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Master Thesis

Digital gender divide and empowering women in the digital age

A critical approach in Iranian society

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Abstract

Gender plays an important role in access to the ICTs and Internet. Even when both genders have almost equal access to the ICTs and online services, or similar literacy rates, women have a lower rate in technology related education, employment, income, and in social activities than men.

This thesis focuses on the existing digital gender gap by identifying its key factors and trends and studying the role of Internet and ICTs in bridging this gap. In addition, to suggest improvements to empower women in the developing countries and especially in Iran. A qualitative research method was adopted and semi-structured interview with 5 Internet users who were purposely chosen, was conducted. The data were analyzed and interpreted with the help of Lichtman's 3C method. This research study has examined the possible gender digital divide among users of ICTs and Internet in Iran and by making use of the existed secondary data. The empirical findings are discussed and compared to the reviewed literature, which resulted to an arising framework for a better understanding of digital gap among women.

This research gives an overview about the digital divide, with a focus specifically on the challenges women face in accessing the ICTs and Internet in this region. Current gender disparities and discrimination in Internet use are outlined and the obstacles hindering women's access to the technology world are described. At the later stage, the research has a look at the potential opportunities for women's participation in a global digital society along with a consideration of the initiatives that have been developed in order to mitigate the gender inequity in Iran.

Keywords: Developing countries, Iran, digital gender divide, technology, Internet and ICTs, education, cultural norms, women's role.

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Contents

List of abbreviation

Abbreviation	Full Name
ICT	Information and Communication Technology
OECD	Organization for Economic Co-operation and Development
GSMA	Groupe Spécial Mobile Association
OHCHR	Office of the High Commissioner for Human Rights
ITU	International Telecommunication Union
UN	United Nations
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UBS	Union Bank of Switzerland
UNCTAD	United Nations Conference on Trade And Development
APC	Association for Progressive Communication
MGI	McKinsey Global Institute
STEM	Science, Technology, Engineering and Mathematics
IGF	Internet Governance Forum
BPF	Best Practice Forum
IDI	ICT Development Index
MOOC	Massive open online course

1. Introduction

Chapter 1 contains an introduction to the research study, the research setting description and topic background along with the purpose and aims of the research and research questions. This chapter is concluded with the topic justification, and scope and limitations of the research study.

1.1. Introduction and Research Setting

Information and Communication Technology (ICT) is the important actor of modern business and all businesses, public sectors and other organizations can benefit from its innovation (Beynon-Davies, 2013). Due to a wide usage of ICT and its different levels of interaction (organizational, societal and individuals), with social changes, this field has gained a broad attention in the twentieth century (Bradley, 2006). With the rise of Internet and its applications in recent years, ICTs have an explosive growth, which has significantly changed our lifestyle. We live in a world that technological development brings many changes with itself (Davaki, 2018).

According to Bradley (2006), there is more focus on technology related disciplines compare to human requirements and needs in ICTs usage and development. Walsham argues that by using ICTs, we can make a better world, and understanding the right way of using technologies and Information Systems by giving everyone the opportunity of doing so, can make a better life for individuals, organizations and the whole world (Walsham, 2012). Individuals can get the information about everything from healthcare issues to legal and civic concerns by having access to the ICTs. In future, ICTs, Internet, web, and social media will act as the conception repository and archive for most human knowledge (Bradley, 2011). Over a hundred years ago, people were discussing about how the basic literacy is needed in human's life and what its impacts are on people's condition. Today, we discuss about digital literacy and access to the ICTs in the same way. According to Bradley, digital literacy can be considered now as a basic human right that helps users' impact on society. Bradley (2011) argues that an important factor of well-being is a healthy relationship between citizens and their society, and an accurate knowledge about technologies with the possibility to use them. With the use of multi functionality ICT tools, many opportunities for information and communication have been provided to us, to benefit from them in our political, social and cultural life.

According Voogt et al. (2013), apart from online resources, social media and blogs, services such as e-government, e-commerce, e-banking, e-health and e-learning, create faster and easier way of communication and engagement in social and economic behaviors. Digitalization became a new source of cultural capital by allowing diverse possibilities of creativity to improve organizational and administrative procedures' efficiency. New skills and competences are required in both private and public sector, in order to cope with such transformation. Voogt et al. (2013) describe that in order to contribute and play a part in the society; we need to communicate well with it by creativity, productivity, thinking critically and solving problems.

