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Gender digital divide in Rwanda: A qualitative analysis of socioeconomic factors

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ABSTRACT

This study aims at exploring how information and communications technology (ICT) is accessed and used by women and men in Rwanda. Specifically, we analyze the factors that contribute to the gender digital divide in Rwanda. In addition, we assess the importance of equal access to ICTs between genders. Rwanda is a particulary interesting case study, since previous studies on gender differences in the usage and accessibility of ICTs have focused on Western countries, while Africa, and Rwanda in particular, have been less covered. The qualitative method of in-depth interviews was used to collect the data. Interviews were analyzed using a thematic analysis technique. The findings of this study reveal that a gender digital divide still exists in Rwanda, even though the government puts forth much effort to eradicate this phenomenon. Reasons for barriers for women's access to ICTs were found in social, economic and cultural factors, such as feelings of lack of self-worth, self-confidence, and proper educations; heavy domestic responsibilities; and computer anxiety. The findings also indicated that equal access to ICTs would be a shortcut to economic growth in Rwanda. This study concludes that Rwandan women need to be better educated in the use of computer technologies. Certain gender-sensitive strategies that guide the use of ICTs in this way also need to be established.

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1. Introduction

Over the past decades, access of women to information and communications technologies (ICTs) has become a global concern. ICTs are seen as a cornerstone of sustainable and equitable development in both developed and developing nations; however, there is a gender gap in both with fewer women accessing and using ICTs compared to men (Ghadially, 2007; Hilbert, 2011; Mori, 2011). Studying European, Asian and North American countries, Huyer et al. (2005) found that women spend less time accessing ICTs than men. In Africa, women also have less access to ICTs than men, which is especially true for rural women. Reasons for this situation include that they have less time, money control, learning opportunities, and they give priority to others' needs such as education of their children, business, and social relations (Ghadially, 2007). In addition, Hilbert (2011) found that in developing nations the gender gap in accessibility and use of ICTs increases the existing gender inequalities in the daily life of women in the areas of employment, education, health, and economic sectors. Therefore, this study aims at exploring how ICTs are accessed and utilized by women and men in Rwanda. Specifically, we analyze the factors that contribute to the gender digital divide in Rwanda. In addition, we assess the importance of equal access to ICTs between genders.

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Rwanda is a particulary interesting case for studying the access and use of ICTs by men and women, since it is regarded as one of the most gender equal countries in the world, as evidenced in the Global Gender Gap Report, in which Rwanda ranked 5th out of 144 countries (The World Economic Forum, 2016). In addition, ICTs in Rwanda are considered a crucial sector, which can be a backbone for social and economic growth. Unlike most African countries, Rwanda has few natural resources. This limitation necessitates Rwanda to adopt different strategies for development that diverge from those of other countries in the region— strategies whereby ICTs form the cornerstone of developmental plans to transform Rwandan's economy.

Some of these plans focused on building ICT infrastructures and enormous investments have been made toward this end. The outcomes are highlighted in the fact that a high-speed fiber-optic support network now interconnects all districts of Rwanda, including the border zones of the country. This network also interconnects all government institutions as well as private organizations situated in Kigali (Ntale et al., 2013). In spite of the remarkable progress that has been achieved, the ICT sector continues to face several challenges that impede its development. As highlighted by The United Nations Development Programme (2015), ICTs is a sector where women are most at risk for marginalization due to economic insufficiency, lack of ICT skills and heavy domestic responsibilities. Other hindrances pertain to the high number of the Rwandese population living in rural areas (about 80%, of which women make up 51.8%) where communication infrastructures are limited (The National Institute of Statistics of Rwanda, 2015).

Research regarding the accessibility and utilizations of ICTs is not new. In the last decade, studies on ICTs have found, for example, that some forms of economic marginality can be negotiated by technology; thus, for instance, mobile phones may allow fishers to get good prices for their daily catch (Jensen, 2007). Another study also focused on the challenges and potential of ICTs for rural women (Otto, 2006). From the findings of this study, it has been shown that despite great progress in the field of ICTs, a serious geographical and gender digital divide still exists in Kenya. Research on ICTs has also moved away from the core economic impact of its use to examine how ICTs and policies may have deep effects for men and women in relation to employment, health, community development, education and environmental sustainability (Cummings et al., 2005). However, such studies do not focus on factors that hinder equal accessibility and utilization of computer technologies among gender.

