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Digital Availability and Accessibility for Sustainable Development in the Catholic Archdiocese of Nyeri, Kenya

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ABSTRACT

For a long time, digital integration has been a goal for the future but now, it is evidently a current necessity that we must all actively embrace for relevance and development. In religious settings, the question is not 'if' but 'how' we will adopt digital transformation effectively in the church functions. Furthermore, it is necessary to find out how digital adoption in the churches can contribute to global sustainable development. In this study, the contribution of digital availability towards sustainable development is examined, in the context of the Catholic Archdiocese of Nyeri in Kenya. The study utilized a mixed methods approach and the convergent parallel research design to collect data from 143 participants within the Nyeri Central Deanery, Catholic Archdiocese of Nyeri. From the data collected, it was noted that the access to digital infrastructure in Nyeri Central Deanery is generally high, with many churches using projectors/screens for their weekly Masses. Availability and accessibility of digital infrastructure positively contribute towards the sustainable efforts made by the church, especially through the engagement of younger generations in the church administration and functions. The study contributes to existing literature by providing the religious context of the relationship between the digital infrastructure and sustainable development.

INTRODUCTION

We are currently existing in the digital era, where the digital infrastructure has taken over every aspect of our lives in terms of how we get information, communicate with each other, work and view life (Levin & Mamlok, 2021). The digital era holds immense opportunities of growth, effectiveness and efficiency in all aspects of our lives. Digital tools and systems can be leveraged to bring people closer together as well as promote sustainable development in our communities (Mondejar *et al.*, 2021). Before delving deeper in how digital infrastructure relates to sustainable development, it is important to understand what these terms mean and how they have been interpreted in various parts of the world.

Zuckerman (2020) defines digital infrastructure as tools and systems that are required to enable digital life work. He continues by mentioning that these tools are what is needed to make digital life accessible. In the US, a developed nation, digital infrastructure and other infrastructure functions so well that they are considered invisible. The European countries face some disparities in terms of digitalization where there is a shift from the mere presence of the digital infrastructure to empowerment that is allowed by these tools and systems (Evangelista *et al.*, 2014). Using the Infrastructure Digitalization Index, the European Union is able to measure the qualitative and quantitative aspects of the level of ICT network in the countries as well as the quality and affordability of the digital infrastructure in the European countries. From this research, there is emphasis on digital infrastructure as a pre-condition for digital impact in an economy to take place. Digital infrastructure in Asia takes an interesting turn where it is used as a primary driver of urbanization

and tackling urban problems. With the concept of smart urbanism taking root in countries like Singapore, digital infrastructure adopts the characteristic of infrastructure that Zuckerman (2020) embodies (Willems & Graham, 2019). Zuckerman (2020) defines a developed nation as one where the infrastructure works so well that it is invisible.

Among all other continents, Africa is considered to have the highest number of developing countries. This could be a result of the poverty, economic stability, poor governance and conflict in the continent. The adoption of digital technologies in the continent has helped the countries to maintain connectivity and productivity. Digital infrastructure in Africa can promote inclusive growth and economic growth which will help to develop the countries and ultimately reduce poverty and inequalities (Calderon & Cantu, 2021). While some countries like South Africa are considered the Technological Pioneers for their notable technological advancements, many other countries like Zambia face issues mostly based on the lack of access to essential services like electricity and poor digital infrastructure (Kala, 2023).

In East Africa, the barriers of digital infrastructure mostly consist of lack of affordable internet-enabled devices and the high cost of access to internet. East Africa, therefore, is able to attract donors and governments that seek to improve the connectivity of the region to other parts of the world (Foster *et al.*, 2018). Kenya, in particular has garnered attention as a leading tech hub in Kenya, getting the alias, The Silicon Savannah (Akamanzi *et al.*, 2016). Projects such as Konza City and innovations like M-pesa, have positioned Kenya on the path to digitalization (Akamanzi *et al.*, 2016, Ndung'u, 2019). Challenges still

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exists where the informal business owners do not have working computers and access to the internet-connectivity in marginalized areas but the country is working to put systems in place to improve the digital infrastructure. Such systems include the installation of fiber-optic cables which is gaining popularity in the country (Akamanzi *et al.*, 2016).

Within the context of the Catholic Church, particularly in the Catholic Archdiocese of Nyeri, digital tools present new opportunities for intergenerational engagement, transmission of faith, and long-term mission sustainability. However, access, digital literacy, and support structures vary widely, especially across age groups and parishes. This study examines how digital infrastructure and digital competencies influence the church's ability to promote sustainable development.