According to the Groupe Spécial Mobile Association's (GSMA) report, the Internet and ICTs deployment are different in accordance to the individual, social and cultural characteristics like discrepancy in access, capacity to use the system, or the ways of engagement with ICTs, which are named **digital divide** (Davaki, 2018). Report shows that such disparities are generated by socio-cultural, political and economic factors, with technology's own nature.

"The gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICTs and to their use of the Internet for a wide variety of activities" (OECD, 2011, p. 5).

Digital divide includes both the access to ICT resources and the various ways of use by individuals and organizations. Differences and disparities can be described by referring to the socio-economic background, educational characteristics of the users and household, age, gender, location, ethnicity or disability (Cruz-Jesus et al., 2016). Digital inequalities' subject is highly on demand globally in governments, international organizations and private sectors. There is a vast potential in digital technologies in people's work and life improvement. Issues of gender equality are approached from different aspects, including economic, political and human rights' perspectives. Despite the actions taken and activities in this regard, still gender equality faces significant challenges. According to GSMA (2018) report almost half of the world's population is connected to the networks, however, not everyone has been enjoyed this unequaled growth in connectivity equally. Based on a report by Organization for Economic Co-operation and Development (OECD), we cannot take ICTs availability and access for granted.

By recognizing ICTs as the potential for promoting women's empowerment and gender equality, the subject of **digital gender divide** has been identified which can intensify gender inequalities (Davaki, 2018). Unfortunately, connectivity's benefits are missing in a big group of the people across the world, by using and having less access to the ICTs and women and girls are the majority in this group. Disparities in resources and differences in the ability to access and utilize ICTs effectively within and between different countries or regions and socio-economic groups, have led to the digital gender divide which shows these disadvantages for women globally (Davaki, 2018). According to GSMA report in developing countries and regions such as Middle East and Africa, the internet penetration and gender gap is more than developed countries such as Europe (Rowntree, 2018).

This research study examined the digital gender divide in Iranian society and between the users of a large mobile network operator.

1.2. Problem Area and Topic justification

According to Betterplace Lab report (2016) on a global scale, industrialized and developed nations' digital footprint means the access, usage, and digital content and products, which is completely inappropriate in comparison to the developing countries. According to the Office of the High Commissioner for Human Rights (OHCHR, 2018) report, various studies show that digital gender divide is widening and over 200 million fewer women have access to the Internet and can use Internet and online services than men do. According to the International Telecommunication Union (ITU, 2016) statistics,

gender digital divide is in the highest rate in the Arab Region and Asia in comparison to the other parts of the world such as USA, Europe and Australia and the male control and dominance exist in those regions, even in the access and use of ICTs. Meanwhile, the report shows that gender equal rates in ICTs access and use are noticeable in some parts of Latin America and Asia (2016). ICTs in digital gender divide theme are recognized by having the potential to support gender equality and women's empowerment, but women can access and use ICTs less than men do. An article from United Nations (UN, 2018) explains that despite all potential benefits of women's role in the industry and economic growth and in ICTs, there is still a wide digital gap between women and men, which is not decreased. The gap between genders in terms of Internet penetration also has been increased since 2013. The current socio-economic gender inequalities are exacerbating gender gap in the region and in Iran, with the norms favoring men. The internet can be used to empower the people who have access to it, however, the others who have little or no access to it, may confront social and economic inequalities. This gap is separating society into those who are able to take the advantages of new ICTs, with the people who are not, and usually women are among this group. The discriminations that women face in many aspects of social life, employment, literacy and income are the main reasons of the inequalities in ICTs usage (Hilbert, 2011). Meanwhile, many governments do not consider the benefits of ICTs in their plans and do not take serious actions against inequalities yet. United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) declares this matter.

"Despite the potential benefits, UNESCAP finds that yet e-government policies and implementation typically do not consider the differentiated gendered elements to access to, and impact of, ICTs" (UNESCAP, 2016, p.3).

In addition, according to the United Nations e-Government Survey (2012), Antonio and Tuffley (2014) and GSMA report (Davaki, 2018); most of the internet content is in English and this makes it difficult for the people who do not know any language except their own. Shariati, et al. (2017) argue in a research about the Iranian immigrants to Australia that English competency and, computer and Internet skills are the common problem for Iranian users.

