Assessment Of A Telecenter In Bridging The Digital Divide In Rural Areas: A Case Study Of Rulindo District, Rwanda

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ABSTRACT: Rwanda as a developing nation in East Africa has established Telecenters in rural areas in a bid to bridge the digital divide and as a vehicle to attain its vision 2020. However, there is no study done in Rwanda on the assessment of Telecenters in bridging the digital divide in rural areas. Therefore, the purpose of this paper is to assess the effectiveness of Telecenters in bridging the digital divide in the Rwanda's rural areas. Specifically, this paper will focus on the services and the challenges the users of Telecenters face. This study used questionnaires as a tool for data collection. For one month, the research data was collected from 200 Telecenter users of the Rulindo Telecenter, Rulindo district, Rwanda. From the analysis of the data collected, it was observed that the majority of Rulindo district Telecenter users are satisfied with the services offered by the Telecenters so far. However, it was clear that the Telecenter management should plan to sensitize the Rulindo District community especially the women and the young people aged between 19 and 30 years on the use of Telecenter. Finally, the respondents cited location, hours of opening and closing Telecenters, the cost of visiting Telecenters, Level of education and customer care contributes to the usage of the Telecenters.

Keywords : Information Communication Technology, Telecenters, Digital Divide

1 INTRODUCTION
The advent of information and communication technologies (ICTs) has led to technological revolution across the globe leading to the information age where information has become a precious resource in our everyday life [2]. This paper defines ICT as technologies with the intent of enhancing the creation, storage, processing, communication and dissemination of information [14]. Building digital societies requires the reduction of the gap between communities that are information rich and those affected by the digital divide [12]. The communities living in the rural areas requires ICTs to bridge the vast information gap that exists between them and the urban population in developing nations that have access to the ICTs [13]. Rural communities in developing nations face infrastructure unavailability and some other economic challenges [10] [13]. It is in this perspective that the Rwandan government through RDB has set up thirty Telecenters in all districts across the country to bridge the digital divide [13]. This study seeks to assess the effectiveness of the Rulindo Telecenter in bridging the digital divide in Rwanda. Specifically, this study seeks to: 1) identify the ICT services accessed by the Rulindo Telecenter users. 2) Identify users' perceptions towards accessing information through the Rulindo Telecenter. 3) The challenges users face when accessing information at Rulindo district, Rwanda.

2 LITERATURE REVIEW
Establishment of Telecenters in rural areas empowers the rural community to access modern inventions for their development. Since their establishment in mid -1980s in Sweden to provide rural farmers with training and jobs through computers and modern telecommunications equipment the Telecenters have spread to other parts of the globe to reach Europe and Africa [1][10]. In Africa, the establishment of the Telecenter was initiated international organizations such as the International Telecommunications Union (ITU); the United Nations Education, Science and Culture Organization (UNESCO); and the Canada's International Development Research Center (IDRC) [1][10]. In Rwanda, the Rwanda Development Board has embraced the setting up of Multipurpose Community Telecenters (MCTs) as part of its program to bridge the prevalent digital divide within rural Rwanda and the rest of the world. This rural community access program, hugely accorded attention by the government, bodes well with the policy to implement national e-government and e-governance programs pegged on improving public and private sector service delivery [13]. Multipurpose community Telecenters link the rural communities and other professionals to other parts of the world by providing services such as video conferencing to improve communication, consultation and learning experiences with experts abroad. E-learning will be taking place on a broader scale, allowing professors to provide training to several hundred students at a time through online facilities [13]. Therefore, this paper views Telecenters as means to give rural communities the chance to adopt ICTs to their benefit, strengthen social and economic ties both within and outside world [10]. Currently, Rwanda Telecenter Network (RTN) is implementing a digital literacy program famously known as the Telecenter women campaign led by Telecentre.org targeting women both in rural and urban areas on the use of Telecenters. This program seeks to transform the country's economy from the current agricultural based into the knowledge-based economy and empower women at the village level to acquire ICT skills. Currently, there are about 30 Telecenters in all the districts countrywide operated by private individuals to strengthen the social, economic, educational, and cultural lives of the communities [5].

