"Assessing the contribution of HIS usability towards quality Health Care in Tanzania Public Regional Referral Hospitals: A case study Geita Regional Referral Hospital"

Peter Charles,

Department of Business Management,

Institute of accountancy Arusha, Tanzania.

Karisha Kavuta,

Institute of Accountancy Arusha,

P.O.Box 2798, Main Campus Njiro, Tanzania.

Abstract

The world is now emphasizing the equitable health services with no discrimination and access to all and is almost in the move to the Universal Health Insurance (UHI) to ensure that everyone is covered with health insurance and is confident to health services. Nevertheless, the question of quality health service is still cracking the heads of bighead states though the situation worse in the developing world countries. More studies agree that ICT has become a tool for dealing with poor health services worldwide. This study focused on assessing the contribution of ICT towards quality healthcare services to regional referral hospitals,a case study of Geita Regional Referral Hospital (GRRH). The study divided the research participants into two strata including service providers and service recipients to ensure balanced opinions. The participants were obtained using stratified simple random sampling technique. The mixed research approach was appliedin collecting both quantitative and qualitative data. Data were collected using both questionnaire and semi structured interview guide. The findings revealed that the use of ICT has improved the quality of healthcare at GRRH. Additionally, despite the existing challenges such as frequent power outages, lack of instant communication among service providers, lack of proper channel of communication between the hospital and community and insufficient trainingthe use of ICT in GRRH showed a remarkable contribution towards quality health care provisionincluding waiting time reduction, treatment cost reduction, easy and quick patients data retrieval, equitable service, people - centered or individual preferences, integrated and coordinated care, and efficient care by providing and maximizing the benefits of available resources.

Key words: Health Information System, Information and Communication Technology (ICT), Usability, Health Care, Awareness, quality health care

1.1. Introduction

Health service is one of the fundamental rights of human beings. The Government of Tanzania has a constitutional commitment to warrant public health to entirely its citizens. Part III section 14of the Tanzania Constitution declared the right to life emphasizing that "Every person has the right to live and to the protection of his life by the society in accordance with the law" (Tanzania Constitution, 1977), this indicates that all Tanzania citizens nevertheless of their strata have equal right of access to standard medical services. Healthcare systems in Africa suffer from neglect and underfunding, leading to severe challenges across the six World Health Organization (WHO) pillars of healthcare delivery (Obinna et al., 2019). According to Ricardson (2006) argues that healthcare providers and governments have no choice but to meet healthcare demands for future citizens and the application of e-health is thus fundamental.

Globally, countries are faced with health system problems that vary from one to another (Obinna et al., 2019). African countries over the years suffered more from man-made issues which cut across institutional, human resources, financial, technical, and political developments (Obinna et al., 2019). World Health Organization (WHO) in 2007 proposed a framework that describes healthcare systems in terms of six core components or "building blocks": i) service delivery; ii) healthcare workforce; iii) healthcare information systems; iv) medicines and technologies; v) financing; and vi) leadership/governance (Obinna et al., 2019).

Several studies have been conducted on health services delivery revealed that the use of Information and Communication Technology (ICT) has a significant positive contribution towards the improvement of health services. A study by Khatun (2015) found that using ICT is a key strategy to meet the demand for health services as it helps to meet increasing demands, and cut health service costs, limited resources, and workforce shortages. Manda (2019) also found that the adoption of ICT in the supply chain enhances the quality of services in the purchasing and supply of essential medicines. In addition, a study by Omondi (2016) revealed that the use of ICT improves health service delivery to patients. According to Mimbi and

Bankole (2015) findings suggested that ICT significantly improves life expectancy at birth and reduces infant mortality rate, the study also proposes that African countries must significantly invest in ICT to improve their health systems. However, in Tanzania little is known on to what extent the ICT investment and application has contributed to the quality of health services in public regional referral hospitals. Regardless of the interventions and studies conducted still the problem of poor health care in RRHs persists (HSSP, 2015). Poor health care may result to increased waiting time, increasing demands, increased health costs, delayed service delivery, incorrect health data and even death (Ruxwana et al., 2010).

