Women Engagement in ICT Professions in Tanzania: Exploring Challenges and Opportunities

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Abstract— **While the government of Tanzania tries to increase number of women representation in all sectors, there are still fewer women in ICT sector. ICT has a great potential in reduce gender gap as it overcome geographical barrier and provide information and knowledge with easy and low access cost. Scholars from different countries have conducted research on the reasons of lesser number of women in ICT profession; however there are insufficient studies in Tanzania which systematically show the reasons of why women are underrepresented in various arenas of ICT professions. Therefore this study aims at identifying barriers that hinder women to engage in ICT professions in Tanzania and thereby exploring opportunities that could be adopted to overcome gender inequality in ICT professions. The study employed literature review and survey methods to achieve the objectives. Through Literature review and survey this paper has found that lack of awareness on the importance of ICT (76.2%) and lack of moral and financial support (65.6%) were the most dominant factors hindering women to pursue ICT professions. Additionally it was also found that having good background on science subject (86.4%), being confidence and focused on a certain career path (84.2%), and encouragements from role models (72.9%) were the most important factors which would provide women with opportunities to engage in ICT professions. We concluded that there is a need of formulating polices in higher institutions which are gender sensitive in order to engage women in ICT related professions.**

Keywords- ICT; Gender; women; ICT professions, Tanzania

I. INTRODUCTION

Information and Communication Technologies (ICT) refers to hardware and software technologies that provide opportunities to produce, process, transfer and use information. ICT includes the Internet, radio, mobile phones, wireless technology and television. ICT has a great potential in healthcare services improvement, increase employment and business opportunities, offer education and knowledge in rural area and increases awareness, transparency and participation within society [1], [2].

Over the years there is increase in research on the relevance of ICT in developing countries. Consequently many governments are looking to support ICT industry as a strategy for fast economic development. According to [3] ICT can be useful and valuable to people if it has a useful local content and where the capacity to provide and maintain infrastructure at a reasonable price and in a sustainable way exists. In this case increase workforce in ICT sector who can design, create and maintain beneficial ICT infrastructure and provide the users with the skills to use and understand the ICT applications is highly recommended. These will provide employment to people and hence increase economic growth.

A. Women and ICT

Gender equality is most important for socio-economic, political and human development. [4], defined gender as the culturally and socially determined characteristics, values, norms, roles, attitudes and beliefs attributed to women and men through constructed identity in a society. According to [5]. Gender equality denotes women having the same opportunities in life as men, including the ability to participate in the public sphere. ICT has a great potential in reducing gender gap as it overcome geographical barrier and provide information and knowledge with easy and low access cost. Though people are aware of importance of ICT as a tool for the promotion of gender equality and the empowerment of women, a gender divide has also been identified, reflected in the lower numbers of women accessing and using ICT compared with men [6], [7]. Gender division persist more in ICT occupations, lesser women are found in ICT specialist occupation than those found in ICT using occupations [8]. One of the reasons why it receives more attention than gender disparities in other occupational groups is that ICT professionals influence work organization and the organization of economy and society. Occupational inequalities in ICT are also inequalities in power relations in society. The gender gap in ICT professions is calculated as the difference, in percentage points, between the proportion of men and women working in ICT occupations within the employed population [9].

A report on a bright future in ICT opportunities for a new generation of women of 2012 found that globally women accounted for 30% of operations technicians, only 15% of managers and 11% of strategy and planning professionals.

Consequently studies show that in Africa specifically in South Africa women makes 20% of the ICT workforce and while in Nigeria out of total ICT workforce, 27.30% are female employed for full time job and 51.83% for part time jobs [10]. The 2012 Tanzania population census survey show that women constitutes 51.3% of the total population however study done by [11] from seven public universities of Tanzania found that woman contributes only 26.34% of all students enrolled for science, engineering and technology. It also found that only 18.53% of academics and research staff and 21.88 % of management and administrative staff in the fields of science, engineering and technology in public universities are women. This implies that there is less number of women in science, engineering and technology. Even though it is well known that women are underrepresented in various areas of ICT professions, still there are insufficient studies in Tanzania which systematically show the reasons of why women are underrepresented in various arena of ICT professions.