2.1 Services Offered by Telecenters
Telecenters have been effective in providing information to empower rural communities by providing access to information on agriculture, education, business development, e-commerce and participation in e-governance etc. Strengths and weakness of each of these services depend on resources, institu-

tional arrangements, policies, and legislations. In Kerala, India, Telecenter networks were used as decentralized delivery points for Government services on a public-private partnership model [15]. The Akshaya, Telecenter Network project in Kerala, continued to provide, health, education, agriculture and legal services besides e-governance in enabling the rural community become active partners in the e-governance process and contribute to reducing the space for corruption in the government sector [15]. In Pakistan, There is a great potential of providing distance education through MCTs in rural areas. AllamaIqbal Open University (AIOU), the first Open University in Asia, has established over 1,400 study centers throughout the country. 58 percent of its students belong to the rural area. The opening of Virtual University is another step in the way of providing distance education through ICTs in Pakistan. There are examples of indigenous web resources providing information services to villagers. The examples are TelMedPak (for telemedicine) and Pakistan (to help agriculturists) [10]. In many developing countries, the greatest demand is for Telecenters is computer literacy that could lead to an increase in employment opportunities [4]. In South Africa, Mozambique, Senegal, Mali, and Uganda, the Telecenters offered similar services: photocopying, telephony, and training in computer hardware, software, internet access, and word processing. Facsimile transmission; document design, processing, and printing; and email services were also available. However, the level of use made of this wider array of services was lower. Low or non-use of some services was reported, for example, Internet and email in the most rural Telecenters in Uganda, Mozambique, and Mali [4]. At Nabweru Multipurpose, Community Telecenter in Uganda, The telephone service, and the photocopying service are the most popular. The young people surf the Internet for scholarships, make telephone calls - local, national and international, sending and receiving faxes, Video shows - education and entertainment [9].

2.2 Challenges Facing Rural Telecenter Users

Challenges facing Telecenter include but not limited to accessibility, usability, and sustainability. On accessibility perspective, the location of the Telecenter tops the list of factors that impact on Telecenter accessibility in the sense that users often have to incur transportation costs to access the Telecenter. At the Nabweru Telecenter in Uganda, the proximity of the Telecenter to a police station, a prison and magistrate's court discourages users from accessing the Telecenter as they find this threatening [9]. At Mankweng Telecenter South Africa, was located in an insecure area resulting in the loss of equipment to thieves [7]. Additionally, the opening hours of Telecenter limits their accessibility to the potential Telecenter users [8]). In Uganda, the telecenters are open on official working hours limiting the potential users from accessing the Telecenter services at night, on weekends and even during holidays [4][9]. In Africa, the cost of services was found to be high about user incomes and earnings resulting in a serious barrier for women, the unemployed, student and poor community members [4]. Usability of Telecenters is enormously fuelled by the lack of awareness on the services offered by the Telecenter [10]. In Mankweng in South Africa, although the people were aware that a Telecenter did exist, many did not know the exact location of the Telecenter [17]. In Kampala city, a surprising number of people did not know the location of the neighborhood cybercafé [4] [10]. User literacy also is a stumbling block to Telecenter usage [7]. In Senegal and to some extent Mali, Tel-

ecenters are still perceived as places providing services for educated. This perception is related to the language of the content used in Telecenter services most of which is in English or is French [4]. In Pakistan's rural areas, 99 percent of the populations cannot read and write in English [6] which discourages the usage of Telecenter. Additionally, the elders perceive the Telecenter as an entertainment medium mostly used by youngsters to access pornographic content resulting in restrictiveness on women and children from accessing the Telecenter [10]. Finally, this paper perceives Telecenter sustainability in terms of sustainability of infrastructure, services and relevancy, human resources and finances [11]. In Pakistan, the cost of setting up the telecommunication infrastructure in rural areas is prohibitively high [7]. The unreliability of electric power is another challenge the rural areas in Pakistan are struggling to overcome. For instance, in Gwadar, electricity is available for only ten hours a day resulting to poor service delivery by Telecenter to its users [7][10]. The lack of political will for the provision of information services is also a challenge; hence Local governments with a low budget have to provide other basic needs such as education, health, and electricity. Information provision remains one of their lowest priorities [10]. In Africa, the practice of getting technicians from far-flung places for maintenance or repairs and the high cost of equipment and supplies skyrockets the cost of maintaining the Telecenter [3][4] [8][10].

