

# The Effectiveness of Medical Technology in Measuring Service Quality in Nigerian Healthcare Sector

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**Abstract:-** The purpose of this paper is to review the effectiveness of medical technology to improve service quality in the Nigerian healthcare sector. This paper is a review of medical technology and service quality to see what modifications could help to achieve sustainable medical technology to improve the service quality in the hospitality industry. The findings of the study showed that healthcare environment has acknowledged the importance of adopting medical technology. Discoveries showed that service quality as perceived by patients in a hospital setting is determined by cleanliness, hygiene, competence of doctors, and skilfulness of nurses among other factors that patients may consider as service quality. In general, the findings of this study could help hospital managers and medical personnel (doctors, nurses, and patients) consider medical technology as a major characteristic that defines service quality positively in the healthcare sector of Nigeria.

**Keywords:-** Medical Technology, Service Quality, Qualification Development, Healthcare Sector and Nigeria.

## I. INTRODUCTION

The thought of applying technology to expand the service quality in the healthcare sector has dominated recently. Research has shown that technology has the potential to improve the efficiency, safety, and quality of healthcare services. Wei et al., (2017) argues that health technology have increased the effectiveness of prevention, diagnosis, and care to some degree, but can also have detrimental effects, such as high price of several health technologies and possible ethical issues. In many instances in developing countries, such systems do not fully realise the objectives envisaged and have sustained the objectives partly or entirely at the pilot stage (Adjorlolo & Ellingsen, 2013).

This report is seconded by Arman & Hartati, (2015) who claimed that many factors contribute to the low usage of technology in developing countries, some of which include high cost, patient data privacy issues, system being too problematic to utilise, social influence, and absence of training. According to Liu & Cheng, (2015), despite the perceived potentials of technology in both private and public

hospitals, healthcare professionals still find it difficult to part with the paper-based system in developing countries. On the other hand, most developed countries have recorded improved care delivery system since the adoption of technology in the sector Achampong, (2012). The challenge in Africa is to ensure that the technology system is effectively set up for better health outcomes with quality data to improve health planning and policy formulation. This has become an area in which the potential for effective use of the full range of technology can be integrated to enhance service delivery (Awofala & Ogundele, 2018).

Moreover, the healthcare environment provides a complex system with different characteristics than other industries such as making customer demands a highly customized and subjective affair. The environment of technology implementation will increasingly depend on the employees' service delivery, how they interact with customers and solve customers' problems, reliability of the services they provide to the customers, and how the employees apply policy and physical relationship with the customers (Nuru, Zewdu, Amsalu, & Mehretie, 2015).

There is increased attention in Nigeria regarding the weak condition of health services performed by the private and public sectors. The lousy state is most notably seen in public healthcare organisations across the nation (Yegon, 2012). Not only that, the healthcare in Nigeria is still facing several challenges that is dragging it behind. Some of these drawbacks to the healthcare system in Nigeria are: facing corruption in healthcare, bad education of management specialists, bad education of doctors, poor healthcare management, ill-trained nurses, lack of medication, lack of funding, lack of hygiene, lack of medical facilities, lack of tools (medical technology), and lack of empathy. All of these have distracted the growth of service quality. Secondly, the structure of the healthcare system is poorly developed (Olakunde, 2012). This has caused it to suffer a significant setback that causes patients to not go for services there, most notably at the local government levels.

Thirdly, the system has suffered a major challenge of low morale in the government, which always leads to Nigerian doctors protesting over meagre pay (poor salary) and they even go on a strike by leaving poor patients on sick

beds without treatment or medications. A study of service quality of hospitals in Ghana demonstrates that not-for-profit mission and for-profit private hospitals deliver better service quality compared to public hospitals (Abor, 2016). The low morale causes the low quality of medical services given. Lastly, a lot of effort have been done to include citizens in the insurance plan; however, there are still numerous citizens who are not protected. This is recognised as a significant difficulty for the healthcare practices in Nigeria, and various private hospitals also confirm this issue.

Moreover, hospitals that are not licensed are growing in unbelievable places, and they are capable of obtaining customers who would have been adequately served by the public hospitals. The public health sector is therefore under intense pressure due to the competition it faces from the private health providers. Thus, the improvement of technology system in the public and private health sectors is an urgent problem (Awofala & Ogundele, 2018). Because of intensified competition, technological innovation and customer preferences, high quality levels for businesses have become crucial for endurance. However, the application of such policies and programs remains a hostage to problems of management and governance.

