigation mobile Application, visitor information, tour guiding, trail orientation signage, Masai Mara

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INTRODUCTION

Nature interpretation is an educational activity that examines and attractively reveals an area's physical, biological, and cultural attributes and interrelationships using tangible objects and first-hand experience to create satisfaction, caring actions, awareness, and obligation to the interpreted values and areas. Nature interpretation attempts to convey cultural and natural heritage values, deter negative impacts and support conservation initiatives of protected areas. Over the years and also in the contemporaries, nature interpretation has become one of the essential foundations in visitor management as destination managers, and planners endeavour to balance between sustainable conservation of tourism resources and visitor satisfaction (Stokes and Crawshaw, 1986; White Oak Wildlife, 2021; Unites States Environmental Protection Agency, 2021; Salazar, 2005). Nature interpretation, also known as environmental education, has been used as a visitor management strategy for areas that attract visitation to solicit public support for conservation initiatives.

Nature interpretation, used synonymously with environmental or conservation education depending on the season or management focus, has been implemented varyingly at different destinations. These approaches include the use of interpreters or tour guides, visitor education centres, display boards, directional signage, visitor codes, guidebooks, brochures, and other print media broadly classified as personal and non-personal approaches in nature interpretation (Salazar, 2005; Black and Ham, 2005; Mak et al., 2011). Interpreters or tour guides, as a personal form of nature interpretation, are people from different educational and socio-cultural backgrounds that have specialised in providing an essential interpretation of observed realities and experiences in an area entertainingly (Mak et al., 2010; Black and Ham, 2005; Nyahunzvi and Njerekai, 2013; Prakash et al., 2011; Huang et al, 2010; Poudel and Nyaupane, 2013). Scholars argue that the quality of nature interpretation delivery

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depends on the competencies of tour guides/ interpreters. That is, the knowledge and skilling possessed by tour guides or interpreters can make them serve as better mediators and positive change agents within destinations for sustainability (Marzouki and Posecion, 2019; Jahwari et al., 2017; Guzman, 2011; Rahmawati, 2015; Lin et al., 2017). In most destinations, tour guide training is not strictly regulated (Ong et al., 2014; Jacobson and Robles, 1992; Leff, 2011).

In contrast, others regulate them through licensing and/or membership in professional associations to manage tour guides' conduct, skilling, and competencies. On the contrary, some scholars argue that the experience and social-cultural background significantly impact interpreters' or tour guides' interpretational delivery and competencies (Prakash and Chowdhary, 2010; Huang et al., 2010). And given the human resources and cost implications of training and engaging tour guides, this approach becomes expensive, albeit being among the best because of the personal touch and immediacy provided in any guiding situation. As managers and planners strive for the sustainability of attractions and destinations, they commonly complement interpreters with other non-personal nature interpretation approaches (Kuo, 2002). These non-personal nature interpretation approaches include information centres, trails, signages, and display boards (Juma, 2016; Kuo, 2003; National Parks Service, 2022, June 23; Mukhina et al., 2017; Švajda et al., 2018).

In essence, the implementation of nature interpretation approaches varies from one scenario to another; various techniques complement each other depending on the area and management objective or focus. Complementarity is critical for the sustainable development of destinations and or attractions as different nature interpretation approaches present certain advantages or disadvantages over others. These facts notwithstanding, destination planners and managers have endeavoured to apply different approaches to different visitor groups and scenarios (Stewart, 2017; Kuo, 2002). For instance, in expansive nature-based destinations, nature trails or tracks with adequate orientation maps, signage, visitor codes, and information centres will facilitate practical interpretation by tour guides. The diverse nature interpretation approaches present destination managers with different characteristics and challenges relating to the cost of implementation, appropriateness, effectiveness, size, and scale of the undertaking. In this regard, with the enormous growth in internet access and smartphone ownership, and in an attempt to enhance the diversity of cost-effective nature interpretation techniques that are effective and accessible to a wider reach. Other jurisdictions have used mobile applications for outdoor navigation and nature interpretation. These facts are not the standing; using mobile applications amongst contemporaries is a new trend that presents challenges and opportunities. This study, therefore, sought to assess the potential for using an innovative mobile application for nature interpretation and visitor management in Masai Mara National Reserve, Kenya.

LITERATURE REVIEW

The use of smart solutions and Applications in nature interpretation is gaining traction in tourism, both among service providers and tourists, thanks to technological advancements combined with greater online sociability. In this regard, the current research had sought to establish existing Applications and smart solutions as implemented in nature-based tourism destinations like national parks and reserves. This analysis consequently guided the study in establishing the potential for a mobile-phone-based Application in nature interpretation amongst visitors and guides visiting Kenyan national parks and reserves. Nature interpretation in wildlife tourism destination areas in Kenya should never be disregarded, given current trends and forecasts that will impact future travel and tourism. Among the projections and trends that will characterize the future of tourism are tech-enabled travel, personalization and guidance, planning and experiences, sustainability, safety and health-focused measures, and a return to business travel (Bowen and Whalen, 2017; Kaplan, 2018; Kountouris and Sakkopoulos, 2018). And indeed, it has been observed that extensive deployment of smart technology is vital in tourism, and opine that these technologies make tourists more engaged and expect more from places or destinations (Zhang, and Yang, 2016). Further to these, Koo et al. (2019) observed that integrating smart technologies and infrastructure into visitor experiences at tourist attractions and destinations is a worthwhile investment. Research on smart tourism suggests that tourism infrastructure and information communication technologies are combined to improve destination and business efficiency and tourists' experiences (Gretzel, 2016; Femenia-Serra & Neuhofer, 2018; Muñoz et al., 2019).