2.0 Literature Review

Ghavifekr and Rosdy (2015) view ICT as a short hand for computers, software, networks, satellite links and related systems that allow people to access and share information and knowledge in a variety of forms. According to Ajayi (2009) ICT is defined as a technological means of collecting (inputting/gathering), collating (processing/analyzing), and conveying (outputting/transferring) information via technology. Generally, ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. For example, personal computers, digital television, email, robots, phones, Local Area Network (LAN), application software from stand alone to enterprise resource programs (ERP), social media and etc. For effective utilization of ICT facilities, there is need for adequate and reliable electricity supply, good information system, computers and computer environment, literate computer population and technical expertise (Akor et al., 2016).

However, when dealing with improving quality of health care using ICT the issue of HIS usability is the core considerations and has a big contribution to whether the system can be accepted for use or not. According to ISO-9241-11 (2018) usability is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use."

Furthermore, according to Nielsen (1993) usability heuristic are perceived by novice users and divided it into five elements that are learnability, efficiency, memorability, errors and satisfaction.

According to Nielsen (1993) efficiency means the resources expended in relation to the accuracy and completeness with which users achieve goals. Satisfactions the freedom from discomfort, and positive attitudes towards the use of the product.Learnability implies that the system should be easy to learn so that the user can rapidly start getting work done with the system. Memorability means that the system should be easy to remember so that the casual user is able to return to the system after some period of not having used it without having to learn everything all over again. Other usability aspects explained by the Nielsen areerrors which means that the system should have a low error rate, so that users make few errors during the use of the system and that if they do make errors they can easily recover from them. Moreover, Nielsen define user as the person who interacts with the product, and the goal means the intended outcome.

3.0 Methodology

This study was conducted at GRRH in Geita region at geita district. The mixed research approach was applied in data collection due to limited time and insuring accuracy while the survey research design was employed that enabled the researcherss to collect both quantitative and qualitative data from primary source. According to Thomhill (2012) research design is a necessary tool for meeting research goals. The sample size of 153 participants was obtained from 600 population of two groups that is 250 service providers at GRRH and 350 average daily attendance service recipients at the same using Yamane (1967) formula n = N/ (1+N (e) ^2), calculated strata wise. Moreover, a pilot study involved 8 participants 5% of the participants from Nyankumbu health centre were carried out as a way to test and refine the data collection instrument. Also, an instrument was reviewed by various research experts and content experts to ensure that the instrument could objectively meet the intended use of revealing hidden feeling of ones.

The study employed probability stratified simple random sampling selection since the study had two groups. While both questionnaire and interview guide were used as the data collection instruments capturing primary data from the participants. Data were analysed using both descriptive and content analysis methods. The quantitative data employed descriptive analysis using SPSS version 25 as tool for analysis and qualitative data employed content analysis method to analyse pattern of the similarities and uniqueness of concepts.

4.0 Findings

Both quantitative and qualitative findings obtained from questionnaires and interviews revealed three (3) importantfactors to the improvement of quality health care in Tanzania regional referral hospitals. The contributions revealed from both service providers and recipients are ICT infrastructure, HIS usability and level of users' and customers' awareness. However, in this study the usability factors were assessed to discover in-depth its contribution to the improvement of quality health care. The study made an assessment on the contribution of the HIS usability in helping to improve the healthcare services in GRRH.HIS usability components or items tested were cursor visibility on HIS interface, interface colors for color blindness, menus arrangement, HIS easy movement (navigation), HIS hospital functions accommodation or captures, reports production, patients' simplified data retrieval in HIS, HIS notification feature and queue controlling or management capability.The results of the findings were presented in frequency tables and bar chart graphs to increase results visibilities and others were presented in narrations for qualitative data that started presented showing the usability status for HIS at GRRH and below are the results shown in tables.

Table 1: Cross Table Shows Cases versus Service Providers' Responses

Case No.	Case	Service Providers' Response				
		Disagree	Disagree	Neutral	Agree	Agree
1	GRRH uses Health Information System (HIS) to attend patients	1 (1%)	1 (1%)	5 (7%)	31 (42%)	36 (49%)
2	Cursor on the HIS interface is clearly seen	0 (0%)	3 (4%)	11 (15%)	40 (54%)	20 (27%)
3	HIS interface colors are good to work with	1 (1%)	2 (3%)	11 (15%)	44 (59%)	16 (22%)
4	Menus in HIS are arranged with accordance to business process easy to follow for use	0 (0%)	3 (4%)	24 (32%)	29 (39%)	18 (24%)
5	HIS interface allows you to move to the next step easily	0 (0%)	4 (5%)	12 (16%)	39 (53%)	19 (26%)
6	HIS can perform all hospital functions in GRRH	4 (5%)	16 (22%)	14 (19%)	20 (27%)	20 (27%)
7	All necessary reports in GRRH can be produced from HIS	3 (4%)	14 (19%)	15 (20%)	28 (38%)	14 (19%)
8	HIS in GRRH has ability to give alert for minimum stock level	12 (16%)	12 (16%)	20 (27%)	21 (28%)	9 (12%)