Providing justification for our research stemmed from the importance of the topic and its outcomes on the economy, society and global development in general. In the International Telecommunication Union (ITU) report- A Bright Future in ICT- (2018), the importance of women's roles in driving the economy towards a sustainable future and gender inequality were the main topics, which discussed. The more we try to understand the reasons behind gender gap and look forward to bridge this gap, the more job openings will be available for women in the field of IT. According to Ms. Bogdan-Martin from ITU, the research by UBS, McKinsey, Accenture, and UNCTAD, declare how the society can benefit economically with having more digitally skilled women in decision-making and in leadership roles. In addition, closing the gap can bring diverse opportunities for the mobile and technology sector (ITU, 2018). This can be a help to economic growth across the society, in public services, government authorities and private sectors. According to Eva Kjer Hansen in the OHCHR report (2018), based on the World Economic Forum study, around 90 percent of jobs require ICT skills and enhancing women's access to and use of ICTs will assist us to close the digital gender gap and

empower women to be decision makers, claim their rights and take leadership of their lives.

The importance of gender equality, women empowerment and the potential role of the Internet and ICTs as particular facilitators of sustainable development, have been declared in many studies and reports and UN puts it on its 2030 Agenda for Sustainable Development (UN, 2018; ITU, 2016). Betterplace Lab's (2016) report declares that the digital gender gap is growing globally; particularly in developing countries. Women's affection by digital divide, exclusion and lower rate than men in the internet access are the issues, which need more concentration in a country like Iran. The importance of ICTs in economic and social development can explain the priority of bridging the digital divide. Digital gender divide is a new phenomenon in the Middle East and in Iran. There is a much higher interest in computer usage, design and in general technology in men by ignoring the needs of the women in this field. In a study by Dehghan and Rahiminezhad (2010), they describe that gender inequality and its relationship with ICTs is a new phenomenon in Iran, adding how usually women's needs are being ignored while designing ICTs' relevant events. In order to know the reasons behind the bias against women, we need to know who is designing the programs, and what their focus is (OHCHR, 2018). In the foundation of emerging technology and as a way to engage women and girls in ICTs, fairness should exist.

In this research, I examined the digital gap between genders in Iran, with discussing the reasons behind it and the possibility to empower women in this region to reduce gender inequality. Addressing the digital gender divide is crucial in order to realize the significant possible benefits, which women can gain from the Internet usage in their society and the ways to be beneficial in the economic development and growth. In addition, this research outlines briefly, a set of practical actions that users can take to address the gender gap in Internet access and use.

1.3. Purpose Statement and Research Questions

Digital gender divide is a broad topic; this research examines the digital gender divide in Iran, focused on ICTs and Internet penetration in order to explore their effects on the current gap through one of the large Internet provider users' perspective. The research also investigates characteristics users desire for empowering women in ICTs. The aim is to explore and acquire knowledge about the existing digital gender gap by identifying the key factors and trends, in Iran and in other areas where gender inequality and disparities are encountered. In addition, to suggest improvements based on users' points of view and by analyzing the state-of-the-art practices, in order to enable women's participation in the digital industry and ICTs as well.

Based on the above statement, these research questions needed to be explored:

1) How does digital divide impact women's life in Iran?

    - How ICTs and Internet affect women's life?
    - What are the reasons behind digital gender divide?

2) How can the existing digital gender gap be reduced?

1.4. Scope and Limitations

Digital gender divide is an existing subject and important issue to be considered especially in the developing countries. The scope of work is to explore the effects of digital divide on women's life by discussing the role and benefits of ICTs and Internet penetration in Iran through one of the largest mobile network operators' online services users. In addition, the research questions are designed to help us in finding the ways to reduce this gap and empower women especially in the field of ICTs. This master thesis provides suggestions and updated evidences as a long-term goal, for new prognostics in the area of women in ICTs in Middle East and especially in Iran. The research is limited to the people who have access to the internet through this mobile network operator's information system. I chose the interview method for my data collection. All interviews were conducted in English and whole process was through Skype. I tried to do verbatim transcriptions carefully in order not to lose or misinterpret the empirical data. I was careful during the research to maintain a professional relationship with the participants and treat the collected information with full respect. The framework proposed in this research was considered generic and flexible. It might raise various issues regarding its applicability, specifically with regard to the government readiness of applying suggestions to empower women in the field of ICT and as well in the other areas of technology and society.

1.5. Dissertation Outline

This thesis is designed to explore and acquire knowledge about the existing situation by identifying the key factors and characteristics regarding the gender gap in Iran and identify important conditions, which women confront with gender inequality and disparities. It is organized in six main chapters:

Chapter 1: Provided an introduction including the research setting along with foundational information and definitions and later, the purpose statement, research questions, limitations and justification of the topic have been discussed.

Chapter 2: Synthesizes the available literature of the Master thesis main topics highlighting the various characteristics of research including a summary of the theoretical and empirical studies.