Further to these, Gretzel (2016) and Femenia-Serra & Neuhofer (2018) observe that globally, countries and organizations are working hard to encourage smart tourism development (Koo et al., 2019; Gretzel, 2016). Tourists employ smart technology to engage actively with other stakeholders and build their own experiences (Neuhofer et al., 2012). Smart tourists are providers and users of Smart Tourism technology services. Smart visitors now create, share, and persuade others. In today's smart world, digital platforms and media like the internet, social media, navigation Applications, and smartphones are used for more than just information (Neuhofer et al., 2012; Morrison, 2019). Contemporary tourists have become more independent and competent (Park et al., 2019) and heavily reliant on mobile telephony, Applications, smart gadgets, and situation and geo-location solutions (Dorcic et al., 2019). Smart Tourism technology services assist travellers in integrating content better and making better decisions (Xiang et al., 2015; Shiwei et al., 2020; Xu, 2022).

General appeal and the future of smart Applications in tourism

Every year, with eight billion tourists, nature-based protected places and national parks and reserves are popular in contemporary tourist destinations (Balmford et al., 2015). Visitors pay attention to national parks and reserves for their diverse tourist, ecological, and cultural resources and recreation opportunities (Espinosa et al., 2017; Kim et al., 2018). In this regard, park management agencies must establish more specific and quantifiable indicators critical to management frameworks to guarantee sustainable use incorporating the best possible sightseer experience and protecting the resource. Only in this way can the value of tourist experiences and the destination's cultural and natural resources be assessed and controlled. (Kim et al., 2018). More research suggests that spending time outside might benefit our mental and physical

health (National Parks Service, 2022, June 23; Stewart, 2017). Unfortunately, preserving urban and national parks is not always straightforward. National Park managers must monitor hundreds of miles of untamed terrain, making maintenance difficult. Not many people think about technology outdoors, but a new analysis claims technology can support the management of many nature-based protected areas worldwide (Korpilo et al., 2017; Liberato et al., 2018; Muñoz et al., 2019; Thimm and Seepold, 2016). In this regard, the concept of smart parks promotes technological advancements as the most cost-effective way to sustainably preserve and utilize national parks to their full potential. Some experts, however, believe that the problem is more complicated, noting reasons such as growing tourist demand on natural resources and budget constraints as forcing protected area managers and teams to strengthen the capacity (Kabii et al., 2019a; Pai et al., 2020; Xu et al., 2020). Therefore, a smart park's concept should integrate large rural parks with the internet of things technology to instantly communicate valuable intelligence to establish an integrated network system.

Arguably, according to Thimm and Seepold (2016), the use of technology for better communication and data collection is not new. The paper identifies some successful commercial Applications of the internet of things to maximise open space utilisation. For example, Disney World has been using Magic Bands to improve guest experiences (Kountouris and Sakkopoulos, 2018). Scholars like Kaplan believe that using technology in parks might benefit a broad spectrum of people (Kaplan, 2018). The beneficiaries might include park visitors, companies, towns, and management authorities, enhanced air quality, communal life, education, and overall nature connection (Chu et al., 2012; Kountouris and Sakkopoulos, 2018; Lee et al., 2017; Saeedi, et al., 2010; Yuan, 2014). Indeed, a networked information system would also help park staff do their jobs more effectively. On the other hand, park rangers might monitor wildlife and safeguard sensitive species using Applications like Smart Earth Network, allowing tourists to exchange data and register animal sightings or invasive species reports (Chu et al., 2012; Shimokihara et al., 2020). Connected parks systems also potentially provide life-saving information to campers and tourists, such as real-time weather alerts (Korpilo et al., 2017; Muñoz et al., 2019; Thanos et al., 2016; Wang et al., 2012; Zhang et al., 2019). Therefore, these present the potential of employing similar Applications to safeguard natural resources and visitor management scenarios of destinations like Masai Mara National Reserve.

Smart community safety Applications like the Oxford Flood Sensor Network already employ this information exchange to keep communities safe (Clark and Nyaupane, 2022; Mandić and Garbin, 2019). Thousands of visitors to national parks rely on technology to enhance their experience. For instance, Applications like Chimani and Google Maps allow users to discover many national parks and reserves in the United States of America using global positioning systems (Chu et al., 2012; Kountouris and Sakkopoulos, 2018, Saeedi et al., 2010). Kaplan argues that national park organisations should collaborate with corporations to create a single software platform to maximize effectiveness (Kaplan, 2018). In this context, the key success factors are its interconnection, data interoperability, analytics, and end-user communication. Thus, Kaplan proposes getting stakeholders together at innovation events like hackathons to generate ground-breaking solutions (Kaplan, 2018).

Scholars observe that the internet has continued to change how people communicate, organize, and share information globally and that it has grown in importance in our daily lives, influencing both individuals and major economies (Bessho et al., 2008; Bowen and Whalen, 2017; Johnson, 2022). While the digital population is visible expanding globally, internet access and availability vary significantly by country. This setback is explained by the slow advancement of digital infrastructures in remote localities, a global problem. Nevertheless, mobile internet has grown in popularity in recent years as smartphones have become more accessible and affordable (Statista, 2021). As more people worldwide utilise smart mobile devices to access the internet, mobile internet currently accounts for over 50% of global online traffic (Gharaibeh and Gharaibeh, 2022). In January 2021, over 59.5 percent of the world's population, or 4.66 billion people, used the internet, with another 92.6 percent (4.32 billion) using mobile devices for internet access (Johnson, 2021). For a country like Kenya, with about 54.38 million people, 33.4 million are aged 15 years and above as of January 2021 (Statista, 2021), and internet penetration rates of 40.0 percent for the whole population and 65.13 percent for those aged 15 and older accounting for 21.75 million internet users (Johnson, 2022). Furthermore, Kenya had 108% of the population with mobile connections in January 2021. Between 2020 and 2021, social media users in Kenya grew by 2.2 million, or 25%, to 11.0 million.