3 RESEARCH DESIGN AND METHODOLOGY

The population of this study consisted of the local community of Musanze district who visit the Telecenter in one month. According to the Rulindo Telecenter manager (2014) there is an average of 400 users in a month. Using Yamane's sampling formula [16] 200 respondents were given the questionnaire for data collection and Analysis. The questionnaire contained following sections: 1) Demographic Data section, 2) Services accessed by the Telecenter users section, 3) Users satisfaction towards Telecenter services section, 4) perceived usefulness of Telecenters section and 5) Finally the Challenges Telecenters users face section. Before the questionnaire was distributed, a pilot study involving 100 Telecenter users of Musanze district was done in which the all the sections of the questionnaire had a Cronbach's alpha of above 0.6. Therefore, the questionnaire was reliable and can measure what it is supposed to measure. The researcher then presented the questionnaire at the reception of the Rulindo Telecenter and the customers were requested to fill in the questionnaire by the receptionist.

4 DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Demographic data
Demographic characteristics considered in the survey include age, education level, gender, distance from Telecenter of respondents.

4.1.1Distribution of respondents per age

Fig. 1 below provides a summary of the age distribution among the sampled Telecenter users.
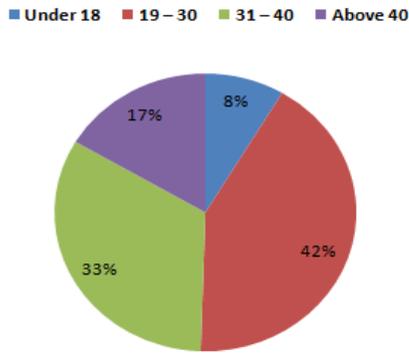
FIG. 1: *Age distribution among the sampled Telecenter users*

From fig 1 above, the majority (42.00 %) of the respondents who visit the Telecenter are youths aged between 19 and 30 years. They are closely (33.00%) by those aged between 31 years and 40 years. In terms of age, the majority (75.00%) of the respondents who visit the Telecenter are aged between 19 and 40 years.

4.1.2 Gender distribution
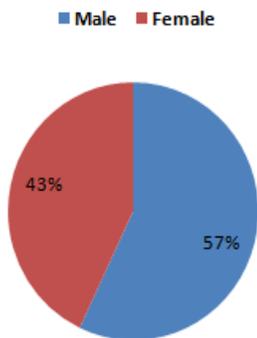Fig. 2 below provides a summary of gender distribution among the respondents.

Fig. 2: *Gender distribution among the respondents*

From fig 2 above, 57.00% of the respondents were male, and 43.0 % of the respondents were female.

4.1.3 Highest Education level
Fig 3 below provides the distribution of Telecenter users, according to their highest educational level.
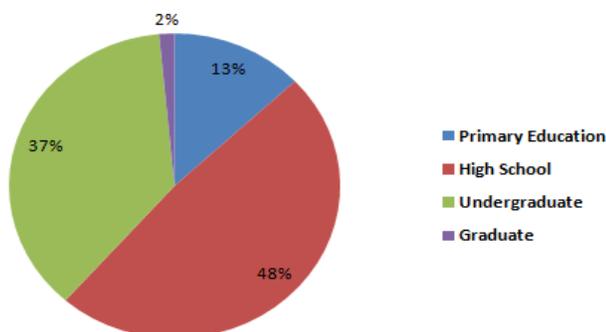
FIG. 3: *Distribution of Telecenter users according to their highest educational level*

From fig 3 above, the majority (48.50 %) of the Telecenter users has a high school qualification, and 37.0 % had an undergraduate education.

4.1.4 Users Distance to the Telecenter
Fig 4 below provides a summary on the distance covered by the respondents in visiting the Telecenters.
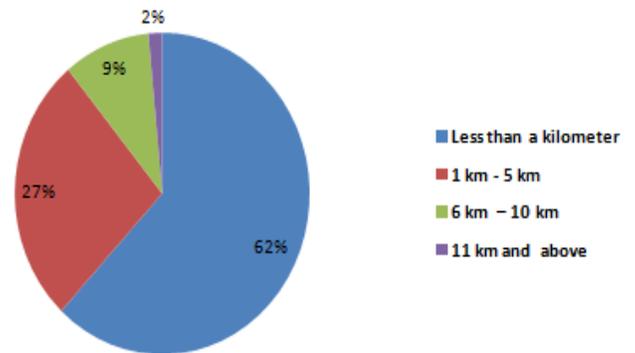
FIG. 4: *Distance covered by the respondents in visiting the Telecenters.*

From fig 4 above, the majority (62.00%) of the respondents cover less than one kilometer to the Telecenter. 27.0 percent of the respondents cover between 1 and 5 kilometers to the Telecenter. Meaning that 89 % of the respondents who visit the Telecenter travel five or fewer kilometers. Therefore, the Telecenter is within reach of the users.