Chapter 3: Describes the methodology of the empirical study including the methodological approach, the methods for data collection and analysis approach, along with the issues inherent in design choices, such as reliability, validity and ethical considerations.

Chapter 4: Following this, the findings are presented and analyzed.

Chapter 5: Discusses the findings and lessons learned.

Chapter 6: Summarizes and concludes the master thesis research and offers suggestions for future research.

2. Literature Review

Literature review is a critical evaluation, analysis and synthesis of existing knowledge relevant to the research problem. In literature review, the definition that the research topic holds will be assessed, to evaluate the employed methodological approaches and to identify the gaps in empirical work (Hart, 2005).

According to Creswell (2014) conducting a comprehensive literature review is the most demanding approach, which indicates a critical, concise and understandable study of the existing research studies.

For this review, I undertook a literature search by using the terms "gender digital divide", "gender gap and ICT", "digital literacy" and "Digital gender gap in developed and developing countries". In addition, the key phrases such as "gender differences in Internet access and ICTs usage" and "Digital gender gap in developing countries and in Iran" are used to identify and recognize the studies of specific content. The research domain included, but not limited to, Linnaeus University Library database, library search engine OneSearch, Ebook Centrals, DiVA (Digital Scientific Archive) and Google Scholar. The reports and briefing articles added to this research as the updated references, due to the subject of study's rapid changes, which led to further results upon examination of the references and used citations. Therefore, I was able to follow the development of the main arguments in this field and identify the related articles with the highest impact. Not many empirical researches have been undertaken in gender digital divide filed and especially in Iran, as such, my research is strengthened by statistical data and reports available through governments and organizations, such as the United Nations, APC and ITU.

In this section, I presented a review of the literature, which means to enlighten and define current approaches about the digital divide between men and women and its effects on the society and economic development. The research also provides the empirical evidence of correlations between gender gap and the characteristics, which cause it in the field of technology and ICTs. At the latest stage, I discussed about literatures related to the digital gender gap in Iran and the ways to bridge this gap.

2.1. Gender divide and the role of ICTs

The definition of **digital divide** as one new form of inequality which is added to the existing forms of discrimination and according to Hilbert is "an inequality in the power to communicate and to process information digitally"(2011, p.4). He mentioned that despite the differences in researchers' methodological approach, they all could answer this question: who (individuals or organizations, communities or societies/ countries, etc.), with which characteristics (income, age, gender, education, geography, etc.), how connects to (access, usage, and real impact) and which type of technology (phone, Internet, computer, digital TV, etc.). The higher Internet penetration rate for men than women in the most countries and especially in developing countries brings **digital gender divide** term to the concept (APC, 2017). In the world war two (WWII), when men went

off to fight, women were replaced them in the workforce. Female mathematicians, who secretly called "computers", did all calculating trajectories and ballistic tables for soldiers. "Computer Girls" were in charge of all programming, which was called as a whole woman's kind of work. However, later by having computers in the market, they were called "boy's toy" by marketers (Armbrecht, 2015).

The role of women and their positions in society is one of the most striking features of the late 20th and in 21st century. According to Meece, Glienke and Burg (2006) women's participation in the labor force and particularly in their entry into traditional male-dominated positions and professional areas increased. Therefore, in recent years, men's traditionally positions and careers in ICTs has been changed towards a more gender balance. On the other hand, there are many arguments showing that still in many industrialized countries, women are the minority in computer science (Anderson et al., 2008). Despite gender imbalance in favor of men, there is an increase of female participation in the computer science field in the European Union. In the countries with high gender-neutral percentage such as Sweden and Norway, the technical gender gap is going to be statistically insignificant and disappear. In these countries, girls perform as well as boys in mathematics and technologies (Hausmann, et al., 2012). McKinsey Global Institute (MGI) explains how important is to notice to the gender inequality subject.

"Gender inequality is not only a pressing moral and social issue but also a critical economic challenge. If women—who account for half the world's population—do not achieve their full economic potential, the global economy will suffer." (MGI, 2015, p.3).

Various articles have been written about the gender related digital differences, in access to and use of the Internet. A study among students with different levels of education show that women have less positive perceptions about their computer competence comparing to men and they are less attracted to computers in general (Busch, 1995; Vekiri and Chronaki, 2008). The number of the times and frequently usage of the computer in general and internet particularly by women, are less during the education and after completion of study (Hakkarainen et al., 2000; Volman and van Eck, 2001).