Source: Researchers' Survey Data, (2022)

Below are the presentations of the findings as summarized in Table 1. Cases The cases in this table involved only 74 service providers as participants out of 153 due to nature of variables tested.

However, researchers before undertaking any usability evaluation wanted to know if the participants were using the HIS that they needed to test its usability. The result showed that the system was highly used at GRRH and majority 67(91%) of the participants agreed that GRRH uses HIS to attend patients. The result granted the legitimacy to carry out the study for usability evaluation as it unveiled that GRRH had system in place being used. Indeed, cursor on the HIS interface was evaluated to know whether users were able to see it easily and quickly navigate by pointing the intended function. The finding revealed that majority 60 (81%) of the participants agreed that it was easily seen meanwhile when participants asked to comment on the colors used on the HIS interface 60 (81%) of the participants agreed that the colors were good and supported the effective usage. Moreover, the researchers wanted to know the way participants perceived the arrangements of menus of the HIS if they enable quick prediction and memorability of the next process to come after the previous one has finished. The findings showed that majority 47 (63%) of the participants were comfortable with the way menus were organized. Nonetheless, there was still a large number at a neutral point 24(32%) that indicated that intensive and regular training and awareness to service providers (participants) has to be elevated.

Consequently, the researchers were interested to evaluate the ease of navigation on the HIS interface on accplishing one process towards the other. The result of the study showed that majority 58 (79%) agreed that the moving to the next step on the HIS interface was ease and this revealed that the HIS usability is good in terms of memory and satisfaction and learnability to users and increases user performance and HIS effectiveness at GRRH. Thereafter the researchers wanted to reveal if HIS accommodate all treatment processes at GRRH. The result showed that majority 40(54%) of the participants agreed that HIS can

perform all hospital functions. The finding unveiled that the HIS usability is good in terms of efficiency, error free and satisfaction to users and thus increased users performance and HIS effectiveness at GRRH.

Moreover, the researchers wanted to reveal if all required reports for reporting and decision making could be obtained from the HIS. The result showed that majority 42(57%) of the participants agreed that all necessary reports in GRRH could be produced from HIS. The finding unveiled that usability elements of satisfaction, efficiency and error were met. Then, the evaluation of whether the HIS in GRRH was able to manage the minimum stock level by giving notification to respective users such as dispensing, laboratory, and main store at GRRH to avoid stock out that led patients miss medications and other laboratory services. The result showed that majority 30(40%) of the participants agreed that HIS in GRRH has ability to give alert the finding unveiled that the alert or notification at GRRH is either not familiar to a considerable number of users or are not aware of the feature. Instead of the fact that majority agreed that the notification on HIS works, still there is a need for intervention

Table 2: Cross Table Shows Cases Responses for both service providers and service recipients for HIS usability

S/N	Case	PARTICIPANTS' CATEGORIES									
		Service Providers					Service Recipients				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9	Patient's data retrieval is simplified using HIS.	1 (1%)	5 (7%)	10 (14%)	42 (57%)	16 (22%)	2 (3%)	5 (6%)	14 (18%)	32 (41%)	26 (33%)

#	Statement										
10	Queue of patients is controlled in every section in HIS at GRRH	3 (4%)	18 (24%)	20 (27%)	23 (31%)	10 (14%)	2 (3%)	15 (19%)	17 (22%)	21 (27%)	24 (30%)
11	Use of HIS reduces patients' complaints during service provision	4 (5%)	11 (15%)	16 (22%)	26 (35%)	17 (23%)	1 (1%)	9 (11%)	11 (14%)	35 (44%)	23 (29%)
12	Use of HIS in GRRH reduces patient's waiting time.	3 (4%)	8 (11%)	15 (20%)	34 (46%)	14 (19%)	1 (1%)	10 (13%)	12 (15%)	27 (34%)	29 (37%)

Source: Researchers' Survey Data, (2022)

Below are the presentations of the findings as summarized in Table 2 in cases category wise. The cases in this table involved 153 participants both service providers and service recipients.