While Tanzania is committed to attain its 2025 development targets especially promotes equal educational access for boys and girls, greater representation of women in policy making bodies, and expanded economic opportunities but still women are underrepresented in ICT professions field, which implies that it might be difficult for Tanzania to achieve its targets [12]. Therefore this study aims at identifying factors that hinder women to engage in ICT professions in Tanzania and exploring opportunities that could be adopted to overcome gender inequality in ICT professions.

The study will help Tanzania to attain its targets by working out with identified opportunities and resolve the identified barriers. Significantly there are number of organizations in Tanzania and worldwide which emphasize women to engage in ICT sectors such as she codes for change and girls in ICT. This study will be of valuable inputs to their success.

II. METHODOLOGY

The research was confined in University of Dodoma at the college of Informatics and Virtual Education. The university Dodoma was selected because it includes people with different background from different locations of Tanzania. This gives the researcher great opportunity to collect enough data for the study. In this study Questionnaire survey and literature review methods were adopted to inform the study. Data obtained was analyzed by using SPSS software package. Participants involved during the study include female students and women who are in ICT professions. Population pool of study constitute of 364 participants. To calculate the sample size, formula from [13] was adopted as follows:

$$n = N \Big/ 1 + N(e^2)$$

Where n=sample size, N=Population size and e= the level of precision 5% at 95% level of confidence. Then n =364/1+364(0.05)² which makes the required sample size to be equal to 190. One hundred and ninety (190) copies of the questionnaires administered, One hundred and seventy seven returned (177) and all of them were useful for analysis giving 93% returning rate. Purposely sampling technique was adopted to sample participants.

III. FINDINGS AND DISCUSSION

A. Factors which hinder women to engage in ICT Professions

Participants were asked to rate their level of agreement with each statement or question with appropriate responses on a five item Likert scale. Where (1) is "Strongly Disagree", (2) is "Disagree" (3) is "Neither Agree nor Disagree", (4) is Agree", and (5) is "Strongly Agree". There are number of reasons that make women to be under represented in ICT career. The results in Fig 2 shows the percentages of most determinant factors that causes less number of women in ICT sectors. Unaware of the roles ICT play in everyday life cause women not to choose ICT professions as their career. This can be evident from Table 1 as more than 76.2% respondents agreed on the fact that lack of knowledge on the importance of ICT can lessen interest of women to engage in ICT professions.

Although women work very hard and take care of their families in Tanzania, still they are classified and consider themselves as weak. As well as in ICT professions males are considered more superior in ICT subjects compared to women. These perceptions cause young women not to choose ICT field. Table 1 manifests this where 58.2% of respondents agreed that gender stereotype discourage young women to pursue ICT profession. Also more than 63.8% of respondents agreed on the fact that stereotype can also cause women in ICT career to drop out of their profession careers.

The myth that all technical ICT task are men's jobs still persist [6], [14]. 55.3% of respondents agreed with this statement. Such perception increase gender gap in ICT professions where women prefer to choose female oriented service jobs. The same happens for ICT professional women in ICT sectors, instead of dealing with technical jobs they end up working as ICT users [6].

Tuition fee for ICT related subjects range from $1200 to TZS $1500 for significant number of universities in Tanzania [15], [16] . This Fig is very high for developing countries like Tanzania. Even if women are interested with ICT, they may fail to join ICT profession if they lack financial support. Table 1 indicates that 65.6% of respondents agreed on the fact that lack of financial and moral support decreases number of women in ICT career. Similarly, 48.6% of respondents think that ICT related subjects are more difficult compared to other subject.

Surprisingly respondent did not think that ICT career pay less, as only 21.4% of respondents consider that ICT is less paying career. These means that people are aware that ICT professions is among a highly paid profession. The European Commission [17] reported that the gender payment gap is also less in ICT sectors compared to other sectors. This implies that when women get empowered, everything will well.

TABLE I. TABLE TYPE STYLES

Factors	Scale				
	Strong Agree (%)	***Agree (%)***	***Neutral (%)***	***Strong Disagree (%)***	***Strong Disagree (%)***
ICT Related Subjects are Difficulty	21.5	27.1	14.7	23.7	13.0
ICT professions pay less	9.0	12.4	13.0	30.5	35.0
Lack of knowledge on importance of ICT	33.3	42.9	9.6	9.0	5.1
Lack of moral and financial support	23.2	42.4	12.4	15.3	6.8
Gender stereotype discourage young women from staying with their careers and progressing in them.	28.2	35.6	15.3	15.3	5.6
Perception of all technical ICT tasks are men's business	22.0	33.3	9.0	18.1	17.5
Gender stereotype discourage women from undertaking ICT related professions	23.2	35.0	13.0	16.4	12.4

