# THE INFLUENCE OF FIBER OPTIC TECHNOLOGY ON DELIVERY OF DIGITAL CONTENT IN BROADCASTING SECTOR IN KENYA

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## ABSTRACT

The developments in media technologies are an effective substance for transformation across the continent and the globe. These new technologies in information and communication have not only production and transfer but also redefined the concept and notion of broadcasting. Nevertheless, it remains more and more difficult to establish the place of broadcasting in a world that is loaded with information. The objective of this study was to assess the influence of the effect of fiber technology on delivery of digital content in broadcasting sector in Kenya. Data was collected using a questionnaire from 120 ICT experts from 11 different media houses who are involved in delivery of digital content in the broadcasting sector in media. The data collected was cleaned, coded, analyzed and presented by means of Statistical Package for Social Sciences (SPSS). This was in the form of graphs, tables and charts while qualitative findings were presented thematically. From the findings, it can be inferred that digital content was not fully delivered in the broadcasting sector. The findings indicated that the fibre optic technology was highly involved in delivery of digital content in broadcasting sector. The study concluded that availability of fibre optic technology is positively related to delivery of digital content. The study recommends measures to be put in place to ensure successful delivery of digital content in broadcasting sector in Kenya. This study benefits stakeholders in the ICT sector in advancing on various measures that ought to be taken to overcome the challenges of delivering digital content in broadcasting sector in Kenya.



Key words: **Information and Communication Technologies, Digital Content, and Fiber Technology**


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## INTRODUCTION

Information Communication and Technology (ICT) in the 21st century is a force since it has continued to cause key changes on how people live. ICT has provoked and ignited drastic and extreme changes in electronic media that has developed and affected the broadcast industry, most particularly in timeliness and immediacy of news. Ohiagu (2013), Information and Communication Technology not only enhance and facilitate the formation, processing, distributing and information dissemination in the broadcast industry but also the timely and immediacy of news is of an extraordinary importance. Marcelle (2000), in his views referred ICTs as applications and facilities that are used for creation, processing, distribution and also transformation of information with the help of ICTs tools.

According to Joseph (2003), computer has been revolutionized by the internet and the world of communication like nothing before. He further adds that “the internet has a worldwide broadcasting ability, dissemination information mechanism for information dissemination, and a means for interaction and collaboration between computer and individuals without regards for physical location”. Computers and satellites are changing the ways news are gathered, produced and also the process of delivery. In broadcasting, production is dealt by technical revolution while packaging and content is dealt by philosophical aspects. Internet

provides a network and vehicle of all types and individual stand-alone computers to link to form a global network, which connects people all over the world AINA (2008).

According to Adigwe (2010), ICT is perceived as the utilization and integration of computer technologies for reason of distributing information to a target consumer or destination without space and time constraint. Benefits of Information Communication Technology has greatly been recognized in the broadcast industry since reporters and news editors have greatly benefited from it plus the entire chain and those involved in news.

Nonetheless, Rodriguez and Wilson (2000), indicated that majority of the population has not been affected by media as TV sets remain the reservation of middle class and urban dwellers. In the developed countries such as the United Kingdom, United States, China and Japan, the media sector has largely progressed as well. TV is measured as the most common means of information medium in most parts of the world offering diverse reliable and accessible informative, entertainment and educating that remains supreme by print media.

Global statistics indicate that various countries have embarked on policies and policies that recognize the importance of development of digital content. Others are concentrating on the power of digital content to transform and change economies, or are investing in industries of digital content. Other countries are concentrating on the digitization of tradition material and their capability to proposal themselves to broader audiences. International organizations, like OECD, are mounting a significant body of policy and thinking around content standards and digital content, and are discovering issues that are related to digital divide and social equity. According to Amuchie (2001), the world of today has become a global village where information at hand tend to move faster and at any cost stands a country that is detached either by ignorance or by chance out of lack of appreciation will certainly contend with backwardness.