Furthermore, researchers wanted to know how the process of retrieving the patients' previous data such as the re-attending records found to be simplified from both service providers and recipients. The results showed that 58 (79%) service providers and 58 (74%) service recipients both agreed that the process had been simplified. Majority in aggregate 116 (75%) of the participants agreed that Patient's data retrieval was simplified using HIS. The findings unveiled that the HIS usability is good and increased its learnability, efficiency, memorability, error free and satisfactions to users at GRRH consequently increased quality of health service. Also, researchers wanted to know if the existing HIS helps in managing and controlling queue considering FIFO algorithm to make the patients satisfied with regard to special circumstances The result showed that 33 (45%) service providers and 45 (57%) service recipients both agreed making majority of 78(51%) of the participants that agreed that queue of patients is controlled in every section in HIS at GRRH. The findings unveiled that the HIS controls queue at every point that increases HIS usability and

effectiveness and meet users' and customers' satisfaction at GRRH that in turn increases users' performance.

Finally, researchers wanted to know if the use of HIS at GRRH resulted to the reduced patients' complaints by eliminations of most of manual processes that believed to be associated with chaos such as lost files, payment, uncontrolled queue and so many more. The result showed that 43 (58%) service providers and 58 (73%) service recipients both agreed. The result shows that majority 101(66%) of the participants agreed that use of HIS reduced complaints. The findings unveiled that the HIS helps in reducing patients' complainants at GRRH when is used effectively and meets users' expectations. Similarly, researchers wanted to know whether the use of HIS reduced patients waiting time. The results showed that 48 (65%) service providers and 56 (71%) service recipients both agreed The findings revealed that majority 104(68%) of the participants agreed that HIS usage had reduced waiting time and thus satisfaction among users and increased performance.

4.1 Discussions

The study revealed that HIS usability was very important in contributing the improvement of quality of health care at Geita Regional Referral Hospital by increasing service provider's motivation and efficiency. The analysis of primary data collected from service providers and service recipients on the HIS usability showed that to promote the use of HIS among the service providers and increased performances.

The findings in this study revealed that majority of the research participants agreed that the HIS usability was of acceptable standard and thus contributed to the improvement of health care service delivery at GRRH. The results agreed with usability elements as described by (Harrison et al., 2013) that are learnability, efficiency, memorability, errors and satisfaction. The Nielsen heuristic elements above were assessed by novice users in a number of ways and they concluded the HIS being usable. According to Ghavifekr and Rosdy (2015) views ICT as a short hand for computers, software, networks, satellite links

and related systems that allow people to access and share information and knowledge in a variety of forms. Similary the use of HIS implies the use of ICT at GRRH. Using HIS improved quality of health service and is similar to what suggested by Khatun (2015), Manda (2019), and Mimbi and Bankole (2015)

The study was conducted in Geita Regional Referral and therefore involved service providers and recipients from a single localized hospital. More hospital could have been involved and obtain a variety of views from different locations. However, the result from this study can be used to any other hospital due to employment of probability selection method and quantitative data that allow the generalization of results as suggested by (Acharya et al. (2013). Furthermore, the adequate ICT infrastructure is one among the important factor or requirement for successful and effective HIS (Akor et al., 2016) discussed that for effective utilization of ICT facilities, there is need for adequate and reliable electricity supply, good information system, computers and computer environment, literate computer population and technical expertise. Likewise the level of awareness to both users and customers is another important factor for effective utilization of HIS at Geita RRH and this agreed with Okonokwo & Eruvwe, (2020) that if an individual is aware of an existing event, the next step is to make use of this event. Also, as according to Çallı, Coşkun and Özşahin(no year) explained that ICT awareness and perception is the main determinants of ICT adoption and utilization.

5.0 Conclusion and Recommendations

5.1 Conclusions

The aim of this study was to assess the contribution of HIS usability towards quality health care in public regional referral hospitals a case study Geita Regional Referral Hospital (GRRH). The findings of this study revealed that HIS usability has a remarkable contribution towards improving the quality of health care at regional referral hospitals and for successful deployment of any other system as it affects directly the user who is the prime actor on the system. By increasing the ease of use through, learnability, efficiency,

memorability, errors free and satisfaction to users created motivation and consequently performance of the users Therefore, it is highly advised not marginalizing any usability issue because they contribute much to success or failure of HIS implementation and definitely any other information system.