B. Opportunities for Women to Succeed In ICT Professions

This study further highlighted factors that would provide opportunities for women to engage in ICT professions. Based on literature, different opportunities which have been used to engage women were explored. The considered factors were divided into three groups which are personal, social and educational factors. Participants were asked to rate their level of importance from 1-5, where 1 was a very important factor and 5 being the least important factor.

a) Personal Factors

Results show that gender stereotype is an obstacle for women to achieve in their career objectives, women has been discriminated in majority of technical work in the world, to succeed in ICT professions women need to overcome this constraint and see gender as an opportunity of their success. This has been agreed by majority of the participants 70% as shown in Fig 1. Respondents agreed that being committed form work 67.8%, being confidence and focused on a certain career path 84.2% and self-motivation 76.3% are considerable factors that would enable women to excel in their ICT profession careers. This means that women should never under estimate their power and therefore they should work hard to achieve and reach their goals.

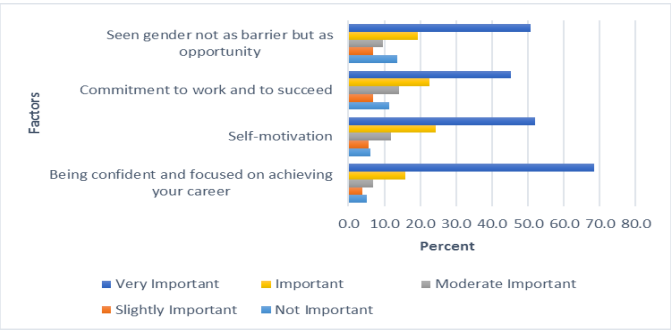

Fig 1: Personal factors

b) Social Factors:

72.9% of the participants as shown in Fig 2 indicated that good relationships with professional relatives had deep influence on the success and pushed them into the ICT professions field. This suggest that, women who have been succeed in a certain career should be the role model to the young women who are still struggling and undecided on what kind of career they should pursue.

The way we behave and think is the final product of socialization. Since the moment we are born, we are being molded into the being the society wants us to be. Through socialization we also learn what is appropriate and improper for both genders [18]. This finding concurred with our study which revealed that 68.4% of the participants agreed that provide exposure to women offer opportunity to learn new things and meet peoples from different traditions and culture. Therefore women should socialize with other people in order for them to succeed to their ICT career path.

According to [19] it was found that women's double and triple workloads of domestic, income-generation and community management activities mean that they often do not have the free time to travel, to learn about and use ICTs. Also, majority of the women affirmed to have unequal access to the use of ICTs in their institutions in comparison with their male counterparts [20], however this study found that 66.7% respondents as shown in Fig 2 agreed on the use of ICT tools could encourage women to undertake ICT professions, this results confined with[21] that also found that increase access to ICT tools encourage women to pursue ICT career . Therefore this implies that women should be encourage and empowered to access ICT tools as a means for them to be able to achieve their career in ICT.

70% respondents as shown in Fig 2 elaborates the need of considering workplace policy in favor of their success, this implies the policy should not indirectly or directly

discriminate women. This call for government effort to enforce and ensure that workplace policy provides equal chance for women and men to excel in career of their choice.

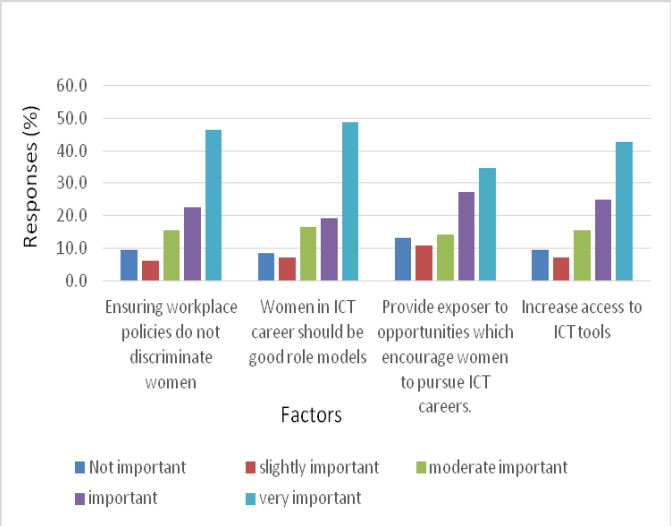

Fig 2: Social Factor

c) Educational Factors:

Place ICT professions courses are amongst of the expensive professional courses in the world and parents are not willing to pay such large amount of money to their female children in the concept that, women are incapable of undertaking such heavy professions. Fear of powerless and discrimination leads to majority of them not to engage in this profession, however majority of the participants 74.6% as shown in Fig 3 agreed that women would be encouraged to persue ICT studies when they are provided with financial support. This results confined with [14] that also revealed that providing scholarships to women encouraged them to undertake ICT related studies. Therefore this finding call for the effort to sponsor women in ICT related professional arena.

Consequently, it is well known that science subjects are the main entrance to ICT professions field, yet majority of women in Tanzania are escaping to study these subjects in the concept that they are of more masculine than feminine. 86.4% of the participants as shown in Fig 3 agreed that good educational background in science subjects is the main success factor for the engagement in ICT professions field. This implies that women needs to be emphasized to undertake science subjects in order to increase number of women in ICT professions. This means that if women are not motivated to undertake these subject, it is most likely that they will be continue to be underrepresented in this field and thereby it will be difficult for our country to achieve 50% seats of women in the decision making board especially in ICT professions. This calls for the government effort to ensure that women are highly represented in science subjects in Tanzania.

Many educational institutions in Tanzania offer ICT related subjects that leads to a certain professions, 72.9% of the participants as shown in Fig 3 agreed that being aware with the institutions that offer ICT related subjects could enforce women to persue ICT professions of their choice. Therefore women need to be empowered so that they can be aware with the universities that provide ICT professional courses.

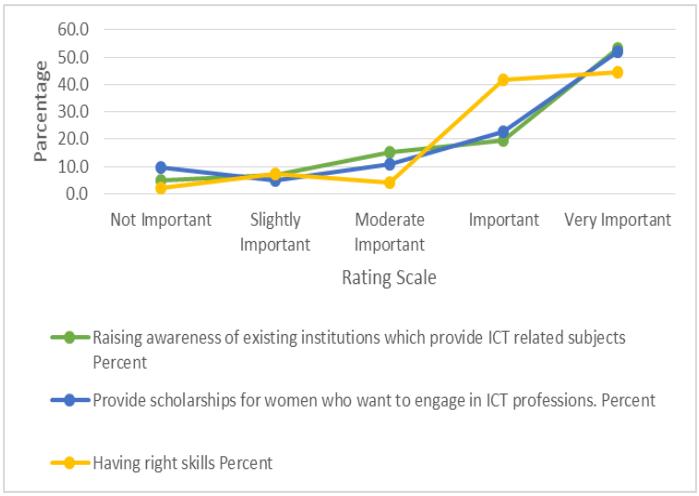

Fig 3: Education Factors

IV. CONCLUSION AND RECOMMENDATIONS

Generally environment which surround females reduce their morale to engage in ICT professions. From their childhood they see females practice soft tasks while men do the hard/ technical tasks like fixing a bulb and so on. It is not that they are unable to perform such tasks but they choose not to do so as the community considers all technical tasks should be done by males. Females being considered as weak and not being able perform technical tasks which are considered as men's job push them away from pursuing ICT career.

Motivation from parents, teachers and community in general is considered as the highest factor which will encourage female to engage in ICT related studies and professions. Parents should give equal opportunity to their children to use ICT tools available at their domicile and when it come of choosing their career they should not favor one child than the other. At the community, if significant numbers of women who have achieved in their ICT career are observed then females who are at the verge of make career choices won't resist to pursue ICT profession. However increasing number of females in ICT sector is still a piece of work because it is hard to remove people's perception about female and ICT. On other hand, government should also play part in ensuring that women gets encourage to undertake science subject form their childhood as well as to ensure that the working place policy do not discriminate women. If gender issues are not articulated in policy, it is unlikely women will reap the benefits of the information age.

Policies in higher level institutions should be formulated in such a way that they allocate space for women to be accepted in ICT professions studies. There is also a need of formulating special program specifically for impacting hands on practices to women in their careers for those who have been enrolled into various ICT institutions. This study found that most of the women in these professions are just end users and they lack

hands on practical experience of their studies. Therefore further studies should focus on determining the proper approach in which women who have been enrolled in various ICT professions could be impacted with hands on practices

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