The term sustainable development first came to life in the Brundtland Report (World Commission on Environment and Development, 1987) to mean development that caters for the needs of the current generation without compromising the ability of future generations to cater for their own needs. Defining sustainable development does not come easy and scholars like Rogers *et al.* (2012) who state that sustainability can often be achieved in the short term, rather than long term. To support sustainable development, the UN came up with 17 goals to be applied globally (Appendix C shows the list of the 17 SDGs). The goals address the economic, social and environmental goals that countries should work on to achieve sustainability by 2030 (Sachs, 2012).

Sustainable development in Europe comes about as an additional priority to job creation, development and competitiveness for the European Commission of the European Union, EU. To cater for the global environmental crisis without compromising other economic and social goals, Maes & Jacobs (2017) show how nature-based solutions can provide a realistic path to sustainable development. Nature-based solutions are living solutions that are designed to cater for social challenges in a resource-efficient and adaptable manner. Such solutions are supported by and use nature. An example of a nature-based solution is low carbon technology innovations.

In Asia, steps towards development have affected sustainable development in different ways. In South Asia, globalization has had a negative impact toward environmental sustainability while the impact has been positive in other parts of Asia; South East, Central and East Asia. On the other hand, social inclusiveness and technological change have had a positive impact to social sustainability and economic sustainability, respectively, in all parts of Asia (Younis & Chaudhary, 2017). Sustainable development, therefore, plays a huge role in making economic policies in Asia.

In 2015, the UN launched its 2030 agenda and on the same year, the African Union (AU) agenda 2063 was also adopted. This brought about a sense of competition, complementation and suspicion for others due to the

timing of the launch of the two. Ramutsindela and Mickler (2020) attempt to understand what the sustainable goals meant for the development of African countries and some of the constraints endured while implementing them. In South Africa, sustainable development is considered a political process which is heavily impacted by government policies. The collapse of apartheid in South Africa continues to affect the people and contributed to the constraints of implementing sustainable development in its different contexts (Cole, 2014). All in all, countries in Africa have committed themselves to playing their part in implementing the SDGs and a number are significantly supported by countries in Europe and the US (Ramutsindela & Mickler, 2020).

Coming closer to East Africa, the struggle of implementing sustainability continues to be seen as countries often wonder whether to prioritize the SDGs or their own personal development goals. In a comparative study between Ghana and Uganda on the prioritization of these SDGs, Mugambe and Avongo (2024) show that Uganda was ranked 141 out of 166 in the 2023 annual sustainable development report while Ghana was at 122. In terms of the specific SDGs, Uganda had been able to achieve the targets of SDG 13 and had showed significant challenges in implementing SDGs 3, 7, 9, 11, 15 and 16. Information on SDG 14 for Uganda was not available. Ghana, on the other hand, was excelling in SDG 12 but struggling with SDGs 3, 5, 10, 11 and 16 (Appendix A shows the list of the 17 SDGs). The study could be a mirror showing how East and West African countries relate to the SDGs and ultimately, the progress that has been made in both regions of Africa for the achievement of sustainable development.

Uganda offers a similar narrative, with churches adopting mobile-based platforms and digital hubs to promote youth engagement while preserving cultural values. Namara *et al.* (2023) emphasize that the digitalization of intergenerational communication in Ugandan religious communities has not only facilitated knowledge transfer but also addressed challenges such as declining youth participation in church activities. In Kenya, digital infrastructure has increasingly been leveraged for development, though challenges such as unequal access and low digital literacy persist. Schilirò (2024) notes that digital tools have transformed communication dynamics within organizations, enabling broader participation in decision-making processes. However, they also point out the need for deliberate efforts to bridge the digital divide, particularly in rural areas.

Kenya faces challenges in implementing development such as poor governance, corruption and limited resources, just to mention a few (Nyadera *et al.*, 2023). For this reason, the country developed a blueprint, Kenya Vision 2030, to guide development in the country and to give all its citizens the opportunity to enjoy high quality of life within a secure and clean environment (Macharia, 2019). The SDGs would contribute to the Vision that Kenya had and add other functions that the country

would be required to implement, with the focus on future generations. Onyango and Ondiek (2021) emphasize on how technology can be leveraged in Kenya, the Silicon Savannah, to promote sustainable development in public organizations. The government institutions are, unfortunately, plagued with poor investments in digital infrastructure and this slows down the integration of the SDGs in the public organizations.

Waema (2016) posits that sustainable development can only be attained through participation of the population that it is targeting. From her research at Mt. Kenya Hospital, Nyeri, she concludes that a Key Population Project failed due to poor participation of the community from the conception and design, all the way up to the implementation of the project. She notes, however, that the poor participation may be attributed to the poor socio-economic status of the people living in that community. Nyeri County, has highly invested in ICT because of its capacity to promote development. The gaps in digital infrastructure mentioned earlier such as limited access and high costs of digitalization and many other apply to this particular county which hinder the digital development of the county. Potential of growth is seen in business, agriculture, education, security and industry. The ICT sector, fortunately, is popular for job opportunities and for young professionals (Wachira, 2020).