4.2 Telecenter User Acceptances

4.2.1 Frequency of the Telecenter Access in a Month
Fig 5 below provides a summary of the days the user accessed the Telecenter in a month.
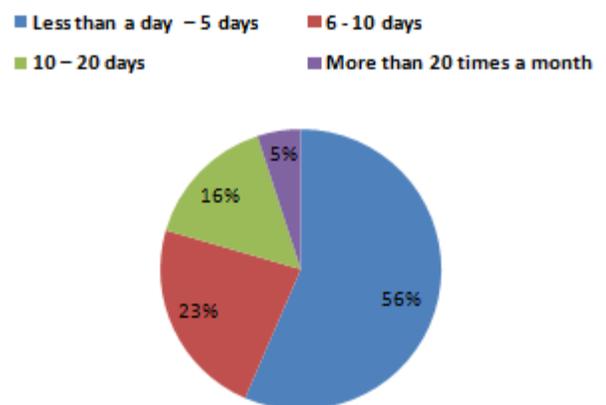
FIG. 5: *Frequency of the Telecenter Access in a Month*

From fig 5 above, it can be observed that the respondents access the Telecenter regularly

4.2.2 Services accessed by the Telecenter users

Table 1: Services Accessed by the Telecenter users

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Weighted Mean	Standard Deviation
I frequently access the Information for fun	9 (4.50%)	32 (16.00%)	49 (24.50%)	82 (41.00%)	28 (14.00%)	3.44	1.05
I frequently access the Information on Agriculture	37 (18.50%)	76 (38.00%)	40 (20.00%)	39 (19.50%)	8 (4.00%)	2.52	1.12
I frequently access the Government Information	33 (16.50%)	76 (38.00%)	37 (18.50%)	44 (22.00%)	10 (5.00%)	2.61	1.14
I frequently access the Job search Information	5 (2.50%)	26 (13.00%)	35 (17.50%)	76 (38.00%)	58 (29.00%)	3.78	1.08
I frequently access the Scanner services	10 (5.00%)	13 (6.50%)	63 (31.50%)	59 (29.50%)	55 (27.50%)	3.68	1.09
I frequently access the Printing services	0 (0.00%)	4 (2.00%)	2 (1.00%)	43 (21.450%)	151 (75.50%)	4.70	0.59
I frequently access the Photocopy services	10 (5.00%)	36 (18.00%)	66 (33.00%)	56 (28.00%)	32 (16.00%)	3.32	1.09
I frequently access the ICT Training	10 (5.00%)	29 (14.50%)	26 (13.00%)	67 (33.50%)	68 (34.00%)	3.77	1.20

From table 1 above, it can be observed that the majority (41.0%) of the respondents agreed (mean = 3.44 and SD = 1.05) that they access the information for fun. When responding to whether they access information on agriculture, the majority (38.00%) of the respondents denied (mean = 2.52 and SD = 1.12) that they frequently access information on agriculture. Contradicting the belief that the majority of the populations in rural areas are farmers and therefore they should seek agricultural related issues. Respondents also remained neutral (Neither agreed nor disagreed) (mean = 2.61 and SD = 1.14) on the whether they frequently access the Government Information. The majority (38.00%) of the respondents: 1) agreed

(mean = 3.78 and SD = 1.08) that they access the Job search Information. 2) Agreed (mean = 3.68 and SD = 1.09) that they frequently access the access the scanner services. 4) Strongly agreed (mean = 4.70 and SD = 0.59) that they frequently access the access the printing services. 5) Remained neutral (mean = 3.32 and SD = 1.09)   on frequently access the photocopy services. 6) Agreed (mean = 3.77 and SD = 1.20)   that they frequently access the ICT Training.