On the other hand, a study by Popovich et al. (2008) have a more gender-balanced picture about computer usage from undergraduate students, showing that there is no longer any significant difference between men and women attitudes toward computers, similar to the differences in the past decades. According to their study, no significant sex differences is found in the college computer students' number, the amount of time they spent on using computers or self-reported computer anxiety. One of the most robust findings in the previous researches on gender gap with regards to the access to and usage of ICTs shows that the way of usage between male and female group differs and women use computers and Internet in a different manner than men. Both gender groups' online practices differs based on their intrinsic gender differences, for example, women tend to engage in collaborative conversations more while men are into competitive communication (Tekobbe, 2013). Doiron's (2012) study compares the differences between both genders in their ICTs competencies, also in the perception of the new technologies in academic and higher education. In closure of his study, he explains while men have more broad-based experience with ICTs, women have a more in-depth experience when it is coming to the basic software applications, which are used in the educational context (Doiron, 2012).

Gender gap in Science, Technology, Engineering and Mathematics (STEM) fields is growing with age; girls' new generation are interested to an engineering career or an architect, two times more likely than boys are. Meanwhile, based on the Organization for Economic Co-operation and Development (OECD) report, only 20% of ICT field's tertiary graduates are women and in case they study STEM, having glass ceiling in mind, prevents them from holding senior positions (OECD, 2018). ICTs have a vast potential in improving many aspects in everyone's work and life. Almost half of the world's population is connected to network. Using ICTs are enabling us to make new businesses and business models while ensuring more and better information and communication flows (OECD, 2018). However, not everyone enjoys equally this unprecedented growth in connectivity. Today over 200 million women are less online than men (OHCHR, 2018) and 200 million less own a mobile phone (Rowntree, 2018). In addition, women who have access to the Internet tend to use it for less complicated tasks comparing to men. In developing countries, the majority of women lack access to digital technologies. Internet and ICTs offer many new opportunities for development and empowerment in different fields such as healthcare, education, environment and business. Gender divide can be named as the most significant inequality factor, which is expanding globally across different social and income groups. Daily, women are facing serious social, economic and cultural challenges, which limit or prevent their access to or use of ICTs or benefiting from it in general (Hilbert, 2011). However, digital gender gap is higher in older generations comparing to the younger people, therefore, it is expected to have a decrease in digital divide by reducing the cost of online access and the replacement of the new generation to the old ones (OECD, 2018). Gender gap is less among younger pupils comparing to the older groups in attitude regarding ICTs and we can expect the disappearance of such differences in our future generations (Hilbert, 2011).

2.2. Women and ICTs in Developing Countries

The large majority of women- an estimated four out of five (Hilbert, 2011)- live in developing countries and living conditions and opportunities are different in developed and developing countries and they often suffer from more gender-related discrimination comparing to their counterparts in developed countries. They are more likely to be unemployed, having fewer employment and educational opportunities (Chadwick et al., 2013). In a report from Association for Progressive Communication (APC), Internet as a pervasive, affordable connectivity with a sufficient quality and speed must be available to everyone. This will enable users to benefit from its usage, have access to participate in society, engage with people and information for development and well-being, without any obligation in the means of such access (APC, 2017).

By ICTs become the irreplaceable tools for use, the number of people who are using Internet in daily life in various activities such as education, business, and social engagement and banking increases every day. Nowadays being connected online becomes a part of our daily life. As stated in Antonio and Tuffley's article (2014) digital gender divide is one of the boosted significant inequalities by the digital revolution. In most of the studies particularly related to addressing Internet usage in developing countries, the Internet use penetration rate by women is significantly less likely than men. Although the women in developing countries need the Internet to mitigate and remove the barriers which have prevented them from being more present in digital world, still

they face gender-related discrepancies and discrimination which are precluding them from the full access and benefits of ICTs (Hilbert, 2011).

In developing countries, fewer women are actively working or studying comparing to men and generally, they have less income. Controlling the three characteristics (literacy, education condition, and work and family income) can reduce gender digital divide. Ono and Zavodny (2007) explain a deep correlation between digital inequalities in ICTs and Internet usage with pre-existing and gender inequalities at a societal level. These are associated closely with a gender gap in possession of the computer and Internet usage. It also considers the economic and social inequality's pre-existing measurements as the reasonable predictors for inequality in IT usage (Ono and Zavodny, 2007). In a study undertaken by Antonio and Tuffley (2014), between 2200 women and girls from developing countries almost one fourth of them lack the Internet access. The report highlights the persistence gap in women's access to the Internet in Africa, also in the Middle East and other developing countries around the world. They introduce two critical factors which influencing women's access to the Internet: availability and affordability. An Internet connection in developing countries, can cost around 40% of annual per capita income, while compared to the developed countries this amount is extremely high, so reducing the price of the Internet is one of the ways to make the access to the Internet possible (Antonio and Tuffley, 2014). Although these barriers are applicable to men and women both, but they hinder women more as other socio-cultural issues compound this problem. There are many obligations for women due to religious or cultural norms in some countries, like staying at home and not visiting the public areas such as Internet cafes, for using the Internet (Antonio and Tuffley, 2014).