In the context of this study, sustainable development refers to the church's capacity to thrive socially, culturally, and institutionally, by fostering inclusive communication, spiritual formation, participation in church life, and value transmission across generations. Sustainable development is examined through the lens of the Catholic Church's initiatives in Nyeri Central Deanery. The focus is on how digital infrastructure within the Church contributes to the church's capacity to thrive culturally, socially and institutionally, by fostering spiritual formation, participation in church life, inclusive communication and value transmission. By exploring these dynamics, the study aims to emphasize on the role of faith-based organizations in promoting sustainable development at the grassroot level.

Faith institutions, when properly leveraged, comprise of a significant force in driving sustainable development like environmental sustainability (Isaac *et al.*, 2024). Ideally, faith institutions should foster inclusive environments where all age groups engage meaningfully, share in value transmission, and contribute to communal development. However, studies show that without adequate digital infrastructure and intentional digital engagement strategies, this ideal is difficult to achieve (Roberto, 2014). The COVID-19 pandemic accelerated the adoption of digital tools within churches, revealing technology's potential to attract and retain congregants particularly younger members while also exposing digital gaps (Ojo *et al.*, 2024). Even if digital tools are available in many parishes, their underutilization, misuse, for example, using Church platforms for non-ministerial purposes or spreading unverified content, or uneven use limits their

potential to facilitate learning, community engagement, and mission-oriented growth.

The Catholic Church has long served as a cornerstone of community cohesion, education, and moral guidance, providing a unique platform for development. However, the rapid digital transformation of society presents both challenges and opportunities for the Church to contribute to sustainable development. The rationale for this study lies in the critical role that intergenerational communication can play in bridging digital divides, promoting effective communication, and fostering development within the Catholic Archdiocese of Nyeri, Kenya.

This study therefore seeks to explore how the availability of digital infrastructure shapes sustainable development within the Catholic Archdiocese of Nyeri, focusing on Nyeri Central Deanery.

Research Objective - To assess the availability and accessibility of digital infrastructure for sustainable development in the Catholic Archdiocese of Nyeri.

LITERATURE REVIEW

Theoretical Literature Review

This study utilized several theories. The first theory is the Diffusion of Innovations Theory, first discussed historically by Gabriel Tarde in 1903 then popularized by Everett Rogers in 1962 (Kaminski, 2011; Miller, 2018). The theory offers a strong foundation for comprehending how digital infrastructure is adopted and incorporated into intergenerational communication for sustainable development. This theory elucidates how new ideas (like digital tools and technologies) are taken in, disseminated, and used throughout time within a social structure. It highlights the significance of communication, time, social structures, channels, and adopter types (innovators, early adopters, early majority, late majority, and laggards) in affecting how innovations are assumed (Kaminski, 2011). In the Nyeri Catholic Archdiocese, the theory is especially important in exploring the introduction of digital infrastructure and embraced by the church's various generational groups. The results of the study concur with the theories provided. The Diffusion of Innovations Theory, for instance, shows how novel ideas like technological advancements in the churches are embraced in the communities. In the study, there is evidence that different generations adopt technology at different rates. For instance, the young people in Generation Y and Z are noted to be early adopters while the older generations adopt more slowly to technology and may need more assistance in navigating the technology tools. This adoption of technology is influenced by factors such as trialability and conformity with the church traditions and the role of the opinion leaders in the church is important in encouraging wider adoption of these technology advancements. By engaging the faithful strategically, they church leaders and clergy can catalyze the diffusion of the digital innovations and promote the incorporation of these innovations into church development initiatives. The Technology Acceptance Model (TAM), initiated by

Davis F. D. in 1989, is the second theory, which focuses on digital infrastructure. The key factors in this theory are perceived utility (PU) and perceived ease of use (PEOU) (Davis *et al.*, 2024). Davis *et al.* (2024) confirm that this theory has been used for more than thirty years and offers perceptions into how it is still evolving. This idea is important to the study because it examines the ways in which the faithful use digital platforms. The study also supports the theory on the Technology Acceptance Model (TAM) which shows how digital infrastructure is adopted in religious organizations. The findings show that the faithful embrace technology as a result of its perceived use and perceived ease of use. Through technology, there is perceived improvement in communication, administration efficiency and spiritual engagement. The study also emphasizes on how factors like leadership support, digital literacy and demographic disparities contribute towards use confidence and participation as a result of their perceived ease of use.