This growing number of studies suggest the need to enhance the accessibility and utilization of computer technologies. In the present study, we will, therefore, analyze if there are any differences in the access and use of ICTs by men and women in Rwanda and if this reflects the country's image as one of the most gender equal countries in the world. Due to the imbalances in the accessibility and utilization of ICTs by men and women and the fact that the majority of studies have focused on other parts of the world (notably the USA, Europe, and Asia), we deemed it important to research this topic in the case of Rwanda. Thus, the main goal of this study is to explore the situation of the utilization and accessibility of computers and the Internet by men and women in Rwanda. Such an approach offers a new perspective and a better understanding on the gender digital divide, which can guide sustainable development policies in the area of gender and ICTs. Our research specifically tries to answer the question whether men and women have similar or different computer and Internet skills, which factors possibly hinder women's access to computers and the Internet, what opinions respondents had about the equal access to computers and the Internet, and finally whether these results are in accordance with feminst theory claiming that women's inequal access to computers and the Internet are based on the gender division of labor.

2. Gender and ICT

2.1. Theoretical background

The concept of ICT gained popularity in the 1950s and has generally related to men. It was taken for granted that ICT was a man's domain (Eriksson-Zetterquist, 2007). A number of gender theories in the context of ICTs show the role of ICTs in the context of gender imbalance. For example, Henwood's (1993) "women in technology" theory takes a gender-neutral outlook on technology and concentrates on the growing number of women involved in ICTs. Henwood states that ICTs are cultural artifacts (technology as culture) and that women must not only be users, but also makers of the technology. According to feminist scholars, this theory is, however, limited in scope and ignores various factors in society and stresses that technology is not neutral and the accessibility and utility of ICTs are social realities and it is important to address these differences for the aim of social justice (Rowbotham, 1997). Feminist theory perceives masculinity as rooted in the technology itself and thus underlines the role of technology as a keystone of not only masculine power, but also capitalist dominance (Cockburn, 1985; Game and Pringle, 1984; Wajcman, 1991).

Feminist theorists perceive females' segregation in the ICT sector as a result of the gender division of labor as well as the male control of skilled professionals that construct capitalism. Women's distance from ICTs is historically and culturally constructed (Wajcman, 1991) and ICTs have been regarded as the domain of men (Cockburn, 1985). Similarly, the distinction of manufacturing work into technical/non-technical, light/heavy, clean/dirty are created to preserve the gender division of labor in society (Game and Pringle, 1984).

A number of feminist scholars have analyzed the relationship between gender and ICTs. They caution that theorizing this relationship should not only concentrate on equal access to ICTs, but should also stess improving ICT knowledge and change gender relationships with technology (Henwood, 1993). Similarly, more recent studies evaluate women's personal practices and experience with technology and use these as a starting point for explaining gender relationships in technology, ICT work and skill. For instance, one of these studies (Sáinz et al., 2016) focused on gender stereotypes and attitudes toward ICT professionals in Spain. This study revealed that males and females have the same stereotypical beliefs about ICT professions,

such as the belief that males should monopolize the use of ICTs. Similarly, another study explored stereotypes of individuals in computer science and showed that the underrepresentation of women is influenced by stereotypes such as the idea that computer scientists are "singularly focused on computers," "lacking interpersonal skills," and "socially awkward" (Cheryan et al., 2013, p.6).