Therefore assessing the level of service in hospitals and evaluating their impact is indispensable. Moreover, quality of service and satisfied consumers in such a dynamic setting are very critical to health organizations, and it is not easy to generate them instantly. It involves consistent delivery of quality of service that meets or exceeds the expectations of the customers (Teich, Heneghan, Lowen, Ozaki, & Kaplan, 1997). However, the influence of technology on service quality on the other hand has been covered in very limited literature, particularly in healthcare and specifically in Nigeria.

## II. LITERATURE REVIEW

### ➤ *Medical Technology*

Medical technology is continuously developed to enhance and strengthen the lives of people. There are several innovative medical tools and methods available that protect innumerable lives. Medical technology also helps to improve the condition of lives of several people (Kinley, 2012). By the continuous development of medical technology, it becomes a constant difficulty in maintaining the technology to guarantee individuals' safety and capacity. Healthcare technology administered include various devices from simple thermometers to complex operations such as magnetic resonance imaging (MRIs), smart inhalers, robotic surgery, wireless brain sensors, artificial organs, health wearables, precision medicine, virtual reality, telehealth and clustered regularly short palindromic (CRISPR) etc. Apart from broad range of devices and the increasing need for efficacy and protection, sustaining these devices has become a challenging assignment (Adebara, Adebara, Olaide, Emmanuel, & Olanrewaju, 2017; Ekanoye et al., 2017; Kinley, 2012).

The technology is advanced, and the development proceeds at a fast pace (WHO, J., & Consultation, 2003). Hospitals usually have a biomedical engineering department. The biomedical engineering department is comprised of technicians and physicists who perform corrective as well as planned preventive maintenance (Hedberg, 2018; Kinley, 2012). They also provide other kinds of technical support. Technology develops continuously (WHO, J., & Consultation, 2003). Medical technology is a competitive market, and each company develops at a high rate. However, different companies' equipments are not designed in the same manner to each other.

This results in a large number of systems for the technicians to learn and keep their knowledge up to date. Keeping their knowledge up to date poses a challenging task for the technicians (Oyekale, 2017; Yap, Abdul-Rahman, & Chen, 2017). The service management for medical tools is recognised as clinical or biomedical engineering. Recently, there has been a force to meet the field by renaming its healthcare technology. This field is emerging at a constant speed, but multiple barriers and difficulties are growing more widespread (Kinley, 2012). As the years pass by and technology advances to change, there is no recognition of what improvements will be attained next. Here are the top seven latest medical technologies.

### ➤ *Magnetic Resonance Imaging (MRIs)*

Magnetic resonance imaging (MRIs) provides an image of a body by utilising powerful electromagnet and radio waves. Unlike other diagnostic imaging tests (computed tomography and X-ray), an MRI can scan tissues, tendons, ligaments, and cartilage with precision, as well as nerve roots (Adebara et al., 2017; Kinley, 2012). An MRI assists a doctor to diagnose an injury or disease, and it can observe how healthy patients are progressing with medication. MRIs can be implemented in different parts of a patient's body. It is beneficial for viewing soft muscles and the sensory system.

### ➤ *X-rays*

X-ray is a kind of radioactivity called an electromagnetic wave. X-ray is utilised to take an inside picture of something by applying massive energy electromagnetic emissions with small wavelengths, which can pass through objects. An image that a doctor takes of a patient's insides is to understand if patients have broken bones inside and for pregnant women (Adebara et al., 2017; Kinley, 2012).

### ➤ *Smart Inhalers*

An inhaler is a fundamental treatment choice for asthma, and if used accurately, it will be satisfactory for 90 percent of patients. Nevertheless, a study reveals that only about 50 percent of patients have their situation under control, and as numerous as 94 percent do not utilise their inhalers accurately. A tiny device is connected to the inhaler, recording the date and time of each effect and whether it is correctly controlled (Adebara et al., 2017; Kinley, 2012). These data are then forwarded to the patient's

smartphones so that they can monitor and maintain their wellbeing. Clinical trials have shown that the implementation of the smart inhaler system results in less medicine required for relief, and patients have more days with relievers.