The statistics for Kenya indicate a favourable situation for mobile Application use in tour guiding and nature interpretation. The statistics are not far from global statistics regarding internet access and usage. Citizens of the world spend more than half of their lives traveling from one location to another, whether for leisure, work, or necessity (Korpilo et al., 2017). Travelers still have the unavoidable desire to stay connected with their mobile devices during these journeys, whether long or short, for pleasure (reading, informing, interacting) or for work (skype, meetings, emails, platforms) (Gračan et al., 2021; Rezapouraghdam et al., 2021; Xu et al., 2022). Nowadays, charging stations and internet access are installed in transportation hubs and carriages, making more comfortable and practical transportation and hospitality infrastructures. These services improve the customer experience and elevate the status of destinations and transportation systems in the service infrastructure (Liberato et al., 2018; Thimm and Seepold, 2016). These contemporary trends provide a foundation for mobile Applications in information dissemination like nature interpretation in outdoor recreation settings.

Since 2013, Smart Parks (formerly ShadowView) has used new ways to safeguard endangered wildlife, humans, and the environment. Smart Parks continues to help environmental organisations using sensor technologies and other cutting-edge technology by delivering smart Applications in four key areas where security and safety are priorities (Gračan et al., 2021; Korpilo et al., 2017; Liberato et al., 2018; Pai et al., 2020). First, tourist safety is critical in managing protected areas. Indeed, visitor safety programmes like rescue, vehicle, and visitor tracking are essential for those visiting nature-based destinations like parks and reserves. The second focus is that communities have the most significant impact on animals and biodiversity. Community conservation efforts involve and rely on the local community to conserve biodiversity. Communities can considerably impact biodiversity and wildlife conservation;

therefore, effective conservation programs incorporate community values and concerns as every society, life type, and area have unique priorities. Human-animal conflicts and water scarcity are difficulties that necessitate wildlife and water monitoring utilising technology to preserve assets for future generations. In addition, basic Smart Parks Applications will help in protecting animals from poachers and reducing human-wildlife conflicts is the goal of the technique, theft detection, wildlife tracking, electric fence line monitoring, ranger and vehicle tracking (Korpilo et al., 2017; Xu et al., 2022). Using a tour handbook, joining a sightseeing tour group, visiting an online site, or hiring a personal tour guide have all been utilised in the past; however, it has been recognised that the style and quality of traditional approaches to nature interpretation are insufficient to meet the diverse and individual tourism demands (Kang et al., 2017; Lin et al., 2014).

A smartphone-based intelligent tour guide system should be developed and implemented to supplement the traditional approaches. The number of people utilising smartphones and mobile Applications for daily tasks has increased due to developments in communications technology (Gharaibeh and Gharaibeh, 2022). Indeed, the smartphone is a transformative technology that has revolutionised and simplified communication and is regarded as a technological breakthrough that improves texting, photography, and internet access. The low cost, high computational power, and portability make smartphones more popular than other information communications technology. Smartphone and internet use, therefore, are gradually changing this landscape as mobile-based indoor and outdoor nature interpretation and information dissemination systems eventually take centre stage (Courtney, 2021; Kaplan, 2018; Long and Zhang, 2017; Meliones and Sampson, 2018; VoiceMap.me, 2021; Zhang et al., 2018). Navigation Applications embedded in smartphones and tablets aim to guide users to predefined or user-defined points of interest and routes. However, the smartphone must meet basic and modern functionality requirements (Kountouris and Sakkopoulos, 2018; Lee et al., 2017). Lastly, the mobile Application should create a central management system (adding, removing, and managing) of attractions of interest (Kountouris and Sakkopoulos, 2018).

Practical, exploratory, and Applications are rare, yet effective practices exist. The Self Tour audio guide with built-in global positioning systems is the newest and most comprehensive way to make personalised tours of key tourist locations worldwide (Thanos et al., 2016; VoiceMap.me, 2021). The mobile Application delivers all content to the smartphone or tablet, and one does not have to look at the phone once the tour begins. The tours can be done on foot or by automobile. Some Applications like ParkFinder, Oh Ranger, and National Park Service Applications are popular and are available for free (Courtney, 2021). Research carried out in Kagoshima, Japan, suggests that navigation Applications are helpful for efficient outdoor mobility support (Shimokihara et al., 2020). They significantly reduce time wastage during game drives as appropriate route assistance to the next attraction or destination is made easy. A mobile Application prototype for Sarawak Park in Malaysia used locality/authenticity and interactive design to assess visitor experience. The findings showed that multimedia engagement in mobile travel Applications could enhance tourists' co-creation experiences (Lee et al., 2017). Travellers who want enough knowledge and objective understanding of the places visited and satisfaction of their journey might use smartphone Applications that simulate human tourism guides. These Applications have five modules: user interface, inference engine, knowledge base, dynamic database, and Geographic Information Systems Application for guide functions (Owaied et al., 2011).

According to research conducted to build a framework for their use, six constructs affect how travel Applications are used in Jordan, with word of mouth having no effect (Gharaibeh and Gharaibeh, 2022). These factors include aesthetics, trust, enabling conditions, economic advantages, perceived usability, and considered enjoyment. Global positioning system-guided nature interpretation Applications have improved learning outcomes during excursions. These research findings provide helpful information about technical Applications that can be used practically anywhere (Hincapié et al., 2021). Additionally, mobile Applications provide individualised self-guided services for tourists at any time and in any location and contribute to the wise administration and precise marketing of the scenic area, ensuring healthy market prospects (Zhang et al., 2018). Given these contemporary trends, this research sought to establish perceptions of smartphone Applications that provide on-site nature interpretation in the Masai Mara National Reserve to complement the existing approaches.