5.2. Recommendations

The findings show that the majority of the participants agreed that the HIS usability at GRRH was above average and thus contributed to the improvement of the quality health care at GRRH by enhancing HIS learnability, efficiency, memorability, errors and satisfaction this led to effective utilization and service quality improvement through HIS. Since HIS usability is affected by frequent power outages and behavioral intention of the user therefore it is recommended that stable sources of power should be ensured to minimize interruption of the system during usage. Medical Officer Incharges have to consider training to staff as paramount and can be used to mitigate the behavioral intention as an external factor and influence towards use of the system for reluctant users. Also, regular training can led to exploring the important features of the system as it was discovered some of the features were not so clear to a notable number of users. Furthermore, the usability elements of the system found to bring impact at GRRH thus should always be given priority from the beginning by involving users in planning development of HIS so as the quality of health care is being improved sustainably.

References

1) Acharya, A.S., Prakash, A., Saxena, P. and Nigam, A., 2013. Sampling: Why and how of it. Indian Journal of Medical Specialties, 4(2), pp.330-333.

2) Çallı, B.A., Coşkun, E. and Özşahin, M., ICT adoption in SMEs: determinants, levels, and influence on the organizational innovativeness

3) *Chetty, P. (2016). Importance of research approach in a research. [online] Project Guru. Available at: https://www.projectguru.in/selecting-research-approach-business-studies/ [Accessed 04 Jun. 2022].*

4) *GRRH, no date Outpatients, available at: http://geitarrh.go.tz/wagonjwa-wa-nje(Accessed: 21 Aug 2022).*

5) *Khatun, F. and KhanamSima, M., 2015. Impact of ICT on health services in Bangladesh: a study on HobiganjAdhunikZilaSadar hospital. Impact of ICT on Health Services in Bangladesh: A Study on HobiganjAdhunikZilaSadar Hospital (April 6, 2015).*

6) *Mbizi, Z.L., 2021. Investigating Effects of Implementing Information and Communication Technologies (ICTS) On Health Services in Tanzania: A Case Study of Muhimbili National Hospital (MNH).*

7) *Mimbi, L. and Bankole, F.O., 2015. ICT and health system performance in Africa: A multi-method approach.*

8) *Okonoko, V.N. and Eruvwe, U., 2020. Awareness of Information and Communication Technology-Based Information Resources in Library User Education Programmes in Colleges of Education in Southern Nigeria. Information Impact: Journal of Information and Knowledge Management, 11(4), pp.156-171.*

9) *Paz, F., Villanueva, D., Rusu, C., Roncagliolo, S., & Pow-Sang, J. A. (2013, April). Experimental evaluation of usability heuristics. In 2013 10th International Conference on Information Technology: New Generations (pp. 119-126). IEEE.*

10) *Ruxwana, N.L., Herselman, M.E. and Conradie, D.P., 2010. ICT applications as e-health solutions in rural healthcare in the Eastern Cape Province of South Africa. Health information management journal, 39(1), pp.17-29.*

11) *Yamane, Taro. 1967. Statistics, An Introductory Analysis, 2nd Ed., New York: Harper and Row.*

12) *Nielsen, J. (1993). Usability Engineering. San Francisco: Mogan Kaufmann.*

13) Iso, I.S.O., 2018. 9241-11: 2018 Ergonomics of Human-System Interaction—Part 11: Usability: Definitions and Concepts. International Organization for Standardization. https://www. iso. org/obp/ui/# iso: std: iso, 9241(11).

14) Oleribe, O.O., Momoh, J., Uzochukwu, B.S., Mbofana, F., Adebiyi, A., Barbera, T., Williams, R. and Taylor-Robinson, S.D., 2019. Identifying key challenges facing healthcare systems in Africa and potential solutions. International journal of general medicine

15) Akor, P. U., Joshua, O. A., &Idika-Mba, E. W. (2016, November). Imperatives of modern technology on service delivery in university libraries in Nigeria. In Paper delivered at the International Conference on Information and Communication Technology and Its Applications (ICTA 2016) held at the Federal University of Technology, Minna, Nigeria November (pp. 28-30).