#### ➤ *Robotic Surgery*

In minimally invasive systems and assistance, robotic surgery is used to aid with accuracy, versatility and control. Doctors can perform very complex procedures, which are very demanding and difficult, through robotic surgery. As technology develops, it can be mixed with augmented reality to enable doctors to observe essential supplementary information on a patient in real-time while still working. However, discovery supports the concern that it will ultimately replace human surgeons, but it is possible to be utilised only to support and improve a doctor's practice (Adebara et al., 2017; Kinley, 2012).

#### ➤ *Wireless Brain Sensors*

Medical improvements have allowed doctors and scientists to cooperate and build bioresorbable electronics which can be installed in the brain and dissolve when they are no longer required. This medical equipment will help doctors in regulating the pressure and temperature inside the brain. Since the sensors can dissolve, they decrease the requirement for further operations.

#### ➤ *Artificial Organs*

The scientists are capable of creating blood vessels, artificial ovaries, and pancreas. These synthetic organs then develop inside a patient's body to replace the original damaged one (Adebara et al., 2017; Kinley, 2012). The capacity to provide artificial organs that are not refused by the body's immune system could be innovative, protecting millions of patients who depend on life-saving transplantations every year.

#### ➤ *Health Wearables*

The market for wearable devices has increased since their introduction in the past few years, since the announcement of Bluetooth in 2000. People nowadays utilise their phone to trace everything from their activities, heartbeat and physical health, to their sleeping patterns (Adebara et al., 2017; Kinley, 2012). The elevation of this wearable technology is connected to increasing chronic diseases like diabetes and cardiovascular diseases, and it is proposed to fight these diseases by encouraging patients to control and improve their fitness.

As the years move on, technology in medicine and pharmaceuticals will proceed to increase. People are living longer, and some diseases are considered incurable. New medical discoveries have high breakdown rates because of the inequalities of the technology accessible such as exhaustion tubes, mechanical relays, and other non-solid state devices (Hedberg, 2018; Malmström & Hed, 2010). Additionally, there are no laws and guidelines to control production methods or facilities control. This has generated inequalities in security, performance, and protection

(Adebara et al., 2017; Kinley, 2012). Patient protection is an essential affair when dealing with medical technology.

First, the tools need to be electrically secure, expecting patients to be free from encountering a possible uncomfortable or harmful electrical clash. Conclusively, the devices must fulfil their designed mission flawlessly and securely (Hedberg, 2018). Medical technology is ubiquitous in modern medicine. It has been developed to such an extent that it saves lives on a daily basis. In modern medicine, technical equipment is so efficient that its expectations demand that it functions properly (Nashrath, Akkadechanunt, & Chontawan, 2011; Thatcher et al., 2016). Their efficiency in diagnostics, treatment, and patient monitoring has led to a dependency where the possibilities of replacing them with humans are small and sometimes non-existent (Oyekale, 2017; Yap et al., 2017).

#### ❖ *Service Quality in the Hospitality Industry*

In the hospitality sector, characteristics that are significant such as imprecise patterns and fluttering requirements have been recognised and involve the responsibility of establishing, performing, and measuring service quality (Fatima, Malik, & Shabbir, 2018). Several determinants of service quality are not regulated in which quality perspectives such as convenience, kindness, and refinement are expected to perform differently depending on each customer and hence, evaluated personally. Technology has transformed the idea of communicating, listening to music, performing, shopping, playing games and much more. It is not shocking that technology increases its influence in the healthcare business. Healthcare technology is improving people's lives longer, decreasing wait times and making it more hospitable for doctors to diagnose diseases (Fatima et al., 2018).

Healthcare providers take steps to improve technology performance through the management of costs, improvement of service quality, and enhanced support by the frontline workers to create value for patients who are their customers. As such organisational performance is an essential factor to a healthcare service organisation in terms of internal operations, patients, and suppliers (Madon & Krishna, 2018). Healthcare activities include procurement and movement of items or products to their point of use, patient-doctor interactions, and maintenance of facilities (Nuru et al., 2015). All these elements of a healthcare organisation have an impact on the patients' perceptions and internal affection, either negatively or positively (Bellora & Guenther, 2013). It signifies that healthcare providers will need to give more consideration to the requirements and demands of their customers or patients in the future if they wish to accomplish any result in their bottom line. Therefore, the achievement of organisational aims depends on securing client commitment (George et al., 2015).