The United Kingdom and the United States being the pioneers in the adoption of the digital terrestrial Television and also having extreme set of industry data, they have to be observed due to their long time experience. The free-to-air television sector consist of TV transmission companies (broadcasters) which are either owned by private or publicly programming companies which they pay a subscription fee to the holders of the radio and television sets. The public transfers meant to any company are proportionate to all the responsibilities which it is mandated to carry out such as the transmission of a least percentage of certain types of content, programs and other that the regulator may create Ofcom (2006).

On the regional front, Cloete and Gillwald (2014) noted that South African Broadcasting Corporation begun to produce an export market for its programmes via satellite broadcasting, which leads to its dominance in the regional market. Hence other smaller African broadcasting countries adopted a regional strategy by joining together in order to create a regional content which created counter balance. On the other hand, Emmanuel and Ngozi (2014), the story is not the same in the Nigerian broadcast industry. Even though other countries are going with the advancement of technology and the application of these new technologies, Nigeria seems to be lagging behind in the acquisition and use of them. In Nigeria media broadcasters are not yet in line or together with the trend in modern and

advanced technologies, even though communication specialists anticipated that private broadcast media will give communication its priority and place in the country.

Digital Broadcast Media Convention Nigeria (2019), now in its fourth consecutive year, is the platform for Nigeria's media industry and broadcasting professionals to lean, meet, to do business and to network. The convention came to be the largest annual gathering ever that industrial leaders and professionals came together not forgetting the broadcasting industries. The Convention enabled stakeholders and shareholders to share and review new information, ideas and look for solutions to operationalize and strategies issues faced by the industry.

In the Kenyan 2010 constitution under Article 33, it gives every Kenyan citizen a right and freedom of expression in which freedom to receive, seek, impart idea or information, freedom of creativity, freedom of research and academic freedom is provided. Under Article 34, gives the independence of print, electronic and other types of media whereas Article 35 guarantee every Kenyan citizen the right to information held by the government or state or any other person. The gap in the digital divide at the rural level is actualized through the promotion and guarantee of access to information and idea through television services.

In June 2015, the government through Communication Authority of Kenya successfully implemented the migration of analogue television to digital television to all areas that was previously analogue. This resulted into increase in the number of television channels in which viewers have freedom to choose and also gave the youth employment opportunities. In addition, the government embarked on the exercise of widening digital TV coverage and broadcasting to the other part in the country that was not covered by digital TV broadcasting. With this respect, digital signal was rolled out by MOICT in potential sites in counties by installing digital transmitters.

This project aimed at ensuring 100% Kenyan access to digital broadcasting services by the end on December 2018. It opened up innovation and competition in the digital broadcasting space through the media outlet, signal carrier and also grown the ownership drastically. This has also led to expansion of content genres covered by different channels which has increased the number of digital broadcasters from the previous ten to two hundred and fifty one radio and television broadcasters, CAK (2019). In addition, more outlets in the diverse markets have emerged that are operating in other languages other than Swahili and English. This has transformed the sector providing exciting, innovative and consumer best programmes. Although Kenya's ICT sector is rated among the vibrant in Africa, which is driven by affordability of hardware and innovative products, traditional radio and television still remain the preferred means and source of reliable information among Kenyans.

Media council of Kenya (2015), indicates that close to 7.3 million audience tune into their TV sets on a daily basis with an extra 14.5 million listeners tuning into radio stations of their choice everyday which translates to 80% of the country's audience.

## Statement of the problem

The rise of ICTs has taken a great change in the broadcasting sector all over the world. The broadcasting sector in several countries particularly in the developed world are extremely utilizing and adopting the several opportunities that are provided by the emergence of new ICTs for greater and better quality, efficiency, faster production, cost effective and delivery of more reliable service. However, initial investigations show that use of technology in news processing and broadcasting sector will escalate cost, since money would have to be spent into obtaining both software and hardware, remunerations for employees that would take care and regularly maintain them. Gester (2009), indicates that ICT enables the creation, management, storage and dissemination of information by use of electronic.