2.2. Causes of gender divide in the ICT sector

The causes of the gender digital divide were explored by many scholars and most of them showed that the ICT sector is dominated by men and the main cause of this overrepresentation is culture-based (Allen et al., 2006; Horrigan, 2007; Wilson, 2003). Women are underrepresented in the ICT sector (Allen et al., 2006), which might also be connected with the fact that men outnumber women in science, technology, engineering and mathematics (STEM) education (Lee, 2002; The World Bank, 2016). The causes of this underrepresentation of women in the ICT sector were noted by several scholars (Renzetti and Curran, 1992; Watt and Eccles, 2008; Wilson, 2003). Social learning theorists regard gender differences as a social construct (Bandura, 1977). According to this view, different societies and cultures construct gender roles, which are regarded as a model or good manners for an individual of that particular gender. Such relations also influence the gender gap in ICTs. Similarly, gendered cultures and practices construct an environmental condition for women, and thus women do not receive incentives to join the ICT sector as men do (Watt and Eccles, 2008). In the same vein, research has confirmed that culture can be a barrier to women's full involvement in the ICT sector (Wilson, 2003).

A study conducted by Kling (2000) emphasizes that computer and communication systems are part of a daily life for the majority of people these days. Nevertheless, the accessibility and utilization of computer technologies by women remain relatively low due to different reasons. For instance, many women perceive computer technologies as a masculine field. In addition, other causes of the gender digital divide include gender stereotyping of the choices of subjects at school, an absence of models for women, and a lack of self-confidence and skills in computers (Forson and Ozbilgin, 2003). Ahuja (2002) endorses the above arguments relating to causes of the gender divide in the field of ICT and suggests social and structural factors as the main reasons why women are underrepresented in accessibility and utilizations of ICTs. Social influences are internal and external gender perceptions, role models, family, and media. Structural factors are institutional support such as teachers and counselors, and access to technologies. These factors may highly influence career decision making and gender perceptions. This can restrict the opportunities for women as well as men and create gender stereotyping effects on career choices, in addition to accessibility and utilization of ICTs.

Other research has pointed out that gender differences are not only based on institutional exclusion but also on cultural differences (Mujtaba, 2007; Zauchner et al., 2000). Mujtaba (2007) highlighted poor work environments and the balance between work and family as huge barriers for women in the ICT sector. Zauchner et al. (2000) indicated that in many companies women are not offered full access and participation in the application process of ICTs, and they feel inadequately updated about such processes. In addition, Spotts et al. (1997) pointed out that women are generally fearful of computers as compared to men. Attitudes toward ICTs are also significant in constructing psychological discrimination. For instance, Lee (2002) stated that women hold more negative attitudes toward ICTs than their male counterparts.

Further studies highlight the high rate of poverty as another very important reason. Domestic financial responsibility causes the low accessibility and utilization of ICTs by women in certain African countries, such as Nigeria (Comfort and Dada, 2009). This was confirmed by a household survey in Africa, which displays that in some countries, female respondents cited cost as the main reason they were not connected to the Internet (Gillwald et al., 2010).

Finally, one of the most important reasons that explain the limited access of women to ICT is the communication infrastructure. As mentioned by Primo (2003), communication infrastructures are unequally distributed in many societies. Some are concentrated in nearby centers of business and regions of government, that is to say political head offices and industrial zones, while large numbers of women live in rural areas in many developing countries. Furthermore, Primo points out that, due to the unequal distribution of ICT infrastructures in rural areas, especially in Africa, women have limited access because of traditional gender roles, geographic location, and the cost of the facilities. While the above problems relating to communication infrastructures generally apply both to men and women, the latter are often more disadvantaged. For example, men are free to walk long distances (during the day or night) to seek Internet cafes, while women must cater to home chores.

2.3. Gender and ICTs in Rwanda

While there has been improvement in terms of gender equality over the years, Rwandan society is still patriarchal, and men are given more opportunities than women. When new technologies were introduced in the country during the last few decades, men seized the lion's share despite a countrywide campaign for gender equality. Efforts are currently made to raise gender awareness, but the country still has a long way to go to bring about gender equality in ICT, mostly due to rampant poverty. Policy makers nowadays take gender balance into consideration, which is a result of international and national agreements ratified by the country. These include the agreement of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the 1995 Beijing Declaration and Platform for Action, and the Millennium Development Goals (MDGs). Rwanda has enforced these agreements in internal policy making-related texts, such as the national constitution, Vision 2020, the Economic Development and Poverty Reduction Strategy (EDPRS), national gender policy, decentralization policy, ICT for development (ICT4D) policy, and an action plan well-known as the National Information

Communication Infrastructure (NICI) plan. These policies give priority to the inclusion of women. As a result, some positive initiatives were introduced, such as the participation of Girls in ICT Rwanda, the foundation of Camp TechKobwa, and the formation of SMART Girl as a cornerstone for the SMART Rwanda program (Habumuremyi, 2013).