In the current climate, meeting the challenge of providing an adequate supply of an appropriately trained health technology is a vital intention of the government's reform and planning. In the recent years, research and commentary have suggested that flexibility in healthcare

delivery processes and healthcare technology is needed to adequately meet future demands on health services (Altaf, Tabassum, & Mokhtar, 2018). Traditionally, employees planning has been based on projections of demand and supply with little emphasis on innovative approaches to increase flexibility and productivity (Hall, 2005). The over-specialisation of health workforce roles has been questioned with some believing that this has led to inefficiency and inflexibility (Duckett, 2005; Searle, 2007). Duckett, (2005) argued that workforce flexibility and health workforce planning are necessary for the future management of healthcare needs. Support for policy and legislation change allows healthcare professionals to expand their scope of practice where blurring professional boundaries is inevitable (Duckett, 2005). Informally, the blurring of professional boundaries and scope of practice are seen in the workplace to meet population health needs.

#### ❖ *Qualifications Development*

The advent of medical technology is bringing about a transformation in what knowledge people need to run their equipment and applications. It can entail certain changes in the careers, general qualifications, and specializations staff and firms possess. Simultaneously, the expertise, skills and experiences of the workers can be useful tools in the future, as the workplace will develop and change (Bahrami et al., 2019; Sundström, 2019). Therefore, these problems are implemented to incorporate the nature of the training and learning approaches that people will be able to follow in the future, and also to clarify the importance of the obligation of both the staff and the management in professional development. The expertise and innovation of the staff of an institution or organization are important supports for the use and development of medical technology. Employees need to be provided with a chance to develop their talents and abilities by learning to do this (Taofeeq, Adeleke, & Ajibike, 2020).

Sundström, (2019) explains learning as a method to absorb old knowledge and to produce new knowledge. One of the aims is to develop the capabilities of workers in companies. An individual with a talent or competence in a given job is not only capable of effectively completing the task, but may also learn and work to create a concept. To do this, the worker requires to get the ability to focus on the task, to understand its significance and to be able to blend their realistic and professional work experience.

In addition, the hospital must provide staff with resources to develop and increase awareness so that they can learn from each other and maybe encourage the organization to improve itself. Providing sufficient preparation aid, an incentive for innovation and enhancing performance in the work of operators will reap multiple benefits (Taofeeq, Adeleke, & Ajibike, 2020). Those that will incorporate extra efficient and more effective work would provide more reliable conversation with company workers and employers who are more involved in improving their careers. That is why people seem to be more oriented towards changes and approaches that can be embraced in planning.

### III. RESEARCH METHODOLOGY

Research may be categorized widely in terms of its purpose; exploratory testing, case study analysis, descriptive statistic and hypotheses development. However, the essence of the study depends primarily on the extent of comprehension progression. This research suggested and validated the empirical concept established with input from scholars and literature. In a case, descriptive research is believed to clarify the characteristics of the interest parameters (Taofeeq, Adeleke, & Ajibike, 2020). This study exposes what improvements could help achieve sustainable medical technology to enhance the quality of service in the hospital sector, increase productivity and identify future innovations, consider economic hazards and promote investment in technology.

A systematic analysis was undertaken to present data from the synthesis to achieve the objectives of this research. The overall method of systematic analysis proposed by Lu & Liu, (2014) has been operationalized before. At the beginning of a systematic analysis, the research issues had to be addressed unambiguously and in step 1 as stipulated method, which seems to be the description of the issue or problems for analysis (Khan, Kunz, Kleijnen, & Antes, 2003; Moshood, Adeleke, Nawanir, Ajibike, & Shittu, 2020). Keywords of analysis needed to be defined to meet the study's requirements. A lot of trends in keywords in the study are important to guarantee the analysis area of research. In step 2, it is important to follow data sources alongside detailed and accurate reviews from the relevant journals and repositories.

Therefore, a suitable area of study is expected to be known and selected to access numerous relevant sources and papers. In addition, in Phase 3, the study of earlier research includes the use of keywords for analysis in a given field in terms of descriptions, scopus, and keywords. This keywords of study are encoded and incorporated into the known, and then selected from lists of publishers or journals. Research is expected to be precise, without language restrictions, and subject to moving as desired from the questions of research. Ke, Wang, Chan, & Cheung, (2009) and Lu & Liu, (2014) proposed that a minimal parameter analysis will be used at that point to ensure compatibility (Taofeeq, Adeleke, & Ajibike, 2020).