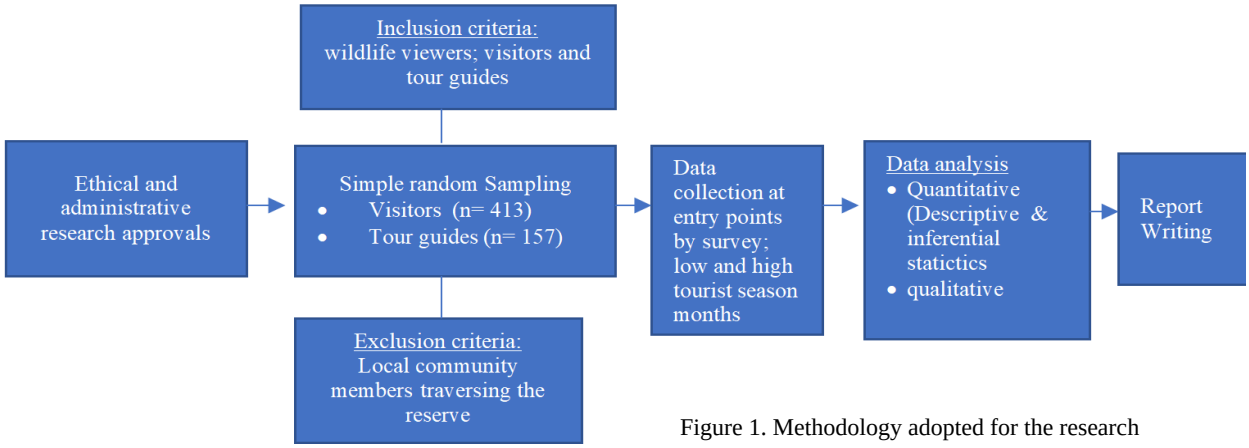

Figure 1. Methodology adopted for the research

RESEARCH METHODOLOGY

This study used a survey with primarily questionnaires to collect data. The data was collected throughout six (6) months from November 2020 to February 2021 and August and September 2021 (Figure 1). The study included 157 tour drivers and 413 tourists from the Masai Mara National Reserve, for 570 respondents. This sample size was considered

representative because it was above the acceptable minimum sample size of 384 for universal populations (Babbie, 2016; Tonon, 2019). The target entry points to the Masai Mara National Reserve were Purngat, Keekerok, Oloolaimutia, and Sekenani gates, the busiest entry points. With a 20% response rate, the COVID19 pandemic challenges required questionnaire distribution and subsequent drop-off at the designated gates. The strategy was preferred over an online survey, which was cumbersome in prospecting and follow-up (Wright, 2006). Descriptive and inferential statistics were used to answer the research question 'What is the potential of deploying mobile-based applications for nature interpretation in Masai Mara National Reserve? For this investigation, *Spearman's rho* correlation was used to test the strength and direction of relationships (Babbie, 2016; Tonon, 2019). The data was collected over a six (6) months period, low season months of November (20%), December (11.2%), January (10.4%), and February (7%), as detailed in Figure 2 below.

The high season months of August (31.2%) and September (20.2%). The high season constituted 51% of the respondents and 49% for the low season (N=570). The respondents (N=570) included Kenyan (67.5%), non-resident (18.7), and resident foreigners (13.7%) that visited Masai Mara National Reserve for data collection (Figure 3). 61.9% of the respondents were males, 36.3% were females, and a further 1.8% for others (Figure 4). The skewed data towards the male gender was because 157 of the 570 respondents were tour driver guides who were predominantly male.

STUDY RESULTS

The majority of the respondents fell in the youthful category of ages 25- 40 years (54.4%), followed by those aged 41- 65 years (29.1%), those aged below 24 years constituted 14.6%, and lastly, senior citizens (66 years and above) with a small fraction of 1.9% as detailed in Figure 5 below. The demographics of the visitor age completely departed from past statistics where senior citizens constituted a more significant percentage of travellers than the current scenario attributed to the COVID-19 scare (Luo and Lam, 2020; Yang et al., 2021). On the education level of the respondents (N=570), over 49.3% of the respondents had a university education, 44.6% had college-level education, while 4.9% and 1.2% had secondary and primary level education, respectively Figure 6 below.

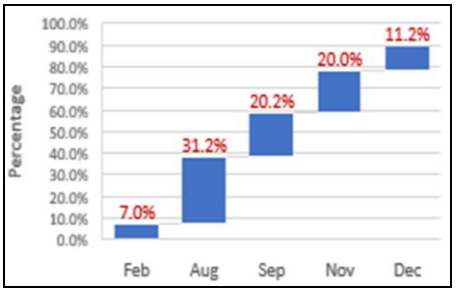

Figure 2. Months of data collection (n=570)

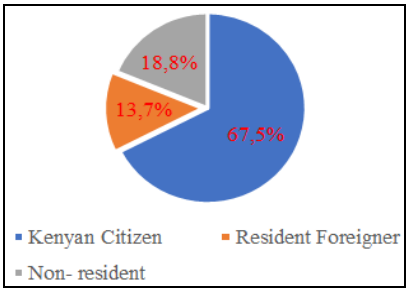

Figure 3. Nationality of respondents (n=570)