Furthermore, many studies have shown that Rwanda has made tremendous efforts to include women in decision making (Gettleman, 2013; The Ministry of Gender and Family Promotion, 2010; Wilber, 2011). As outlined by Gettleman (2013), the constitution provides for quotas in all government bodies, where at least 30% of the leadership must be women. As for now, the Rwandan parliament is comprised of 56.2% women, which makes the country the first in the world with such a high number of women in parliament. According to Wilber (2011), the process of including women has gone through different steps, such as the creation of gender-progressive laws, the creation of a ministry of gender with a strong mandate, a national council of women elected at the grassroots and represented at the countrywide level, as well as the election of women where only women are allowed to elect their representatives to parliament. A legal framework has also been established, including laws on matrimonial regimes, donations and successions, the organization and usage of land in Rwanda, as well as legal sanctions against perpetrators of gender-based violence (The Ministry of Justice, 2016).

Remarkable achievements can be noted in the context of gender and ICTs. These include telecasters and Internet cafes created throughout the country for both women and men to have access to business-oriented information (The Ministry of Gender and Family Promotion, 2010). Also, the One Laptop per Child (OLPC) program has been hailed as a success. In this program, young girls and boys are acquainted at an early age with the use of computers to seek necessary information in order to help them find their way in the science and technology field in the future.

However, despite the above mentioned efforts regarding the inclusion of both women and men in the domain of ICT, Rwanda still shows a number of weaknesses. For example, the ICT sector remains mostly male-dominated. Gaps have been identified at the level of how ICTs are used to promote rights for women and girls, empower women for different kind of activities, increase women's participation in decision making and provide women's employment in ICT and related sectors. The NICI (National Information Communication Infrastructure) Plan 2006 has highlighted some input regarding the positive impact of ICTs in the socioeconomic development of women and girls. Since women are accessing ICT facilities in urban areas, this helped them to exchange information and to empower them in making a contribution to Rwandan society.

3. Method

We chose the qualitative method of in-depth interviews to examine not only the situation of utilization and accessibility of computers and the Internet by men and women in Rwandan households, but also in order to discover whether this access differs by socioeconomic or demographic factors. The first author conducted in-depth interviews with 30 respondents during October and November 2015 by telephone through an MTN fixed line, which uses voice-over Internet protocol (VOIP). The 30 respondents (15 couples) were selected by using a purposive sample including people living in rural and urban areas (see Table 1). The target couples were literate women and men within an age range between 25 and 50 years, who have the possibility of accessing computers and the Internet in some way. The interviews lasted between 30 and 45 min and were recorded with the consent of the respondents and later transcribed in full. However, four interviews were written down during the interview due to technical issues which hampered proper recording. The participants were assured confidentiality in their interviews. Thus, efforts have been made to conceal the identities of the participants in this article.

Qualitative interviews were considered the best suited method for this exploratory study. We used semi-structured interviews, since this format is based on an interview guide, which allows a high content comparability and reduces the interviewer's effects (Lindlof and Taylor, 2011) but still provides enough freedom for open and follow-up questions (Berg and Lune, 2011). To guide the conversation, we used closed and open-ended questions. Closed questions aimed to capture demographic information such as age, education level, area of residence, occupation, and number of children. These demographic data indicated the appropriateness of the participants in the study. Furthermore, such demographic information assisted in the analysis of computer and Internet usage. The open-ended questions focused on respondents' access, experiences, and barriers in using computers and the Internet.