Empirical Literature Review

Digital infrastructure represents an inevitable force, not only in development but in the daily tasks that people partake. Accessibility of the digital infrastructure refers to the existence of the tools and systems. Digital infrastructure is available to people through many forms, ranging from the low-tech options all the way to highly advanced digital systems. Some of the low-tech digital options include television, phone and radio services. Such options are easily available and affordable to many populations. The digital functions provide the basic functionalities of communication and entertainment for individuals. When people want more from their digital tools, for instance, interactive spaces, they need to advance to digital infrastructure that supports these functions.

Middleton (2021) states that there are four primary computing devices; smartphones, tablets, laptops and desktop computers. Each device varies in features, usability, functionalities and cost. The constant in these devices, however, is the need for power and internet connection to ensure that they are fully utilized. Smartphones supports video and voice calls and has the ability to run software applications (apps) but is limited by the small screen size and software functionality. Tablets are bigger in size and are cheaper than smartphones but fully functional ones may be more expensive than laptops. Laptops have more software functionality but do not have built-in internet connectivity as tablets and smartphones do. Desktop computers can run many software functions and are generally cheap but are limited by their portability and dependence on a constant power source.

Middleton (2021) describes accessibility of these digital tools and systems as the ability of individuals and communities to use the digital infrastructure available. Most of the digital infrastructure is used by individuals but there are communities that have set up public places where these individuals can access these digital tools. The main determinants of accessibility are affordability,

geographical location and literacy.

As aforementioned, the cost of purchasing various digital tools varies. Many households are unable to afford devices such as smartphones and laptops due to their prices. Others opt to purchase one which is shared among the people living in the household. Where it is mandatory for one to have some of these tools, like the smartphone for work or study purposes, individuals have to sacrifice a lot to obtain them. This would mean extra shifts at work or borrowing money to be able to afford these gadgets. Affordability also comes in where people have to pay to get airtime and internet connection. This may be a challenge to a number of people who are struggling to cater for their basic needs (Waema & Miroro, 2014)

The geographical location of communities plays a huge role in accessibility, especially because of the network and internet connectivity. The mobile and internet service providers (ISP) in Kenya include Safaricom and Airtel (Nyaega *et al.*, 2015). Some areas in the country, especially the rural and remote areas, struggle to find reliable connection which inhibits their communication and presence in virtual spaces.

Lastly, Nyaega *et al.* (2015) posits that digital literacy is a major factor that affects accessibility of the digital infrastructure. An individual may be able to afford a laptop and could be in a geographical location that has a fast and reliable internet connection but cannot make use of it since they do not have the know-how. Some basic skills that are needed to utilize digital tools include the ability to connect a device to the internet, to send and receive messages and emails, using a web browser, using social media platforms, downloading and installing apps and sharing files to others on digital spaces.

Kibere (2016) points out some complexities around how the access to digital infrastructure works, especially among the young people. Most young people are tech-savvy and have smartphones for school, work and communication. When faced with tough financial times, however, a number opt to sell their smartphones and downgrade to cheaper phones popularly known as kabambe. The kabambe phones enable the young people to make calls, send and receive messages but they lack internet connection and have very limited space and software utilization.

The availability and accessibility of digital infrastructure play a fundamental role in sustainable development by enabling inclusive access to education, health services, and economic opportunities (Schia & Willers, 2020). For instance, mobile broadband provision in rural areas supports local schooling and small-business transactions, which aligns with the United Nations' Sustainable Development Goals on quality education (SDG 4) and decent work (SDG 8) (Schia & Willers, 2020). Moreover, evidence from EU-wide analyses indicates that digital adoption supports social sustainability goals fostering inclusion, cohesion, and improved community engagement (Li & Wang, 2021). Increased access to digital tools within the Catholic Archdiocese of Nyeri could boost local entrepreneurship, assist parish-level

development initiatives, and enhance knowledge-sharing for the benefit of the community.

MATERIALS AND METHODS

Research Design

The study used a mixed methods approach where quantitative and qualitative approaches were applied. The quantitative data was collected using the , while the qualitative data was collected partly through the questionnaires and in the interviews. The mixed methods design is ideal as it gives an expansive and in-depth exploration of the study (Mugenda & Mugenda, 2012). The convergent parallel research design was used where the quantitative data was collected first and then the qualitative data. This method assisted the researcher to address specific issues observed in the qualitative data as well as cater for some gaps that may have been observed in the first phase of data collection.

Sample Size and Sampling Procedures

To get the sample size, Yamane’s formula was used. The

formula was coined in 1967 and is used widely for its accuracy. The suggested confidence level is 95% for this formula (Ahmed, 2024).