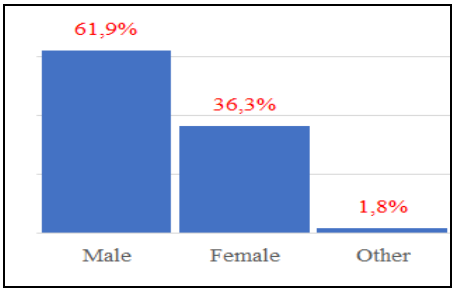

Figure 4. Gender of respondents (n=570)

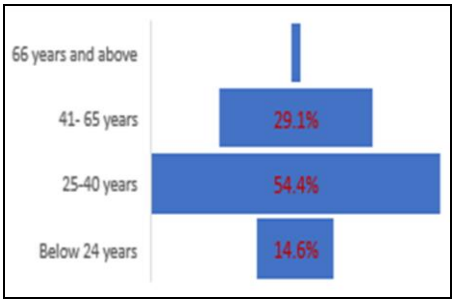

Figure 5. Age structure of respondents (N=570)

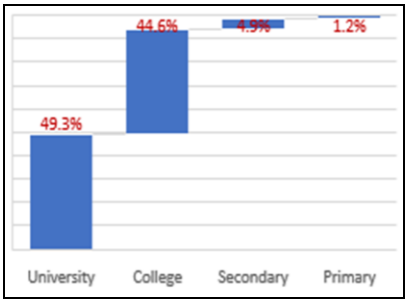

Figure 6. Education level (n=570)

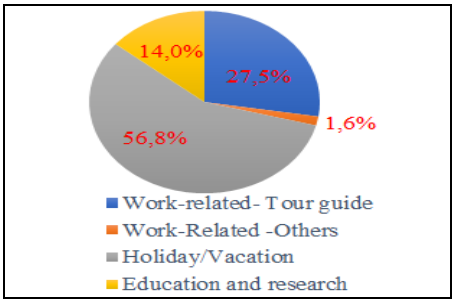

Figure 7. Respondents' purpose of visit (n=570)

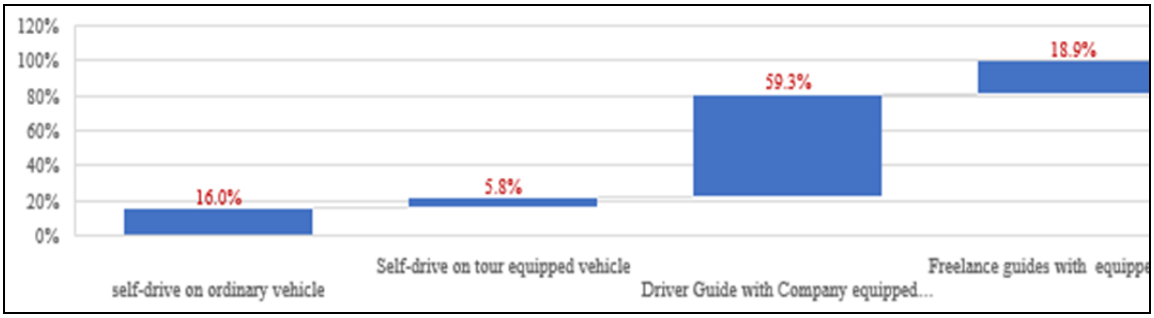

Figure 8. Vehicle type used by respondents (n=570) (Source: Research data)

Regarding the purpose of the visit, 56.8% of the respondents were on holiday/vacation, 27.5% were tour driver guides at work, 14% were on education and research, and a small fraction (1.6%) were visiting for other work-related purposes Figure 7 above. Indeed vacationers, tour guides, and education and research visits constitute the primary travel

purposes to Masai Mara National Reserve. The research also delved into establishing the most commonly used mode of accessing the reserve. Study results revealed that company tour-equipped vehicle with driver-guide (59.3%) was the most popular means, followed by local freelance guides with tour-equipped vehicles (18.9%), and closely followed by self-drive visitors on ordinary vehicles (16%) Figure 8 above. Visitors on Self-drive on tour-equipped vehicles were the least used means for accessing Masai Mara National Reserve. The study looked into the feasibility of introducing a mobile Application to help nature interpretation and visitor information in Masai Mara National Reserve.

Visitors and tour guides were asked if they preferred a mobile Application for Masai Mara National Reserve navigation and wildlife interpretation. The majority of responders (45.8%, n=570) agreed that this Mobile Application is needed to complement nature interpretation methodologies utilised at Masai Mara National Reserve. However, 35.3 per cent of respondents were unsure. As seen in the Figure 9 below, just 18.9% of respondents never endorsed utilising a mobile Application for nature interpretation, tourist information, or reserve navigation.

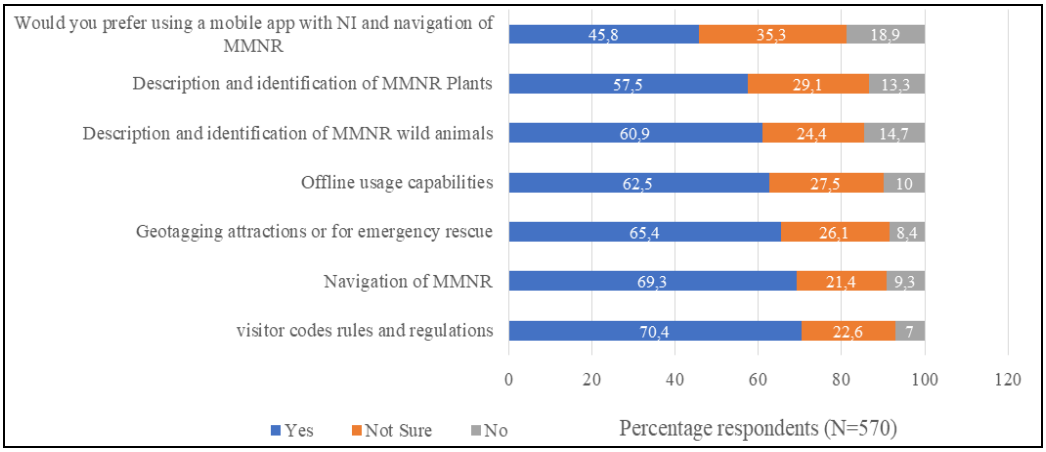

Figure 9. Attitudes towards proposed Mobile Application features (Source: research Data)