Nonetheless, discussion on use of information technology seems to put people out of jobs which are not always the case. Technology only takes over the mechanical part of the assignment and frees people for much intellectual productive assignment. Similarly, the use of technology will result into achieving its overall objective that is the need for more accurate and faster way of solving operations done manually in processing of data, good storage devices for data and information as provided by computer system. The complexities of modern technology which have produced great scientific, mathematical and engineering solutions hence enhance news processing. Abiahenu (2006) stated that ICT enables processing and communication of information, reduce cost and saves time. The broadcasting sector in Kenya is also met with the difficulties of embracing foreign technologies to outfit the local needs. In the era of explosion of knowledge there is more information that needs to reach consumers in timely manner. However, this is not the case especially in the developing countries. This research therefore, opted to find out the applicability and influence of ICTs in delivery of digital content in their reporting.

## Objective of the Study

To establish how fiber optic technology influence delivery of digital content in broadcasting sector in Kenya.

# LITERATURE REVIEW

## Theoretical Framework

Gliner, Morgan, and Leech (2011) describes a theory as a well-thought out phrases of a correlation, set of sensible which generates a set of clarifications while Gelso (2006), considers theory as an assertion of a verifiable association which may be there amid a set of variants allied with a precise phenomenon. A theoretical framework is described as a configuration which monitors a study through dependence on a prescribed concept built using a recognized, comprehensible justification of definite relationships and phenomena. This study will revolve around certain theories as put forward by various scholars.

## Diffusion of Innovation Theory

The Diffusion of Innovation (DoI) theory was suggested by Everett Rogers in 1983. The theory pursues to explain how, why, and at what rate technology and new ideas spread

Rogers (1983). He described five stages, which are essential for the innovative decision process namely innovators, early adopters, early majority, late majority and laggards. An organization has to take an appropriate decision at the right time and motivate the users. Three key concepts that influence the innovative choice for adoption are knowledge, persuasion, and decision Rogers (1995).

Rogers addresses five characteristics that influence the diffusion and acceptance of innovations Rogers (2003). They include relative advantage, complexity, compatibility, and obsevability and trial ability. The virtual advantage refers to the extent to which an innovation is perceived to be improved than the idea it succeeds. Rogers (2003), stated that 'individuals' perceptions of these characteristics predict the rate of adoption of innovations. The individual's perceptions of these characteristics determine whether or not they accept new technology. The DoI theory is relevant to the study since it shed light on the adoption of an innovation. The adoption by users on the use of cloud computing is an innovative approach of using ICTs. Technology acceptance corresponds to the DoI theory since the adopter or users' acceptance of the technology determine the rate of diffusion of the technology from one organization to the other.

Studies on DOI address relevant issues about the characteristics, determinants and effects of the adoption process (Antonelli, 2006). In particular, scholars have attempted to understand why adoption and later diffusion are not instantaneous and all firms do not adopt the innovation at the same time (Stoneman, 1976). Different models have been provided in order to better understand the diffusion of innovation. Generally, these models focus on diffusion delays, analyzing the factors that affect the diffusion process (Goldfarb, 2005).

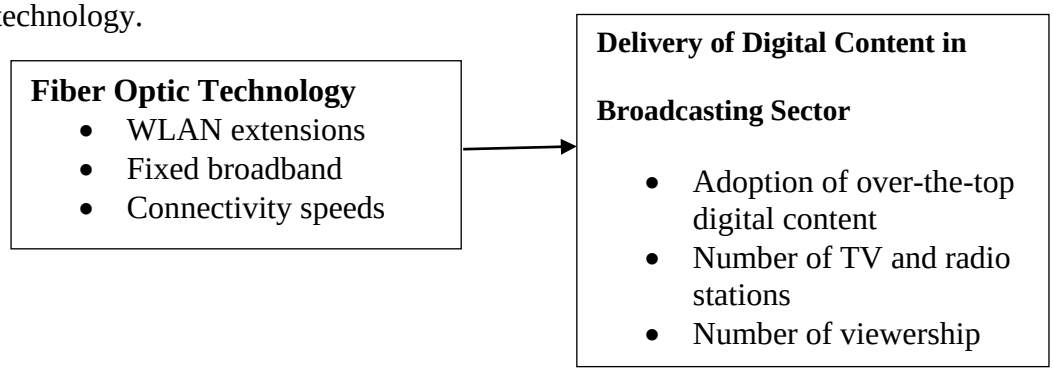
Based on the above theory adoption fibre optic adoption will influence the effective delivery of digital content in broadcasting sector. To leverage on the fibre optic technology will explicitly focus on the role covered by the fibre technology in speeding up the diffusion process in the delivery of digital content in broadcasting sector.