The formula for calculating a sample size using Yamane’s formula is:

$$n = \frac{N}{1 + N(e^2)}$$

Where,

n = sample size

N = population size

e = margin of error

The sampling frame of the respondents is presented in Table 1.

Using the Yamane’s formula, the target sample size will be;

$$n = \frac{6773}{1+6773(0.05^2)} = 377.69$$

The total sample size was distributed in percentage across the target groups.

Table 1: Sample Distribution

Target group	Estimated population size	Percentage (%) – Rounded off	Estimated sample size
Cathedral	790	12	45
St. Jude	1066	15	57
King’ong’o	1123	17	64
Kiamuiru	1845	27	102
Mwenji	1149	17	64
Ngangarithi	800	12	45
Total	6773		377

Data Collection Instruments

Data collection involved a combination of surveys and interviews. Surveys were administered to the selected sample to gather quantitative data on the accessibility, usage, and effectiveness of digital infrastructure. The survey instrument included both closed-ended and open-ended questions.

The interviews were conducted on the spiritual leaders of the parishes, that is the parish priests and church leaders. The questions in the interview guide helped the researcher get a deeper insight towards the specific parish in relation to the focus of the study.

Ethical Considerations of The Study

Voluntary participation, informed consent and confidentiality were sustained all through the study. The researcher created a good rapport with the clergy and lay leaders to encourage their collaboration in the study and guaranteed that the participants were free to leave the study at any moment without repercussions. The responses were collected anonymously and safely stored to ensure confidentiality. The data collected was strictly used for academic purposes.

RESULTS AND DISCUSSION

General Access to Digital Infrastructure

The study employed a mixed approach in distributing questionnaires: 120 physical questionnaires were handed out during church visits, and an online version was shared via Google Forms to reach a broader audience across the Nyeri Central deanery of the Catholic Archdiocese of Nyeri. Out of the 120 printed questionnaires, 58 were successfully completed and returned. In addition to the physical returns, 85 responses were collected through the online form, resulting in a total of 143 valid responses for analysis. The interviews were conducted on 12 participants, of whom were 2 clergy and 10 church leaders.

This combined approach helped improve overall participation, especially among digitally literate respondents, and ensured representation from diverse parishes and age groups. Recent research supports the use of hybrid data collection strategies in faith-based settings, noting that online surveys can significantly boost participation when physical outreach is limited or selective (Evans & Mathur, 2005).

When asked whether their parish or outstation had access

to digital infrastructure (such as internet, projectors, or digital platforms), the majority of respondents indicated affirmative access. This points to a widespread presence

of digital resources within the archdiocese. Table 2 shows the distribution of the digital infrastructure tools and platforms in the parishes.

Table 2: Participants’ access to digital infrastructure per parish (in percentage)

Parish	Yes (%)	No (%)	Maybe (%)
Our Lady of Consolata Cathedral	66.7	33.3	0
St. Jude Ruring’u	100	0	0
St. Charles Lwanga Ngangarithi	94.3	5.7	0
St. Benedict Kiamuiru	66.7	27.8	5.6
St. Joseph Cafasso King’ong’o	85.4	14.6	0
St. Joseph Cafasso Mwenji	82.5	16.8	0.7

There is a significant variation in reported access to digital infrastructure across parishes. While most parishes had high access levels (e.g., 94.3% at Ngangarithi, 100% at Ruring’u), others like Mwenji reported low access (25%). These differences may reflect underlying inequalities in digital resource distribution or infrastructure investment. The disparities in the responses are affected by the

distribution of the participants in the outstations which may vary in terms of their access to digital tools.

Types of Digital Tools Available

Respondents identified various tools available in their settings. The availability of the tools, in percentage, was as indicted in Graph 1:

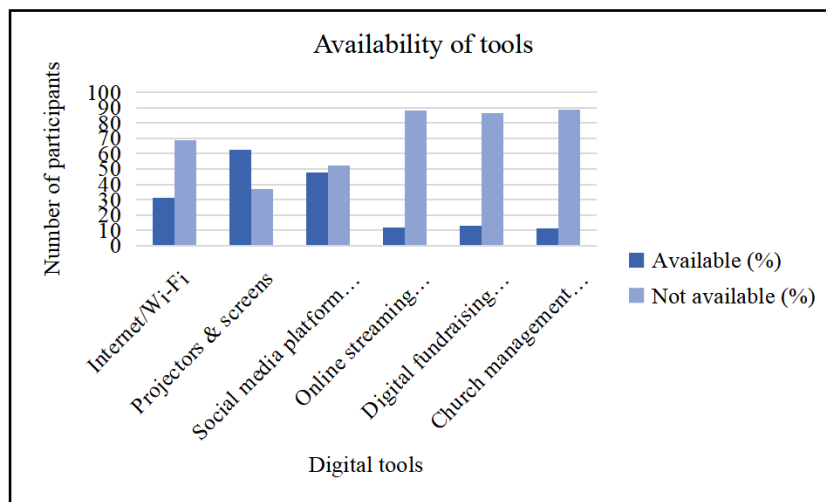


Figure 1: Availability of Tools

The findings reveal that digital infrastructure in churches remains significantly underdeveloped. While a majority have adopted projectors and screens (62.8%) to support in-person communication, only 31.5% have access to internet/Wi-Fi, which is essential for most digital tools. Less than half of the churches utilize social media platforms (47.6%), and an even smaller fraction make use of online streaming services (11.9%), digital fundraising platforms (13.3%), or church management software (11.2%). This limited adoption of digital tools reflects a gap in leveraging technology for outreach, engagement, and administrative efficiency. There is a clear need for investment in digital infrastructure and training to empower churches to effectively serve and connect with their communities in the digital age.

Frequency of Use

In terms of usage, most respondents reported using digital platforms for church-related activities on a daily or weekly basis. This reflects not only access but also active utilization of these tools for communication, spiritual formation, and administration.

Table 3: Frequency of use of digital platforms for church activities

Unit	Frequency	Percentage
Daily	44	30.8
Weekly	72	50.3
Monthly	2	1.4
Rarely	11	7.7
Never	13	9.1

The majority of participants reported using digital platforms for church-related activities on a regular basis, with 50.7% using them weekly and 31.0% using them daily. Only a small proportion indicated infrequent use, with 7.7% using them rarely, 1.4% monthly, and 9.2% never engaging through digital

platforms. These findings suggest that digital tools play a significant role in church engagement for most participants, although a notable minority still remain unengaged digitally.

Barriers to Access

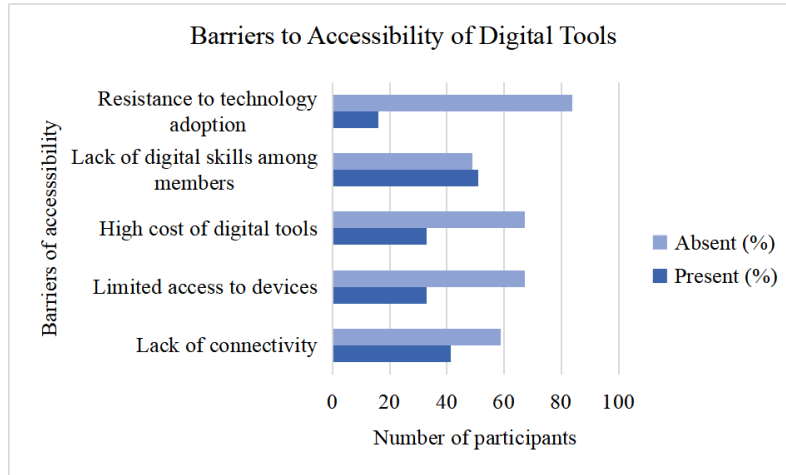


Figure 2: Barriers to Accessibility of Digital Tools

The most significant barrier to digital infrastructure in churches is the lack of digital skills among members, reported by 51% of respondents. Lack of connectivity is another major challenge, affecting 41.3% of churches. Other barriers include limited access to devices and the high cost of digital tools, both reported by 32.9% of participants. Interestingly, resistance to technology adoption was the least reported barrier, at only 16.1%, suggesting that most church members are open to digital integration if given the right tools and support. These findings align with previous research noting that infrastructure alone is not sufficient factors like digital literacy and cultural readiness must be addressed (Okello, 2024). To close the gap, these findings stress the necessity of investing in digital skills and infrastructure.

The qualitative data from the questionnaires and respondents reinforced these findings. One clergy member mentioned that the biggest obstacle in digital adoption was internet availability and that many members of the church did not have smartphones or laptops. This was emphasized by another clergy member who said that on top on lack of internet and digital tools, digital illiteracy was a challenge in digital adoption.