The study identified the mobile Application's possible characteristics. There were features like Masai Mara National Reserve navigation, description of vegetation and wild animals, offline usage, geotagging attractions or emergency rescue, and guest codes laws and regulations. Most respondents (n=570) agreed that guest codes (rules and regulations) should be included, with 22.6 percent unsure and 7% disagreeing (Figure 9 above). The finding emphasises the relevance of visitors to wildlife tourist areas in nature interpretation since responsible behaviour stems from education and knowledge.

The navigation of Masai Mara National Reserve came second. 69.3% replied yes, 21.4% were unsure, and 9.4% said no. In terms of navigation, geotagging tourist destinations or emergency rescue came third with 65.4% of respondents (n=570). Only 21.4 percent were unsure, and 8.4 percent said no (Figure 9). The Masai Mara National Reserve is a vast wilderness. Orientation and navigation are critical to getting the most out of your visit and avoiding getting lost or wasting time. Visitors deemed navigation, geotagging, and emergency rescue features crucial in the Mobile Application.

Because the Masai Mara National Reserve is a remote wilderness area with limited mobile phone coverage, the study suggested an offline mobile Application. The study found that 62.5 percent (n=570) agreed, while 27.5 percent disagreed (Figure 9). In contrast, 10% replied no to offline usage, indicating that the Mobile Application should be dependable for online and offline usage in this popular far-flung wildlife tourism area in Kenya. Wildlife description and identification at Masai Mara National Reserve had a 60.9 percent positive reaction from visitors (n=570), 24.4 percent were unsure, and 14.7 percent answered no. Description and identification of Masai Mara National Reserve flora came in last with approximately the same proportion. 57.5 percent replied yes, 29.1% were undecided, and 13.3 percent said no (Figure 9 above). Despite the attraction of wildlife (plants and animals) to the Masai Mara National Reserve, other asp ects of the suggested mobile Application were deemed more important to an enriching and memorable experience. Other features proposed by respondents for the smartphone Application include timely and regular weather reports to support animal viewing activities and timings (Figure 10). These findings support previous research emphasising the value of regular weather updates for outdoor activities (Clark and Nyaupane, 2022; Mandi and Garbin Pranievi, 2019). The smartphone Application might also provide regular updates on attractions and natural interpretation throughout the enormous reserve. Some respondents agreed that improving mobile network coverage was a must. The mobile Application will rely on cell networks for geotagging, emergency search and rescue, and navigation.

Figure 10. Other suggested mobile Application features (Source: Research Data)

The proposed mobile telecommunication masts should be camouflaged to blend in with the natural landscape. For the mobile Applications to work effectively, display boards and orientation signage should be upgraded, and all road junctions numbered. The road network must be improved to allow tourists to enjoy Masai Mara National Reserve as a wildlife reserve. Reserve users could use a platform to notify defaulters or other events as a proactive measure, requesting rapid corrective action. Despite this, other respondents stated that nature should be left alone.

Correlation Analysis of Attitudes and Respondent Demographics

A correlational analysis to establish which demographic affected the responses on the mobile Application questions, the study majorly showed weak positive and negative relations (Table 1 below). The visitors' education level and purpose of visit had the highest number of correlations, albeit weak positive and weak negative, respectively. This was followed by age, the type of vehicle used, and lastly, nationality and gender. The survey item 'would you prefer using a mobile Application with nature interpretation and navigation of Masai Mara National Reserve had weak positive relationships with age (r_s = .107, p=.011, N=570), education level, and vehicle type used with r_s = .106, p=.011, N=570. In addition, the purpose of the visit had a weak negative relationship with Would you prefer using a mobile Application with nature interpretation and navigation of the reserve (r_s = -.187, p=.000, N=570).

The nationality and gender of the respondents did not have any correlation with Would you prefer using a mobile Application with nature interpretation and navigation of Masai Mara National Reserve as the calculated p-value was higher than the given p=0.05. Navigation of the reserve had similar weak correlation results with age (r_s = .160, p=.000, N=570), education level (r_s = .148, p=.000, N=570), vehicle used (r_s = .121, p=.004, N=570), and purpose of visit (r_s = -.206, p=.000, N=570). The nationality (r_s = .032, ***p*=.452**, N=570) and gender (r_s = .038, ***p*=.367**, N=570) of the respondents did not correlate with navigation of Masai Mara National Reserve as the calculated p-value was higher than the given p=0.05.