4.2.3 User Satisfaction towards Telecenter Services

Table 2: User satisfaction towards the Telecenter services

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Weighted Mean	Standard Deviation
I am satisfied when accessing the Information for fun	6 (3.00%)	23 (11.50%)	24 (12.00%)	103 (51.50%)	44 (22.00%)	3.78	1.01
I am satisfied when accessing the Information on Agriculture	6 (3.00%)	22 (11.00%)	31 (15.50%)	116 (58.00%)	25 (12.50%)	3.66	0.93
I am satisfied when accessing the Government Information	10 (5.00%)	45 (22.50%)	26 (13.00%)	84 (42.00%)	35 (17.50%)	3.44	1.16
I am satisfied when accessing the Job search Information	7 (3.50%)	14 (7.00%)	19 (9.50%)	110 (55.00%)	50 (25.00%)	3.91	0.96
I am satisfied when accessing the Internet connection	11 (5.50%)	7 (3.50%)	6 (3.00%)	114 (57.00%)	62 (31.00%)	4.04	0.98
I am satisfied with the scanner services	13 (6.50%)	35 (17.50%)	53 (26.50%)	85 (42.50%)	14 (7.00%)	3.26	1.03
I am satisfied with the printing services	42 (21.0%)	41 (20.50%)	107 (53.50%)	6 (3.00%)	4 (2.00%)	2.44	0.92
I am satisfied with the photocopying services	0 (0.00%)	1 (0.50%)	156 (78.00%)	38 (19.00%)	5 (2.50%)	3.24	0.49
I am satisfied with the Telecenter's ICT training	0 (0.00%)	6 (3.00%)	167 (83.50%)	22 (11.00%)	5 (2.50%)	3.13	0.47

From Table 2 above, it can be observed that the majority (51.50%) of the respondents agreed (mean = 3.78 and SD = 1.01) that they are satisfied when accessing the information for fun. The majority (58.00%) of the respondents denied (mean = 3.66 and SD = 0.93) that they frequently access information on agriculture. The majority of the respondents (42.00%) agreed (mean = 3.44 and SD = 1.16) that they were satisfied when accessing the Government information. The majority (55.00%) of the respondents agreed (mean = 3.91 and SD = 0.96) that they are satisfied when accessing the job search Information. Majority (57.00%) of the respondents also agreed (mean = 4.04 and SD = 0.98) were satisfied with the internet connection. Respondents, however, remained neutral (mean = 3.26 and SD = 1.03) when asked whether they were

satisfied with the scanner services. However, respondents disagreed (mean = 2.44 and SD = 0.92) when asked if they were satisfied with the printing services. Respondents remained neutral (mean = 3.24 and SD = 0.49) on the levels of satisfaction when using the photocopying services. They also remained neutral (mean = 3.13 and SD = 0.47) with the Telecenter ICT training satisfaction level.

4.2.4 Perceived Usefulness of the Telecenter

Table 3: *Perceived usefulness of the Telecenter*

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Weighted Mean	Standard Deviation
Community will develop economically	0 (0.00%)	4 (2.00%)	5 (2.50%)	130 (68.00%)	55 (27.50%)	**4.21**	**0.58**
Telecenter does not provide the information needed	0 (0.00%)	56 (28.00%)	108 (54.00%)	36 (18.00%)	0 (0.00%)	**1.90**	**0.67**
Telecenters are not interesting	49 (24.50%)	121 (60.50%)	30 (15.00%)	0 (0.00%)	0 (0.00%)	**1.90**	**0.62**
Telecenters are hard to operate	26 (13.00%)	117 (58.50%)	33 (16.50%)	19 (9.50%)	5 (2.50%)	**2.30**	**0.90**
Visiting Telecenters is a wastage of money and time	44 (22.00%)	123 (61.50%)	29 (14.50%)	4 (2.00%)	0 (0.00%)	**1.96**	**0.66**
Telecenters are unsafe	33 (16.50%)	123 (72.50%)	29 (7.50%)	4 (3.50%)	0 (0.00%)	**1.98**	**0.61**
Telecenters are bad	33 (27.50%)	145 (56.50%)	15 (15.00%)	7 (1.00%)	0 (0.00)	**1.90**	**0.67**
Using Telecenter enhances job performance	0 (0.00%)	55 (1.00%)	113 (6.00%)	30 (56.50%)	2 (36.50%)	**4.28**	**0.62**
Using Telecenter help in accomplishment of job more quickly	0 (0.00%)	2 (2.50%)	12 (8.00%)	113 (59.00%)	73 (30.50%)	**4.18**	**0.67**
Using Telecenter can increase my productivity	0 (0.00%)	5 (1.00%)	16 (6.50%)	118 (62.50%)	61 (30.00%)	**4.22**	**0.60**
Using Telecenter enhances job efficiency.	0 (0.00%)	0 (0.00%)	14 (7.00%)	118 (59.00%)	68 (34.00%)	**4.27**	**0.58**
My frequent use of Telecenter will earn me value as being competent.	0 (0.00%)	1 (0.50%)	21 (10.50%)	110 (55.00%)	68 (34.00%)	**4.22**	**0.64**