## Empirical Review

According to some researchers and practitioners, there are certain factors individually and collectively affect the delivery of digital content in broadcasting sector in Kenya, including:It is a device that uses optical fiber to transmit data and information using a communication channel. It is a process of sending information by means of infrared light signals along a thin glass fiber. Fiber optics is a major building block in the telecommunication infrastructure. Its high bandwidth capabilities and low attenuation characteristics make it ideal for gigabit transmission and beyond; this is according to Jadhav and Shitole (2013). Subsequently, light has the highest speed of travel among the things known to man. It emphasizes on the speed to which information is distributed by this device. Fiber optic has the capability to carry enlarged quantities of information at great speed in form of data, voice or images. According to Agba (2001), this device is said to be the latest among the wired communication technologies and it's proficient to carry any type of signal that can be transferred on conventional metal wires.

## Conceptual Framework

A conceptual framework is a model illustrating the interactions between independent variables and dependent variables, Camp (2001). The conceptual framework in this research project is founded on four autonomous variables and a single reliant variable as shown below. As per this project, delivery of digital content is dependent on the availability of fiber optic technology.




**Independent Variable** **Dependent Variable**

## RESEARCH METHODOLOGY

The research design that was used in this study is descriptive design. This is because people's views, behavior, characteristics, attitudes, opinions, and values was required and defined. Accordingly and was established how ICTs affect delivery of digital content in broadcasting sector. The unit of analysis was the various departments in media sectors in Kenya. The unit of observation was the technical ICT engineers. This choice of the target population represents the core functionalities in the organization and knowledgeable of the factors influencing the delivery of digital content in broadcasting sector. The study purposively chose the 11 top most media stations for this study. The study used a sampling frame of 11 top most broadcasting media station in Kenya namely; Royal Media Services, Nation Media Group, Standard Media Group, MediaMax Kenya, Kenya broadcasting corporation, TV47, Ebru TV, Classic FM, Switch TV, KU TV and Radio Africa Holding under which engineers from infrastructure, radio, television and production departments was considered. The choice of the sample size and sampling techniques are determined by the interplay amongst the following key factors: the characteristic and size of the population, time, budgetary and logistic constraints. A simple random sampling procedure will be used to pick two respondents from each stratum of infrastructure, radio, TV and production into the sample. This was preferred for the reason that it permits unbiased sampling and provides the research work with more scientific features that will make the validity of the research more concrete.

Data was collected from respondents through questionnaires. The questionnaire had both closed and open ended questions. The closed ended questions are aimed at giving precise information hence minimizing bias. Data collection was done by the drop and pick method with the help of a research assistant. The questionnaires were distributed to the respondents and later collected. Pilot test was conducted to ascertain whether the respondent had a common understanding of the questions for them to provide the required information.

Quantitative data generated from the study was analyzed using descriptive statistics, which included measures of variability (standard deviation), measures of central tendency (the mean), and measures of relative frequencies.