The interviews were analyzed through thematic analysis, which was considered suitable for this research, since it facilitates the researcher to make links between statements of diverse interviews focused on the themes in the interview guide as well as unexpected themes (Guest et al., 2012). In addition, this method places emphasis on scrutinizing, pinpointing, and recording themes within data (Braun and Clarke, 2006) and this was an aim of this research. Finally, we further examined the most robust themes, which will be reported in the following section.

4. Results

4.1. Computer and Internet skills

An important part of this study was to explore the computer knowledge of both women and men and to find out whether or not they needed help while using computers and the Internet. Almost all of the respondents had experience using computers and the Internet and most male respondents felt comfortable doing so. As one respondent explained:

Table 1
Respondents in the Interviews.

No	Gender	Age	Education Level	Residence	Occupation	Number of Children
1	Male	35	Undergraduate	Urban	Veterinarian	3
2	Female	34	Undergraduate	Urban	Unemployed	3
3	Male	48	Secondary School	Rural	Taxi Driver	4
4	Female	34	Undergraduate	Rural	Teacher	4
5	Male	48	Undergraduate	Rural	Technician	6
6	Female	45	Secondary School	Rural	Unemployed	6
7	Male	35	Masters	Urban	Managing Director	3
8	Female	33	Undergraduate	Urban	Unemployed	3
9	Male	50	Masters	Rural	Unemployed	4
10	Female	45	Undergraduate	Rural	Psychologist	4
11	Male	30	Undergraduate	Rural	Pharmacist	2
12	Female	28	Secondary School	Rural	Unemployed	2
13	Male	29	Undergraduate	Urban	Physician	2
14	Female	25	Secondary School	Urban	Business woman	2
15	Male	42	Undergraduate	Rural	Human Resources Manager	4
16	Female	40	Undergraduate	Rural	Business woman	4
17	Male	37	Undergraduate	Urban	Teacher	3
18	Female	36	Undergraduate	Urban	Unemployed	3
19	Male	50	Secondary School	Rural	Taxi Driver	5
20	Female	36	Undergraduate	Rural	Teacher	5
21	Male	42	Undergraduate	Rural	Technician	5
22	Female	39	Secondary School	Rural	Unemployed	5
23	Male	38	Masters	Rural	Senior Manager	3
24	Female	27	Undergraduate	Rural	Unemployed	3
25	Male	33	Undergraduate	Rural	Business man	3
26	Female	29	Undergraduate	Rural	Psychologist	3
27	Male	46	Undergraduate	Rural	Pharmacist	4
28	Female	36	Secondary School	Rural	Unemployed	4
29	Male	29	Undergraduate	Urban	Medical Doctor	2
30	Female	26	Secondary School	Urban	Unemployed	2

I'm very comfortable with the Microsoft Office package including Excel, Word, Access, Publisher and PowerPoint, and I'm very comfortable while I use this software and I have a great experience doing so. For this reason, I do not need any help from somebody else while I use computers and the Internet (Male, 29 years).

In contrast, all of the women interviewed had only basic computer skills and they needed help while using computers and the Internet. They also started using computers and the Internet at a later age than men and most of them were not familiar with software like Microsoft Word for word processing, Microsoft Excel to produce worksheets, and PowerPoint for presentations. As one interviewee pointed out:

As I started using computers and the Internet in 2010, my experience is very limited, and I have not had enough time to learn a solid foundation. Therefore, while using computers and the Internet I need help, because I not only lack enough skills related to computers and the Internet but also the dominance of English on the Internet is a problem, in addition to the other most important international languages, such as Chinese, French, Spanish, and Japanese. Therefore, it is not easy for me to access the Internet and computers, as I do not speak any of these languages (Female, 46 years).

This comment leads us to other factors hindering women's access to ICTs in addition to language barriers.

4.2. Factors hindering women's access to ICTs

In addition to asking whether women and men have equal access to computers and the Internet, this research also explored challenges that hamper access and use of computers and the Internet in Rwandan households. All the families that took part in this research have a computer and Internet at home. However, women have less access than men. This study found that social, economic, educational, and cultural factors influenced women's access to computers and the Internet. For instance, several women highlighted the constraints of heavy family responsibilities.