From Table 3 above, the respondents disagreed (mean = 1.90 and SD = 0.67) with the sentiment that the Telecenter do not provide the information needed. They also disagreed (mean = 1.90 and SD =0.62) with the statement that the Telecenters are not interesting. Respondents disagreed (mean = 2.30 and SD =0.90) with the sentiment that the Telecenters are hard to operate. Respondents disagreed (mean = 1.96 and SD =0.66) with the statement that visiting Telecenters is a wastage of money and time. Respondents disagreed (mean = 1.98 and SD =0.61) with the statement that Telecenters are unsafe. Respondents disagreed (mean = 1.90 and SD =0.67) with the statement that Telecenters are bad. However, the respondents strongly agreed (mean = 4.28 and SD =0.58) that the Community will develop economically. They also agreed (mean = 4.18 and SD =0.67) that Using Telecenter will help in the accomplishment of the job more quickly. They strongly agreed (mean = 4.22 and SD =0.60) that Using Telecenter can increase my productivity. They also strongly agreed (mean = 4.27 and SD =0.58) using Telecenter enhances job efficiency. Finally, they strongly agreed (mean = 4.22 and SD =0.64) that the frequent use of Telecenter will earn me value as being competent.

4.3 Challenges Faced by the Telecenter Users

Table 4: *Challenges Faced by the Telecenter Users*

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Weighted Mean	Standard Deviation
Telecenter location influences you to use its services.	3 (1.50%)	18 (9.00%)	19 (9.50%)	115 (57.50%)	45 (22.50%)	**3.90**	**0.90**
Telecenter opening hours influence your decision to use its services.	4 (2.00%)	21 (10.50%)	24 (12.00%)	111 (55.50%)	40 (20.00%)	**3.81**	**0.94**
The cost of services influences you to use Telecenters services.	2 (1.00%)	20 (10.00%)	4 (7.00%)	111 (55.50%)	53 (26.50%)	**3.96**	**0.91**
Your level of education influences you to use Telecenter services.	2 (1.00%)	16 (8.00%)	13 (6.50%)	92 (46.00%)	77 (38.50%)	**4.13**	**0.92**
Telecenters staff customer care influences you to use its services.	0 (0.00%)	2 (1.00%)	15 (7.50%)	113 (56.50%)	70 (35.00%)	**4.26**	**0.63**

From Table 4 above, it can be observed that the majority (57.50%) of the respondents agreed (mean = 3.90 and SD =0.90) that the Telecenter location influences the use of the Telecenters. The majority (55.50%) of the respondents agreed (mean = 3.81and SD =0.94) that the Telecenter opening hours influence your decision to use its services. The majority (55.50%) of the respondents agreed (mean = 3.96 and SD =0.91) that the Telecenter opening hours influence your decision to use its services. The majority (46.00%) of the respondents agreed (mean = 4.13 and SD =0.92) that the level of education influences you to use Telecenter services. Finally, the respondents strongly agreed (mean = 4.26 and SD =0.63) that the Telecenter staff customer care influences the respondents to use the Telecenter services.

5 CONCLUSION

From the study, Rulindo district Telecenter users: 1) are satisfied with internet connection services; 2) agree that the Telecenter can spur economic development in the community; 3) believe that using Telecenters services will enhance their job performance. What is needed now at the Telecenter is a good collection of digitized educational materials which can be downloaded or stored in local servers for the community to use. Rwanda Telecenter Network (RTN) through their digital literacy program should plan to sensitize the Rulindo District community on the use of Telecenter. The program should specifically target the women who poorly visit the Telecenters and the young people aged between 19 and 30 years who are in high school and undergraduate. The reputation of the institutions hosting the venues and of the persons working in them is also critical to the users' perception of trust in the venue. From this study, it can be revealed that the Telecenter users agreed that Telecenter staff customer care influence their use of Telecenter services. It is a common and strong perception among the local population that the internet is just an entertainment medium and, therefore, it is not wise for women and children to learn and use it. The greater exposure to ICT through the use of laptops and smart phones has also reduced the effort expectancy for community users; users do not appear to find it difficult to use ICT in general. Users mostly had prior experience with ICT and a higher level of self-confidence in using ICT. Hence, low barriers exist for Telecenter usage. Usefulness is a very significant indicator of the community's attitude towards the Telecenter; a positive view of its perceived usefulness predicts an overall positive attitude towards the Telecenter. Although Telecenters have been effective in developed countries, studies for developing countries indicate that long-term economic sustainability becomes a major challenge and stumbling block for most Telecenters [3].

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