Table 1. Correlations between tour guiding attributes and demographics (n=570)

Spearman's rho Correlations		Nationality	Gender	Age	Education level	Purpose of visit	Vehicle Type Used
Would you prefer using a mobile Application with NI and navigation	Correlation Coefficient	.055	.037	.107*	.106*	-.187**	.106*
	Sig. (2-tailed)	.189	.376	.011	.011	.000	.011
	N	570	570	570	570	570	570
Navigation	Correlation Coefficient	.032	.038	.160**	.148**	-.206**	.121**
	Sig. (2-tailed)	.452	.367	.000	.000	.000	.004
	N	570	570	570	570	570	570
Description and identification of wild animals	Correlation Coefficient	.010	-.046	.073	.173**	-.228**	.070
	Sig. (2-tailed)	.815	.274	.082	.000	.000	.093
	N	570	570	570	570	570	570
Description and identification of Plants	Correlation Coefficient	.012	.035	.069	.036	-.133**	.028
	Sig. (2-tailed)	.778	.400	.099	.390	.001	.499
	N	570	570	570	570	570	570
offline usage capabilities	Correlation Coefficient	-.047	-.001	.146**	.097*	-.166**	.130**
	Sig. (2-tailed)	.267	.974	.000	.020	.000	.002
	N	570	570	570	570	570	570
Geotagging attractions or for emergency rescue	Correlation Coefficient	.058	.060	.097*	.090*	-.146**	.127**
	Sig. (2-tailed)	.167	.153	.020	.031	.000	.002
	N	570	570	570	570	570	570
visitor codes rules and regulations	Correlation Coefficient	.116**	.120**	.112**	.097*	-.097*	.058
	Sig. (2-tailed)	.005	.004	.008	.021	.021	.164
	N	570	570	570	570	570	570
*. Correlation is significant at the 0.05 level (2-tailed); **. Correlation is significant at the 0.01 level (2-tailed)							

Description and identification of Masai Mara National Reserve wild animals had two weak correlations with education level (r_s = .173, p=.000, N=570), and vehicle used (r_s = -.228, p=.004, N=570). Nationality (r_s = .010, ***p*=.815**, N=570), gender (r_s = -.046, ***p*=.274**, N=570), age (r_s = .073, ***p*=.082**, N=570), vehicle type used (r_s = .070, ***p*=.093**, N=570) the calculated p-value was higher than the given p=0.05. Description and identification of Masai Mara National Reserve plants had a weak negative correlation with purpose of visit (r_s = -.133, p=.001, N=570) and all other demographic variables having no relationship at all; nationality (r_s = .012, ***p*=.778**, N=570), gender (r_s = .035, ***p*=.400**, N=570), age (r_s = .069, ***p*=.099**, N=570), education level (r_s = .036, ***P*=.390**, N=570), and vehicle type used (r_s = .028, ***p*=.499**, N=570).

Offline usage capabilities showed weak positive correlations with age (r_s = .146, p=.000, N=570), education level (r_s = .097, p=.020, N=570), and vehicle type used (r_s = .130, p=.002, N=570). There was one weak negative correlation with the purpose of visit (r_s = -.166, p=.000, N=570), whereas nationality and gender had no relationship with offline usage capabilities. Showing a near similar pattern of relationships with the demographics of the respondents was geotagging attractions or for emergency rescue. Weak positive correlations were observed with age (r_s = .097, p=.020, N=570), education level (r_s = .090, p=.031, N=570), and vehicle type used (r_s = .127, p=.002, N=570). There was one weak negative correlation with the purpose of visit (rs = -.146, p=.000, N=570), whereas nationality and gender had no relationship with geotagging attractions or emergency rescue. Also considered in this correlation analysis was the proposal to have visitor codes (rules and regulations) included in the mobile Application. Given its importance in nature interpretation, visitor codes had the highest

correlations except for the type of vehicle used (r_s = -.058, p=.164, N=570) which did not correlate. Nationality (r_s = .116, p=.005, N=570), gender (r_s = .120, p=.004, N=570), age (r_s = .112, p=.008, N=570), education level (r_s = .097, p=.021, N=570), had weak positive correlations while the purpose of the visit (r_s = - .097, p=.021, N=570), had a weak negative correlation.

DISCUSSIONS

The study found a fall in the quantity and composition of visitors to the Masai Mara National Reserve. According to other researchers, the COVID-19 scare could have contributed to this outcome (Huang et al., 2021; Luo and Lam, 2020; Jiménez-Etxebarria et al., 2021). However, this study found a trend against females, international travellers, and the elderly. This number, while not glaring, deviates from the average population's male-female ratios. Because 157 of the 570 respondents were tour driver guides, most male, this departure and skewing of data occurred. Despite those above, some researchers claim that men prefer nature-based and outdoor activities to women (Ali and Obaid, 2014.; Darumurti et al., 2019; Humagain and Singleton, 2021; Meng and Uysal, 2008; Rutter et al., 2021). It may be argued that men are more adventurous than women, which could explain why men visit Masai Mara National Reserve more significantly than women.

The study also found that visitor age data had changed dramatically. Elderly visitors to Masai Mara National Reserve were less likely to visit throughout the study period than in years past. This scenario is attributed to the COVID-19 panic, as supported by similar research (Luo and Lam, 2020; Yang et al., 2021). As a result of the COVID19 pandemic, travel limitations, protocols, and a general fear of getting sick were in place (Jiménez-Etxebarria et al., 2021; Luo and Lam, 2020; Singh et al., 2022; Yang et al., 2021). This is especially true for seniors, for whom COVID-19 may have restricted vacationing despite increasing travel inclination. A clinically susceptible population, the elderly, was advised not to travel and stay home (Teeroovengadum et al., 2021). Contrarily, the young travelled more during the COVID-19 epidemic, possibly due to their increased immunity. This is likely to change when more people acquire COVID-19 vaccines and travel restrictions and protocols loosen globally. The study found that the Masai Mara National Reserve was mostly visited by tourists, tour guides, and researchers. This finding is backed by previous studies that claim most wildlife and nature-based vacations revolve around wildlife tourism (Castillo-Manzano et al., 2013; Lin et al., 2015; Lu and Zhang, 2015; Rabotic, 2014). The reserve is renowned for its biodiversity, large diversity and density, and birding. It is home to the world-famous wildebeest migration, making it the eighth natural wonder of the world and one of Kenya's mega wildlife tourism destinations. This notwithstanding, travellers are less motivated to education and research, albeit several educational and research groups constituted the visitors.