The data was presented in figures and tables whereas the interpretation of the data comprised of comparing and contrasting the study findings with the literature reviewed. Inferential statistics such as ANOVA were applied in analyzing the link between the dependent variables and the independent variable. In deciding the connection amid variables, a linear regression analysis was done using the equation as shown below.

$$\mathbf{Y_i = \alpha + \beta_1 X_1 + \acute{\varepsilon}}$$

Where:
$Y_i$= Delivery of digital content in broadcasting sector
$X_1$= Fiber Optic
ε= error term

Coefficient regression and model summary model was used to test the degree of importance of independent variable compared to the dependent variable. The analyzed data was used to draw conclusions and recommendations as per the study.

## RESEARCH FINDINGS AND DISCUSSIONS

The research study targeted a sample size of 120 respondents of which 105 returned fully filled questionnaires making up a response rate of 87.5%. This response rate was enough and satisfactory to make conclusions for the study. On gender distribution, 57% of the respondents were male while 43% were female. On age distribution, twenty four respondents were between 20 and 29 years (22.86%), thirty nine respondents were between 30 and 39 years (37.14%). Thirty respondents (28.57%) indicated that they were between 40 and 49 years and twelve (11.43%) respondents indicated that they were above 50 years. As far as the highest educational levels attained was concerned, the respondents had primary level as their highest level of education, 5.71% had secondary level as their highest level of education and 16.19% had diploma while 57.14% of the respondents had degree and lastly 20.95% had masters as their highest level of education. The respondents indicated that they had worked in the organization for less than one year, 13.33% had worked in the organization for a period between 2 to 5 years, 31.42% had worked between 6 to 10 years and 45.71% had worked in the organization for over 11 years. On distribution according to the departments in which the respondents worked, 44.76% of the respondents were from infrastructure, 10.47% representing Radio, 17.14% representing Television and 27.62% makes up the production department. The difficulties they encounter by use of these ICTs on delivery of digital content. The results were as shown in Figure 4.6. As per the findings 32.38% of the respondents indicated that high cost of accessories, 21.90% indicated lack of technicians of the new technologies, 26.67% responding lack of access to these ICTs and 1.90% agreed that all of the above the mentioned challenges are being experienced.

### Influence of the fiber optic technology

This section examined the influence of the fiber optic technology on delivery of digital content in broadcasting sector in Kenya. The respondents were asked to give their opinion on

the effect of WLAN extension, fixed broadband and connectivity speeds on fibre optic technology towards the delivery of digital content.

**Table 1: Influence of the fiber optic technology**

| Statement | Very large extent | Large extent | Average extent | Little extent | No extent | Mean | St. Deviation |
|---|---|---|---|---|---|---|---|
| WLAN extension. | 34 | 26 | 25 | 11 | 9 | 3.65 | 0.714 |
| Fixed broadband | 28 | 34 | 21 | 13 | 9 | 4.12 | 0.984 |
| Connectivity speeds | 28 | 36 | 24 | 9 | 8 | 3.53 | 0.702 |

The findings on table 1 indicate that on average, majority of the respondents asserted that WLAN extension influence fibre optic technology on the delivery of digital content with a mean of 3.65. With the notion that fixed broadband influence fibre optic technology, the respondents stated with very large extend it influence delivery of digital content with a mean of 4.12. The finding further indicated that on average, connectivity speeds influence fibre optic technology on the delivery of digital content with a mean of 3.53.

**Table 2: Extent fiber optic technology affect broadcasting sector**

| Statement | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Very large extend | 29 | 27.62 | 27.62 |
| Large extend | 40 | 38.10 | 65.72 |
| Average extend | 22 | 20.95 | 86.67 |
| Little extend | 8 | 7.62 | 94.29 |
| No extend | 6 | 5.71 | 100 |
| **Total** | **105** | **100** | |

The researcher sought to find out the extent to which fiber optic technology affect broadcasting sector in delivery of digital content. From the findings, majority of the respondents, 38.10% agreed with large extend while 27.62% agreed with very large extend on the effect of fibre optic technology affecting broadcasting sector. Only 5.71% of the respondents agreed with no extend on the effect of fibre optic technology affecting broadcasting sector.