As a mother of six children, I am expected to be the home keeper; I wash, clean, and cook. It is merely my responsibility to be constantly available and do everything for my family. So with this heavy responsibilities, I cannot find time to use the computer and the Internet at home (Female, 45 years).

Women who do not have heavy domestic responsibilities underline the lack of suitable education as a challenge to using computers and the Internet. For them, the education system they grew up in offered girls and boys different skills and opportunities, where male students frequently were given primary access to computer technology wherever it was accessible. This created a technophobia for women as they were not used using computers and the Internet. In addition, girls were pressured

to get married or find a job instead of continuing their education. Many respondents highlighted that in their childhood the Rwandan society preferred sons. Thus, financing the education of sons was frequently made at the expense of daughters who had to help with household chores.

Men also acknowledge similar factors as to why women have less access to ICTs. Several reasons related to socio-cultural and infrastructural factors were pointed out by the majority of men who participated in this study.

For most Rwandan women, particular barriers are illiteracy, lack of familiarity with the main languages of computer technology and the Internet, lack of operational training in computers, heavy household tasks, and lack of self-confidence (Male, 50 years).

Another man pointed out:

Infrastructure itself is a big issue related to gender unequal access to ICT in Rwanda. ICT infrastructures are concentrated in the big metropolitan areas like Kigali, whereas numerous women live in rural zones with limited freedom to go to the city due to home chores. Moreover, people in the countryside highly depend on public ICT facilities. These facilities are more likely to turn into men-only seats and hinder women's access (Male, 37 years).

Other reasons for unequal access given were marital disputes and infidelity. When women were asked questions related to who uses computers and the Internet the most, they responded:

It is my husband who uses the computer and Internet more than me, because one day when I was using his computer, I discovered that he was having a romantic relationship with many women. Since that day, he does not authorize me to use his laptop and he changed the password (Female, 28 years).

Another woman referred to marital disputes connected with her usage of computers:

The computer that we have is for my husband, which means it is only him who uses it. Whenever I tried to use it, my husband became very angry and told me, 'A real woman takes care of her children and her husband, but you, you are busy with a computer and you forget your responsibilities as a woman.' Thus, to avoid such quarrels, I stopped using his computer (Female, 34 years).

Both male and female respondents were also asked if they have equal access to computers and the Internet outside of their home. The general trend is that men have more possibilities than women to access computers and the Internet at cybercafés. One woman stated:

I would like to use the Internet and computers at the Internet café, but before my husband comes back home, he obliges me to be there, expects a meal prepared by me, and presumes that I drop the children at school in the morning and pick them up after school. He says 'I will provide for our family's financial needs, but you are a mother. You must stay at home and take care of our children' (Female, 39 years).

All women mentioned that they have less money than their husbands (which is required for using computers) when discussing the unequal access to the Internet and computers outside their home. Reasons for that are either because of lack of resources or because they are not in charge of household funds. They cannot use the family resources reserved for basic needs such as food, education and clothing for children, and many do not have the money to pay for Internet and computer access. Most women in this study were financially dependent on their husbands or had no control over economic resources, which makes accessing computers more difficult.

Another point highlighted by most women was that even if some women could find time for using computers and the Internet in a cybercafé, they did not feel comfortable, because these places are often used by young men who do bar access to others. Additionally, most women found that these technologies allow sexual predators to anonymously exploit women/-girls. These arguments were also raised by most women, and one of them expressed:

Sometimes I use computers and the Internet outside of my home, but most public Internet cafés are usually entertainment joints, where mostly men frequent them to gain access to pornographic content. Often the Internet café owners, frequently young men, are themselves interested in viewing pornographic content, and use their workplace as a regular place for their male friends. Therefore, many girls and women are evidently wary of spending time at such places aimed at accessing computers and the Internet (Female, 40 years).