These findings reflect the existing body of knowledge on digital infrastructure. Middleton (2021) observed that access to digital technologies was limited frequently by cost and availability of the digital infrastructure as well as other infrastructure like internet and energy. Waema and Miroro (2014) noted, as seen in this study, that digital tools like smartphones and computers were becoming prevalent in Kenya but the rural areas faced challenges of affording these devices and accessing internet. Schia and Willers (2020) strongly believed that in underdeveloped countries, digital infrastructure directly impacted

sustainable development initiatives in communities. Roshidul *et al.* (2022) group the challenges that are identified in this study into socio-economic factors, infrastructure limitations and rural-urban disparities as they assess sustainable digital transformation in Bangladesh. Nevertheless, the Catholic Archdiocese of Nyeri shows expanding use of digital adoption, though unequal, which has an impact on development initiatives. Interestingly, this study offers fresh perspective by placing digital infrastructure in a faith-based framework, whereas the majority of the global literature concentrates on governance systems, healthcare, or schools. The study zooms in on digital tools like projectors and cellphones and their use in religious settings, for instance, in projecting Mass responses and songs and the delivery of catechism and church administration tasks. This shows that faith groups should be active users, rather than passive users of digital infrastructure and they should suit it to their particular developmental and pastoral requirements.

Overall, these findings affirm that digital infrastructure is both a foundational and a limiting factor for sustainable development within Church settings. The uneven distribution of digital tools and weak internet connectivity in some outstations raise concerns about the long-term digital readiness of the Church as an institution. Addressing these disparities is critical for institutional sustainability, as equitable access ensures that all parishes can participate in coordinated pastoral and developmental initiatives. While the presence of devices is encouraging, their effective use depends on addressing broader issues of internet access, affordability, and training.

CONCLUSION

The study found that the access to digital infrastructure is

generally high with many parishes reporting that they have access to digital infrastructure, which they use for church activities. The definition of sustainable development by the Brundtland Commission (WCED, 1987) insists that development should meet the needs of the present without compromising the ability of generations to come to meet their needs. In the church context, this can be applied by considering how the activities of the church impact both the current and future generations. Sustainable development calls for addressing the inequalities that exist in the community for an inclusive and collaborative society.

Recommendations

Based on the findings and conclusion of this study, several practical recommendations are proposed. First, the Church leadership at both diocesan and parish levels should prioritize equitable investment in digital tools across all parishes. In addition, targeted digital literacy initiatives should be developed, focusing on older congregants and less tech-savvy church members. Intergenerational mentorship can serve a dual purpose: enhancing digital competence while strengthening intergenerational bonds and promoting value transmission. These actions, if implemented holistically, will not only strengthen the Church's digital readiness but also contribute meaningfully to its mission of integral human development.

REFERENCES

- Ahmed, S. K. (2024). How to choose a sampling technique and determine sample size for research: a simplified guide for researchers. *Oral Oncology Reports*, 12, 100662.
- Akamanzi, C., Deutscher, P., Guerich, B., Lobelle, A., & Ooko-Ombaka, A. (2016). Silicon Savannah: the Kenya ICT services cluster. *Microeconomics of Competitiveness*, 7(2), 36-49.
- Calderon, C., & Cantu, C. (2021). *The impact of digital infrastructure on African development*.
- Cole, K. (2014). *Sustainable development for a democratic South Africa*. Routledge.
- Davis, F. D., Granić, A., & Marangunić, N. (2024). The technology acceptance model: 30 years of TAM. Switzerland: Springer International Publishing AG. *Digital Studies*, 8(2), 245-268.
- Evangelista, R., Guerrieri, P., & Meliciani, V. (2014). The economic impact of digital technologies in Europe. *Economics of Innovation and new technology*, 23(8), 802-824.
- Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet research*, 15(2), 195-219.
- Foster, C., Graham, M., Mann, L., Waema, T., & Friederici, N. (2018). Digital control in value chains: Challenges of connectivity for East African firms. *Economic Geography*, 94(1), 68-86.
- Isaac, U., Oripeloye, H., & Adejo, V. (2024). Can Faith be the Key to Environmental Stewardship and Sustainable Development in Nigeria?. *American Journal of Development Studies*, 2(2), 16-26.
- Kala, E. S. M. (2023). Challenges of Technology in African Countries: A Case Study of Zambia. *Open Journal of Safety Science and Technology*, 13(4), 202-230.
- Kaminski, J. (2011). Diffusion of innovation theory. *Canadian Journal of Nursing*.
- Kibere, F. (2016). Youth and technology in Kenya: A critical analysis. *Journal of African*.
- Levin, I., & Mamluk, D. (2021). Culture and society in the digital age. *Information*, 12(2), 68.
- Li, Y., Zhang, J., & Wang, X. (2024). The impact of the digital economy on sustainable development: A study of Chinese cities. *Frontiers in Environmental Science*, 12, 134147.
- Macharia, J. (2019). Sustainable development in Kenya. *Horizons: Journal of International Relations and Sustainable Development*, (13), 172-183.
- Maes, J., & Jacobs, S. (2017). Nature-based solutions for Europe's sustainable development. *Conservation letters*, 10(1), 121-124.
- Middleton, C. (2021). Understanding computing devices. *Digital Tools Journal*, 10(4), 87102.
- Miller, R. L. (2018). Rogers' innovation diffusion theory (1962, 1995). In *Technology adoption and social issues: Concepts, methodologies, tools, and applications* (pp. 1558-1571). IGI Global.
- Mondejar, M. E., Avtar, R., Diaz, H. L. B., Dubey, R. K., Esteban, J., Gómez-Morales, A., ... & Garcia-Segura, S. (2021). Digitalization to achieve sustainable development goals: Steps towards a Smart Green Planet. *Science of The Total Environment*, 794, 148539.
- Mugambe, P., & Avogo, F. A. (2024). Prioritizing sustainable development goals in Africa: Perspectives from academia in Ghana and Uganda. *European Journal of Sustainable Development Research*, 8(3), em0263.
- Mugenda, O., & Mugenda, A. (2012). *Research methods dictionary*. Nairobi: Applied Research & Training Services (Arts Press).
- Namara, E., Okech, F., & Mukasa, P. (2023). Digital hubs as a means for intergenerational knowledge transfer in Ugandan churches. *East African Journal of Digital Innovation*, 7(1), 33-48.
- Ndung'u, N. (2019). *Digital technology and state capacity in Kenya*. Washington, DC.
- Nyadera, I. N., Agwanda, B., & Maulani, N. (2023). Evolution of Kenya's political system and challenges to democracy. In *Global encyclopedia of public administration, public policy, and governance* (pp. 4550-4563). Cham: Springer International Publishing.
- Nyaega, M. O., Marangu, M. W. N., & Chepkorir, M. J. (2015). *Determinants of Financial Performance in Internet Service Providers in Kenya*.
- Ojo, S. O., Adelaja, I. J., Adio, T. O., & Afolaranmi, A. O. (2024). Assessing the impact of technology on church services and youth engagement. *Information Technology*, 7(3), 58-72.
- Okello, F. (2024). *Bridging Kenya's digital divide: Context, barriers and strategies*.