### Contribution of ICT on adoption of over-the-top digital content

This section examined the contribution ICT has achieved in successful adoption of over the top digital content in broadcasting sector in Kenya.

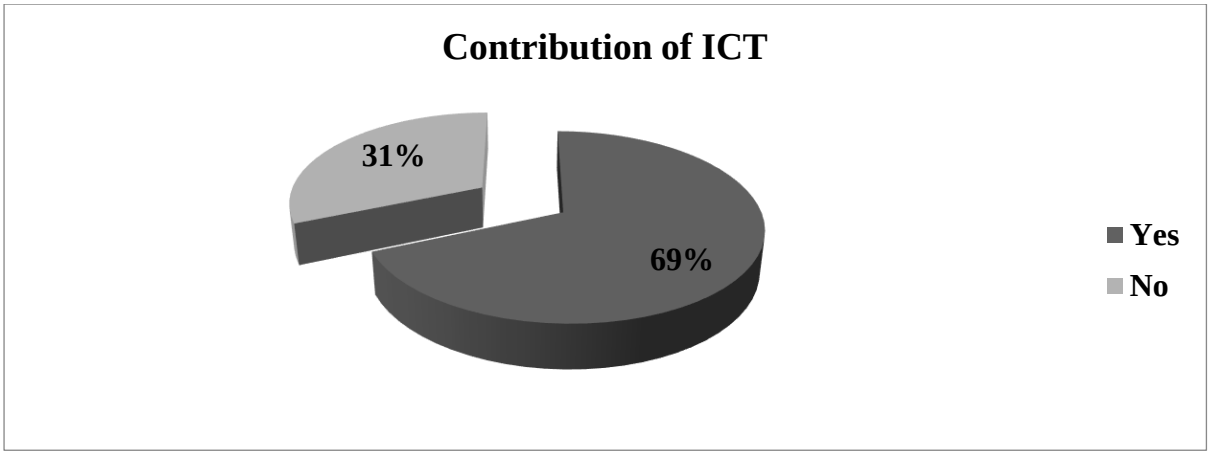



**Figure 2: Contribution of ICT on over the top digital content**

**Table 3: Delivery of digital content**

| Statement | Very large extent | Large extent | Average extent | Little extent | No extent | Mean | St. Deviation |
|---|---|---|---|---|---|---|---|
| ICT has contributed to the number of free-to-air radio and TV stations in broadcasting sector | 30 | 40 | 20 | 9 | 6 | 4.65 | 0.954 |
| ICT has contributed to the number of viewership stations in broadcasting sector | 28 | 44 | 17 | 10 | 6 | 3.50 | 0.886 |

## Inferential Statistics

The study utilized statistical package for social sciences (SPSS Version 26) to code, enter and compute the measurements of the multiple regressions. Correlation analysis and multiple regression analysis were done to test levels of influence among the variables.

## Model Summary

Model summary is used to analyze the variation of dependent variable as a result of the corresponding changes of independent variables. The study analyzed the variations of delivery of digital content due to the variations of fiber optic technology. Adjusted R squared was 0.795 implying that there was 79.50% variation of delivery of digital content in broadcasting sector, due to the changes in fiber optic. The remaining 20.05% imply that there are other factors that lead to delivery of digital content which were not discussed in the study. R is the correlation coefficient which shows the relationship between the study variables thus

implying a strong positive relationship between the study variables of 0.837 from the findings as shown in Table 4.

**Table 4: Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .837[a] | 0.873 | 0.795 | 0.21085 |

## Analysis of Variance

The analysis of variance, ANOVA, is used to determine whether the data used in the study is significant. From the ANOVA statistics, the processed data (population parameters) had a significance level of 0.001 thus making the data ideal for making conclusions on the population's parameter as the significance value (p-value) is less than 5%. The F calculated was greater than F critical (72.348 < 2.154) as shown in Table 5. This shows that fibre optic technology had significant effect on delivery of digital content in broadcasting sector in Kenya.