Finally, some respondents mentioned the distance between a cybercafé and the home for women living in rural areas as a cause that discourages them from using computers and the Internet outside of their home. Other crucial challenges include poor customer service, limited privacy, low downloading speed, and limited facilities. These challenges had equal importance for both women and men taking part in this study.

4.3. The importance of equal access to ICTs among gender

We also asked the respondents if they thought that gender equality in the use of computers and the Internet was important. Most respondents mentioned the beneficial effects of gender equality on economic growth, as explained by one man:

The use of computers and the Internet by both women and men is not only the right thing to do for reasons of social justice, it is also a smart sustainable economic move. So, it is very important that women and men have equal access to ICTs, free from all barriers that can hinder this, because when a woman is emancipated, the whole society may benefit (Male, 50 years).

In the same way, some women argued that equal access to ICT was an essential tool for encouraging gender equality, raising self-esteem, and empowering women.

From my personal experience, gender equality in the use of computers and the Internet enables me to overcome isolation in addition to moving toward increased self-confidence, freedom of expression, political awareness as well as skills related to the use of computer technology itself (Female, 34 years).

Most of the women taking part in this study stated that they would like to have more access to computers and the Internet as well as increase their ICT skills to be able to help their children with their homework. Other reasons articulated by some women were that having equal access to ICTs could help them get better job opportunities or help them make different kinds of documents such as business-related items for opening a small business which could contribute to increasing their families' income.

5. Discussion

The findings of this study reveal that a gender digital divide still exists in Rwanda, even though the government of Rwanda has put forth much effort to eradicate this phenomenon. Indeed, all households that participated in this research showed that women have less access than men to computer and Internet technology.

We found social, economic, educational and cultural factors to be major obstacles for women in gaining access to computers and the Internet. These include lack of self-worth and self-confidence and proper education in their younger years, time constraints, heavy domestic responsibilities, and computer anxiety in their later years. These findings confirm feminist theory, which indicates that women's inequal access to ICT is based on the gender division of labor and the male control of skilled professionals in capitalism. As Wajcman (1991) points out, women's inequal access to ICT is historically and culturally constructed. ICT-related activities have been traditionally in the male domain to the degree that the traditional women's roles of mothering, childcare, and housekeeping have become social obstacles that hinder women from frequently using the Internet (Cockburn, 1985). Research has found that men dominate computer expertise and technology (Horrigan, 2007), which is part of the more general trend that men outnumber women in science, technology, engineering, and mathematics (STEM) in many countries (Lee, 2002). This leads to the result that more women are technophobic of computers as compared to men (Spotts et al., 1997).

Our respondents gave similar views as those in the study by Primo (2003) on social obstacles to gender inequality in accessing ICT, naming societal gender roles as influencing the gender gap in ICTs. Infrastructure factors were also pointed out by the majority as another significant barrier to women's and men's equal access to computer technologies. This is in line with research by Lawrence and Tar (2010) who argue that the lack of infrastructure and poor infrastructure in addition to high prices are the most important limitations to equal access to ICT in developing countries. This is also applicable to Rwanda where the majority of the population lives in rural areas. Among them, women are also either poorer than men or do not own wealth of their own (The National Institute of Statistics of Rwanda, 2015). A similar issue was also reported by The World Bank (2016), mentioning that Africa still has the lowest telephone and Internet user penetration, especially in rural areas (approximately 25 percent and 5 percent compared to the world average of over 70 percent and 20 percent respectively) and highest costs (e.g., the average price for Internet per month is over $40 compared to the world average of $20). This places women at a disadvantage considering that in most African countries women have less access to money than men.

Additionally, this research determined that women do not feel comfortable using computers and the Internet in Internet cafés, because these places are often used by 18–35-year-old men interested in viewing pornography, and they do not allow other people access to computers and the Internet. In this context, Primo (2003) mentioned that ICTs facilitate access to pornographic pictures and videos, which are often sexualized and frequently sexist. This was discussed by The United Nations Educational, Scientific and Cultural Organization (2009) as the main problem limiting freedom of expression in cyberspace and equal access to ICTs among gender. Therefore, women do not feel comfortable accessing Internet cafes and end up staying away from them.