The study also indicated that tour-equipped vehicles with driver guides were the most common way of access, while self-drive vehicles and self-guided tours were the least. This finding could be attributed to the fact that the reserve is a large wilderness with bad roads and inadequate signage. The roads are all-weather, thus requiring vehicles with robust off-road capabilities and experienced driver guides. It has been observed that tour guides are skilled and experienced professionals who play an important role in wilderness areas not only as guides and interpreters but also serve as mediators and moderators acts and inactions of visitors (De Lima, 2016; Kabii et al., 2019b; Poudel et al., 2013; Randall and Rollins, 2009; Reisinger and Steiner, 2006). Further, long-distance travel into wilderness areas has required specialised tour vehicles to be equipped with specific equipment, including UHF two-way radios, charging connections, and onboard WiFi. These vehicular facilities keep travellers safe, comfortable and connected to social media and other modern communication channels. These developments cleared the path for using smartphones as modern information carriers. The study results indicated that the Mobile Application's visitor codes (destination customs, rules, and laws) were considered crucial. Indeed, simple interpretative ways that explain and convey particular standards and anticipated conduct like guest rules are vital, argue some experts, but often ignored (Merriman, 2005). However, visitor codes should be distributed widely to increase awareness despite their shortcomings. A smartphone Application with visitor codes that tourists always carry is a more sustainable strategy than the pricey, non-reusable print media, and many signages that contribute to littering and sigh pollution, respectively (Merriman, 2005; Smith et al., 2014).

For these reasons, the smartphone Application will try to sustainably disseminate visitor codes in numerous situations. Navigation was identified as the second must-have mobile Application feature. This could have been due to the dangers of getting lost or wasting time traversing a vast destination. Indeed, scholars assert that quality navigation, orientation tools, and media are vital (Saeedi et al., 2010; Shimokihara et al., 2020). The Application's navigation tool will be convenient for visitors as the Masai Mara National Reserve has multiple all-weather roads and wildlife-watching routes. Guests can navigate to their selected destinations without a tour guide by integrating navigation, geotagging, and emergency rescue for visitor safety. With a high-precision global positioning system, navigation can track vehicles and people in real time and pinpoint nearby attractions (Meliones and Sampson, 2018). The mobile Application can also be built to notify potential attractions or take extra activities to assist the user, say researchers (Meliones and Sampson, 2018; Saeedi et al., 2010; Shimokihara et al., 2020).

The paradox, however, is that the navigation tool, alongside geotagging static attractions and seasonal sightings, on the one hand, adds value to wildlife viewing experiences while on the other easily causes overcrowding and severe trampling, especially in the high season when tourist traffic is strong (Gordon et al., 2018; Schägner et al., 2017). This is especially true for animals like wild dogs, cheetahs, sandalwood, rosewood, rhinos, and elephants, which have strong conservation and protection policies and surveillance programs (Bhola et al., 2012; Ghosh et al., 2019; Green et al., 2019; Linden et al., 2020). In this regard, geotagging of attractions and sightings should be done with prudence to avoid and or mitigate overcrowding and poaching hazards through geofencing. The Mobile Application's offline capability was ranked third. This could be because the vast reserve has poor mobile network coverage, making the proposed Mobile Application unreliable. Poor network coverage in some reserve regions raises concerns about the Application's ability to be used at any time,

anywhere. Given this, a mobile application with online and offline usage capabilities might be recommended for outdoor and adventure activities. These characteristics will reassure users (Seok, 2018; Thong et al., 2021; Wang et al., 2020).

CONCLUSION

In conclusion, the study observed that the COVID-19 situation somewhat affected the travel demographics into Maasai Mara. The demographic 'purpose of the visit' had a weak negative correlation with all mobile application variables. This was indicative that as the visitor numbers under any of the purposes of the visit increased, the number of people endorsing a feature of the mobile Application decreased marginally. Age came in second in correlating with nearly all mobile application variables, albeit having a weak positive relationship and description of plants in the reserve being the exception. The weak correlations implied that the responses on the proposed mobile Application to support nature interpretation were largely marginally affected by the visitor demographic characteristics.

Moreover, most of the respondents essentially endorsed the Mobile Application feature, with slightly below half saying they will have used the mobile Application if available (see table above). It can be argued that a large percentage were 'not sure' because they were giving views over a proposed non-existent mobile application that required pretesting to provide a precise evaluation. These notwithstanding, most of the respondents endorsed the mobile application features. Largely, respondents accepted the suggested Mobile Application's offline usage functionality in this context.

The study concluded that three of the first four endorsed features were mobile and mobile application capabilities, not their information. These were navigation, offline usage, geotagging attractions or emergency rescue, and guest codes laws and regulations. The result is indicative that the infrastructure supporting nature interpretation is as vital as the nature interpretation information itself. Fifth and sixth on the priority list of prospective elements of the proposed mobile Application were descriptions of the reserve's wild animals and vegetation. Secondly, this could be attributed to tour guides' lower value on descriptions of plants and animals than visitor codes because they clashed with their competencies. Other suggestions were enhanced weather updates, defaulter reporting, and mobile connectivity. It was suggested that each road junction in the Masai Mara National Reserve should be numbered to facilitate mobile navigation applications.

Nevertheless, for the Mobile Application to be meaningful to its users, the dissemination platform should be reliable in its technical and functional capabilities. The replies were overwhelmingly positive, with weak correlations showing that respondents' demographics had little impact on their responses. Indeed, mobile Applications can be utilised to sustainably disseminate nature interpretation information in nature-based locations. The only initial obstacles are adequate network coverage and raising public awareness of its implementation to enhance existing techniques for nature interpretation.

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