**Table 5: Analysis of Variance**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 88.642 | 1 | 3.854 | 72.348 | .000[b] |
| | Residual | 12.024 | 103 | 0.147 | | |
| | Total | 100.666 | 104 | | | |

## Beta Coefficients of the study Variables

The regression equation was

$$\mathbf{Y = 0.843 + 0.572\ X_1}$$

From the above equation, it's clear that holding fibre optic technology the variables will significantly influence delivery of digital content in broadcasting sector as shown by constant = 0.843 as shown in Table 6.

**Table 6: Coefficients**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| 1 (Constant) | 0.843 | 0.348 | | 2.360 | 0.023 |
| Fibre optic technology | 0.572 | 0.043 | 0.648 | 11.699 | 0.000 |

### Fiber Optic Technology

Fiber optic technology is statistically significant to delivery of digital content in broadcasting sector as shown by $\beta = 0.572$. This shows that implementation of fibre optic technology had significant positive relationship with delivery of digital content in broadcasting sector. This implies that a unit increase in use of fibre optic technology will result to increase in delivery of digital content in broadcasting sector.

## SUMMARY, CONCLUSION AND RECOMMENDATIONS

### Summary of Findings

The findings are summarized alongside the objectives of the study, conclusions are drawn from the study and recommendations for action and further studies are given.

### Fibre optic technology

The first objective was to establish the influence of fibre optic technology on delivery of digital content in broadcasting sector in Kenya. The study found that fibre optic technology is critical to the delivery of digital content in the media sector owing to the fact that it has the ability to carry increased quantities of information at high speed which could be in the form of voice, data or images. From the findings, it can be deduced that the fibre optic technology was highly involved in delivery of digital content in broadcasting sector. In the influence of fibre optic technology, the respondents indicated the influence of WLAN extension, fixed broadband and connectivity where 60%, 62% and 64% of the respondents agreed with large extend respectively that the influence delivery of digital content in broadcasting sector in Kenya. Further, the study established that availability of fibre optic technology ensures speedy and timely nature of delivery of digital content in broadcasting sector.

### Conclusions

This study uncovered some of the numerous benefits and challenges associated with the use of ICT in digital content delivery in broadcast industry. This study concludes that ICT has created opportunities for widespread electronic and timely delivery of digital content.

The study showed that although initial cost of acquisition is an inhibitive factor for fibre optic connection, unlimited bandwidth delivery and high Quality of Service (QoS) placed Fiber optics above wireless connectivity in their overall performance. Fiber optics provide high data rate in gigabyte per second with good quality link, but it is always expensive when compared to other technologies, and susceptible to many physical (though accidental) attacks.

Availability of fibre optic technology is statistically significant to delivery of digital content in broadcasting sector in Kenya. This implies that availability of fibre optic technology had a positive relationship with delivery of digital content in broadcasting sector in Kenya. Consequently, a unit increase in fibre optic technology will result to increase in delivery of digital content in broadcasting sector in Kenya. The study therefore concludes that availability of fibre optic technology is positively related to delivery of digital content.

## Recommendations

Broadcast industry should help train their IT personnel in order to compete, and catch up with the rapidly and swiftly changes in new technologies and resistance to change. From the study, it is recommended that a steadfast, strong and vast network of fibre optic technology be in place to enable fast, easy, timely and reliable delivery of digital content in broadcasting sectors in Kenya. With a growing general desire to access to digital contents that in turn necessitates the need of fibre optic technology. A reliable fibre optic technology will enable faster and timely delivery of digital content in broadcasting sectors.

Partnership with other organizations for updates on new technologies, training and funding is required for developing countries. Sharing of resources by operators saves scarce National resources. Research on cost effective and simple broadcast technologies such as wireless and digital applications should be strengthened. Convergence of telecommunications and IT in developing countries enables use of common infrastructure to provide a wide range of radio services. Use of public domain software such as Radio mobile planning tool for optimization of link budget, Linux etc. should be explored further for cost effective operations.

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