Few studies in developing countries have concluded women's prevention in taking a full access to the potential of ICTs, in the economic sphere (Fuad et al., 2011), ICTs industry, economy, politics, and public sphere (Elnaggar 2007; Touati 2008; Fuad et al., 2011; Skalli 2006; Ben Moussa 2013).

2.3. Women's Digital Barriers in Developing Countries

In developing world, women's ability in having the Internet access is influenced by many factors such as; location, age, education, economic power, religious, racial or ethnic origin, and social and traditional norms. According to the existing data and based on the world Internet project report, women are less likely than men to use ICTs in developing countries (Center for the Digital Future, 2017). In the Internet Governance Forum (IGF), Best Practice Forum (BPF) in 2016, the barriers women face in having access to the Internet and online participation in the society have been discussed. The importance of the availability in having access/ relevant content/ relevant policies; affordability; pursuing careers, culture and norms; and capacity and skills, as the ways to bridge the digital gender gap was discussed in this forum. Public Internet centers are located in the places which women usually cannot have access to or have restrictions to visit the place. Language issues, censorship in the gender-related content, insufficient income to afford a device or even Data can be mentioned as some barriers women face in the way to access to and use of Internet and technology in developing countries (APC, 2017). In the APC report, prioritizing men for technology use, online gender-based violence, literacy gap, lacking of skills and knowledge, and low confidence in exploring technology added to

the above list. According to this report, women need public access spaces, which are safe, with providing guidance in how to access online content without any fear or prejudice. Apart from censorship, online violence against women also is an important subject to be studied. APC's report (2017) described the importance of taking action by society and governments, against technology gender-based violence in use of ICTs such as phones, social media platforms, the Internet and email, which are among women's fundamental human rights violations. Based on this report, women reduce participation in technologies they are all using. The normalization of violent behavior against them and behaviors such as cyber-bullying, cyber-talking and harassment, all limit women's ability to take advantage of ICTs' opportunities, including freedom in expression and participation (APC, 2017).

Gil et al. (2010) introduced four barriers, which prevent women's access to and use of ICTs and Internet: Lack of technology education, limited free time, social norms which are favoring men, and financial and institutional constraints.

2.3.1. Lack of technology education

Melhem, Morrell and Tandon (2009) explain how women benefit from knowledge society less than men because of having specifically less access to technology field and to education in general. Having access to the education is still a greater barrier for women comparing to men, when almost two-thirds of the illiterate population of the world are women and girls (Antonio and Tuffley, 2014). Many women lack the knowledge in using technology or in being familiar with it as a reason for not pursuing Internet use. The high rates in women's illiteracy and the lack of ICTs training can be seen as two major problems in entering the information economy (APC, 2017). In addition, based on UN e-Government Survey in 2012, 90% of online content is in English, while just one-third of worldwide Internet users speak English, also many of women are living in rural and remote areas in developing countries.

2.3.2. Limited Free Time

Women in developing countries carry responsibilities related to the household, family and children issues and due to their heavy burden tasks and their roles as primary caretakers, there is not much time left to experiment new technologies. In some cases, they need to work alongside their other responsibilities in order to take care of the family in single mothers' cases or to assist their partners in managing the family income (Antonio and Tuffley, 2014). Lack of having time along with their household duties and socio-cultural norms that give a low priority to education might be called as the reason that many women do not attend to school. Other subject is the autonomy of use in case of having access to the Internet, to what extent their autonomy is limited by the other members of the family. The more they have the autonomy of use, the greater they will be benefitted (Ono and Zavodny, 2007).