In addition, phase 4 involves determining the quality of the study to ensure methodological consistency. This means that the paper obtained for analysis and refinement should be limited to a selection of attributes for an effective assessment. It is important to clean up the conditions of certain papers from the previous search query. Of course, the preceding search undertaken in phase 3 will provide a broad range of concerns and papers on mainstreams. Therefore a clear analysis of the content of the article is needed. Phase 5 contains the collection of the proofs. A systematic analysis to describe and incorporate the excellent polished publications will be followed here, based on papers that are mainly connected with the areas of interest. This results in content elimination that is accompanied by a



testing area and context or structure (Lu & Liu, 2014). Typically the results are analyzed and synthesized by study criteria, existence, and research findings (Taofeeq, Adeleke, & Ajibike, 2020).

#### IV. SUMMARY AND DISCUSSION

Healthcare is dependent on information, and to strengthen the quality of healthcare delivery in any country, the medical technology system needs to be improved. Healthcare quality extends not just beyond meeting clients' satisfaction but it also addresses other components which include effectiveness, efficiency, equity, safety, and timeline in service delivery (Ke, Wang, Chan, & Cheung, 2009a). In recent years, aside from the need to deliver a high quality healthcare in a competitive market, managers of health facilities have been overwhelmed with very complex financing, purchasing, and provision of health services. This volatile healthcare environment has led to the acknowledgement of the importance of adopting medical technology.

There are five key findings in this review, based on the analysis by the scholars. Firstly, as posited by Yegon, (2012), there is already developing attention regarding the weak condition of health services performed by both private and public sectors. Secondly, as highlighted by Achampong, (2012), most developed countries have recorded an improved care delivery service since the adoption of the technology system in the healthcare sector. Thirdly, the challenge in Africa is to ensure that technology system is effectively setup for better health outcomes, as claimed by Awofala & Ogundele, (2018). Fourth, according to Ekanoye et al., (2017), sustaining medical technology in developing countries has become a challenging assignment (Kinley, 2012). Lastly, in the hospital sector, characteristics to measure service quality are convenience, kindness, and refinement. According to Fatima et al., (2018), it is not shocking that technology increases its influence in the healthcare sector (Taofeeq, Adeleke, & Ajibike, 2020).

According to Awofala & Ogundele, (2018), the improvement of the technology system in the public and private health sectors is an urgent problem. It is therefore indispensable to analyse the effectiveness of medical technology in the hospitals and determine their influence to service quality. The delivery of health services is an essential component of healthcare in society at large, and organisations that are involved in the business naturally strive to see that their performance meets and exceeds patients' expectations.

The effect of medical technology on service quality is an essential factor in building the public's confidence in the hospital services. In line with the discoveries, service quality as perceived by patients in a hospital setting is determined by its cleanliness, hygiene, and well-maintained equipment. Consequently, the use of medical technology in healthcare enables jobs to be increased and it encourages the advantages of manufacturing methods according to ecosystem policies in a modern form. This will provide

significantly sustainable environmental and economic perspectives which in the previously existing clarifications mean intellectual assets to many resource challenges. Nevertheless, the demands of technology are increasing, and competences are crucial. Normal activities will vanish, new functions will become more complex and with the dispatch of digitisation new industrial sectors will develop. In order to solve the communication problem of medical technology in healthcare, it is imperative to increase employee efficiency by linking new knowledge and information technology in a sustainable manner. The recommendations are that the hospital might use the service quality perception of the patients through medical technology to aid in developing better quality.

#### V. CONCLUSION

To compete globally, chances given through business digitisation are essential. Several healthcare providers are now embracing digitisation by regularly selecting inexpensive medical devices such as sensors to support their organizations and draw on the data they generate to upgrade their providers and outputs. Medical technology will enable healthcare to cut costs, save time and respond more effectively to customer demands as part of innovation practice and ongoing growth in society. Healthcare infrastructure needs to be built, job gaps need to be resolved, clear cybersecurity protocols need to be identified and digitalisation investment needs to be encouraged.

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