- Onyango, G., & Ondiek, J. O. (2021). Digitalization and integration of sustainable development goals (SGDs) in public organizations in Kenya. *Public Organization Review*, 21(3), 511-526.
- Ramutsindela, M., & Mickler, D. (Eds.). (2020). *Africa and the sustainable development goals*. Springer International Publishing.
- Roberto, J. (2014). Generation Together: A Vision of an Intergenerational Church. *Generation Together: Caring, Praying, Learning, Celebrating, & Serving Faithfully*, 7-36.
- Rogers, P. P., Jalal, K. F., & Boyd, J. A. (2012). *An introduction to sustainable development*. Routledge.
- Roshidul, H., Hossain, M. S., Nayem, S. Z., & Haque, M. M. (2022). Developing a Sustainable Digital Transformation Framework for the Continuum of Primary to Tertiary Education in Bangladesh. *American Journal of Education and Technology*, 1(2), 119-129.
- Sachs, J. D. (2012). From millennium development goals to sustainable development goals. *The lancet*, 379(9832), 2206-2211.
- Schia, N. N., & Willers, J. O. (2020). Digital vulnerabilities and the Sustainable Development Goals in developing countries. In W. L. Filho *et al.* (Eds.), *Industry, Innovation and Infrastructure* (pp. 115–130). Springer.
- Schilirò, D. (2024). Digital transformation and its impact on organizations. *International Journal of Business and Management*, 19(6), 71.
- Wachira, W. (2020). *Factors Influencing Adoption of Cloud Based Human Resource Management System in Kenyan Counties; (A Case Study of Nyeri County)* (Doctoral dissertation, University of Nairobi).
- Waema, J. N. (2016). *Influence on Sustainability of Key Population Projects at Nyeri County: A Case of Mt. Kenya Hospital* (Doctoral dissertation, University of Nairobi).
- Waema, T. M., & Miroro, O. O. (2014). Access and use of ICT and its contribution to poverty reduction in Kenya. *ICT pathways to poverty reduction: Empirical evidence from East and Southern Africa*, 102-131.
- Willems, T., & Graham, C. (2019). The imagination of Singapore's smart nation as digital infrastructure: Rendering (digital) work invisible. *East Asian Science, Technology and Society: An International Journal*, 13(4), 511-536.
- World Commission on Environment and Development. (1987). *Our common future*. Oxford University Press.
- Younis, F., & Chaudhary, M. A. (2017). *Sustainable development: Economic, social, and environmental sustainability in Asian economies*.
- Zuckerman, E. (2020). What is digital public infrastructure? *The Center for Journalism and Liberty*.