2.3.3. Social Norms in favor of Men

According to the World Economic Forum report by Jope (2017), traditional beliefs and social norms are pushing women into traditional roles and holding them back. Most of the time technologies are considered to be within the realm of men and the idea of men having control of technology, and information and knowledge has limited women's opportunities to learn, have access, use or benefit from technology (Antonio and Tuffley, 2014). There are many obligations through social norms which only conferring control of

technology to men. Gender gap in access, usage and the ownership of the ICTs is driven by a set of social norms and cultural barriers, which affect women negatively. With having lack of access to the Internet for more than two-thirds of the world's population, women's chance of having educational and career opportunities globally are less than men and in developing countries in some places, they face restrictive gender inequalities and discriminations (Antonio and Tuffley, 2014). Even in developed countries, non-users are mostly from women in addition to the groups of old, less educated and poor people. Although access is necessary for closing the gender digital gap, but it is not sufficient (Hafkin, and Huyer, 2007). Antonio and Tuffley (2014) describe that having high rates of access to Internet does not imply necessarily high rates of usage and it's required to separately examine the access and use, in order to distinguish the differences between opportunity and choice. Use can presume access but not vice versa. In the case of women as non-users, we need to ask whether it is a choice freely made by them without any obligation and constraint or it is influenced by larger social factors (Antonio and Tuffley, 2014). Melhem et al. (2009) describe how the social and cultural factors can limit women's access in sharing ICT facilities, such as coffee-nets and tele-centers as the meeting spots for men, preventing women's access to the information, knowledge and ICTs' adoption. Such common access points usually are not open for women and in some developing countries, such facilities usage by women and their interaction with men in public areas are not allowed or it is not right according to the society norms (Melhem et al., 2009).

2.3.4. Financial and/or Institutional Constraints

According to Chadwick et al. (2013), due to ICTs role in gathering and sharing information, using those technologies can increase the power and control in the society. They describe that the access to ICTs between disempowered groups' with limited economic resources has been reduced. More than 1 billion people are living with the average of 1 to 2 US$ per day and most of them are living in developing countries and in rural areas (Antonio and Tuffley, 2014). The combination of laws, policies and social customs in these countries create barriers for women in developing their skills and from earning higher incomes, therefore, they are the minority in having access to or use new technologies or affording technologies that might boost them economically (Melhem et al., 2009; Antonio and Tuffley, 2014). Unfavorable conditions in employment, income or education, prevent women from having access to or use the Internet. ICTs can be seen inaccessible for many women due to affordability issues associated with low income and poverty, lack of technological skills, low levels of numeracy and literacy, and geographic isolation (Antonio and Tuffley, 2014). Cultural expectations and societal norms can influence the possibility of possession or having access to the ICTs for them in public places. Meanwhile, by controlling these characteristics women can enjoy more actively appearance than men as the users in the digital and technology world (Antonio and Tuffley, 2014). The existing gender discrimination may negatively affect women in all aspects of political, social and economic empowerment, also in labor markets, preventing women's education and training opportunities and in allocating financial resources for doing business (Sandys, 2005).

2.4. ICTs and Digital Gender Gap in Iran

The average ICT Development Index (IDI) for developed countries is 7.4, and 4.07 for developing countries. Based on the ITU report (2017), Iran's 2017 IDI rate was 5.58, 1.51 points above the average for developing countries. In IDI report, Iran was ranked 89 among 175 countries. In IDI sub-indexes of access and use of ICTs Iran has improved slightly from 2015, while the sub-index of skills remains unchanged (ITU, 2017). However, ICTs and gender inequality's correlation is a new phenomenon in Iran and only few studies have been undertaken in this regard (Dehghan and Rahiminezhad, 2010).

The relation between digital gender gap with stereotype and norms, education and skills, and women's occupations and employment, is reviewed here.

2.4.1. Culture and stereotypes

Existent norms and values along with several different functions in the society can transfer various stereotypes for women. Internet can be seen as a critical place for women in having access to useful information but it is usually unavailable due to social and cultural norms (Dehghan and Rahiminezhad, 2010). The continuity of gender related stereotypes can create and support different types of gender inequality, especially in the ICTs and technology field. Ann Okley (2005) in her article about gender inequality with focus on society, describes that usually parents treat their children differently based on their gender, and gender inequality emerged first at home and then through the socialization process. In the next step, this difference becomes an ongoing process, which will be reinforced by the media and the educational system (Okley, 2005). Dehghan and Rahiminezhad (2010) argue how proverbs and the content of primary school's books can stress the differences between the genders in Iranian society and from childhood. Father provides bread, as one of the first statements which children are learning at school in grade one, by explaining that men are "breadwinners" while women are housewives, intensifies labor division in the education (Dehghan and Rahiminezhad, 2010). They describe such a process' outcome will be the allocation of a large number of positions and professionals to men, and women's deprivation from those jobs. There are many restrictions and policies, which give women less freedom in participation in the society, business and country's economy. Gender stratification reflection in the administrative and management system in the country makes women face unnecessary hardships in having such freedom in selecting a position they like to (Dehghan and Rahiminezhad, 2010).