Most of the respondents underlined that equal access to computers and the Internet are vital to the quality of women's lives and equal access to the Internet and other ICTs can transform Rwandan society into a democratic society. In fact, some of them think that equal access to ICTs and active use of it would be a shortcut to economic growth for their families and their country in general. This may be true because different scholars who studied the importance of equal access to ICTs found that it has improved their quality of life (Hafkin and Taggart, 2001; Herring, 2003). This was the case, for example in Uganda, where women in the countryside used ICTs (particularly mobile phones) for their everyday business activities such as ordering and selling merchandise (Muto and Yamano, 2009). Another study in Liberia also showed that women used mobile telephones to participate in radio programs where they could voice their needs and problems affecting them in daily life (Fortune et al., 2011). Similarly, the respondents in Afghanistan and Bolivia mentioned that equal access to ICTs is an essential tool for encouraging gender equality, raising self-esteem, and empowering women (Slater and Tacchi, 2004; The World Bank, 2005). These views have been confirmed by Slater and Tacchi (2004) who argue that Indian females who are well-educated in computer skills were appreciated as worldly wise and as sources of information, in addition to having become skilled at a complicated technical device. Equal access to ICTs also seemed to increase women's social status in Bangladesh where a study of mobile phones revealed that poor rural women living in Bangladesh experienced an

improvement of social status by way of access to ICTs (Aminuzzaman et al., 2003). They obtained a place in decision-making in their everyday lives, especially in their households, which was a strength that they did not have in the past.

The Internet has also become an influential tool for NGOs in fighting for gender equality (Friendman, 2005). These results coincide with Amuriat and Okello's (2005) view that in regions where ICTs are equally accessed, women have proven their abilities to explore opportunities offered by ICTs in commerce, farming, and involvement in social, political, and economic areas that impact their happiness. Similarly, Primo (2003) mentioned that equal access to ICT can enable women to gain a powerful voice in their community, government, and at an international level. Throughout the world, equal access to ICTs has become increasingly embedded in numerous aspects of everyday life, whether political, social, education or economic. ICTs not only enable access to knowledge and sharing as well as controlling of information, but they also help to prevent the solitude and social isolation faced by many women (Huyer et al., 2005).

Equal access to ICTs has been highlighted by many studies as a keystone for gender equality promotion and women's empowerment (Rabayah, 2010; Shirazi, 2012) and more generally for democracy (Shirazi et al., 2010). Women's empowerment is focused on increasing their ability to gain control over decisions that form their lives, containing access to resources, participation in decision-making and control over distribution of benefits. For women who can access and use ICTs, they offer many benefits, particularly for reducing poverty, improving governance, and breaking isolation.

6. Conclusion and research implications

This study increases our understanding of the reasons for unequal gender access to ICTs and the importance of equal access for both genders. Gender issues are at the heart of ICTs and essential to the success of sustainable development. This is definitely true in the case of Rwandan women, as it has been shown in this research, who have a great role to play in the development process. However, this role continues to be hampered by social, infrastructure and cultural factors. Therefore, women need to be more educated about the use of computer technologies and thus change their relationship to technology.

Finally, this research has revealed that equal access to ICTs among women can contribute to gender equality. However, there are several challenges that prevent this equal access and effective use. Such challenges are related to the presence of pornography on the Internet which make women (especially rural dwellers) fearful to access ICT infrastructures. Certain gender-sensitive strategies that guide the use of ICTs in this way also need to be established. These strategies would guarantee equal access and social equality while defending the rights of people, particularly women, who are more disadvantaged than men. It is also imperative to include women in the discussions related to these trends.

This study shows some causes of the gender digital divide and the high potential for ICTs, particularly computers and the Internet in information dissemination. However, to better understand how full gender equality in using and accessing ICTs can be achieved, further research is needed to explore the implications as well as the intended and unintended outcomes of other ICTs such as mobile phones. Future research should also analyze the effect of age and martial status on the gender digital divide.

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