Although there is an increase in the ICT-related professions among women, the reports show that the least percentage in female careers belongs to the ones who work as physician, mathematicians and in ICTs and engineering fields, which describes the culture and women's concept to the technology and ICT field. Dehghan and Rahiminezhad (2010) declare how family traditional beliefs keep many women away from cooperation in decision-making. In addition, according to the World Economic Forum report by Jope (2017) , there is a different understanding between the impacts of childcare and unequal housework sharing. The privilege of men over women in society and the gender inequality can be the product of civil laws which considering men as `breadwinning' -law no. 1106, 1107 and 1199 or giving the right to the husband in prohibiting his wife from working outside -law no. 1117 (Dehghan and Rahiminezhad, 2010). These evidences all show the amount of gender inequalities in Iran, which emerge

through the existing laws and stereotypes and, ICTs and technology access and usage are not apart from these digital gender divide barriers.

2.4.2. Education, literacy and skills

Based on Sandys (2005) argument, education is the area where all developed and developing countries apply both traditional ways, and technology and ICTs, in order to support education and training of everyone. Education comes in types of formal and informal learning, campus, online and distance education and in establishing e-learning centers (Sandys, 2005). Accordingly, illiteracy and lack of ICTs knowledge are two of the most serious barriers preventing women to enter the information and technology world. Language and basic computer literacy can be named as women's prerequisites to benefit from the use of ICTs for education. Continuing gender gaps in education based on domestic responsibilities, socio-cultural norms and lack of mobility, which have lessened the importance of women's education, can create enormous challenges for this group (Sandys, 2005). Gender inequality in ICTs is related directly to the existent inequality in education and skills and the main task of educational system is to transfer knowledge and required skills to the new generation in a way to help everyone find their rightful positions in society (Dehghan and Rahiminezhad, 2010). ICTs are adapting the process and content of education to everyone's preferences and priorities. Women's literacy percentage differs in privileged and underprivileged regions. In recent years the remarkable improvement at higher levels of educations, shows an increase in female students enrollment comparing to male students (Dehghan and Rahiminezhad, 2010). And according to this study, since 1998 and after Cultural Revolution in Iran, in general an increase in number of women's admission can be seen in comparison to men, but in some major subjects such as mathematics and technical studies still men are ahead of women. And still there is a huge gender gap between technical-engineering experts in STEM, and the number of men is exceptionally higher than women. Although, in recent years, the number of educated women in universities has increased, yet gender inequality among experts cannot be balanced (Dehghan and Rahiminezhad, 2010).

Herbert (2017) argues that the areas, which need to be addressed in addition to general literacy, are digital literacy and e-skills. Based on his study, digital literacy is the ability to use ICTs in finding, creating and communicating information, which requires both cognitive and technical skills, and e-skill is the ability to use and develop ICTs in a satisfactory level to participate in an environment, which is highly dominated by accessing to the electronically enabled information (Herbert, 2017). Shariati et al. (2017) describe that acquiring English competency in addition to e-skills and obtaining both English competency and ICT skills between Iranian societies is imperative and required.

2.4.3. Employment and income

Women face discriminations in many aspects of social life including employment and income.

"These inequalities also throw their shadows on ICT usage. More specifically, being a woman is positively correlated with ICT usage and negatively correlated with employment, income and education" (Hilbert, 2011, p.20).

Hilbert (2011) mentions that the effects of traditional discrepancies on employment and income result underemployed or underpaid women comparing to men, which are turning the correlation between women and ICTs from positive to a negative one. Still most of the managerial and policymaking positions in IT companies are held by men, without giving an equal opportunity to women. Even when women have the equal and necessary skills, social norms favoring men and persistent cultural constraints like stereotypical views of the women and men's roles and gender variation of daily social mobility, remain as the barriers to women's full participation in the economy (Sandys, 2005; Dehghan and Rahiminezhad, 2010).

Gender inequality and discrimination in Iran can be seen more in the area of occupation, employment and income. According to Dehghan and Rahiminezhad (2010), the existent norms in Iran prescribe women's traditional roles as housewives which do not improve their conditions financially nor their social status. Women who live in big cities face more difficulties than rural women do, since many of them have to work outside in addition of doing household tasks. The demand for work outside home is on the rise among women for many reasons, such as being financially independent, covering increasing expenses, participating in a decision-making and using the skills and academic background for creating a better society. These all have a direct relation with the increased number of educated women in the recent years, but there is a question if it is possible for women to enter the market with the same proportion than men, considering that gender inequality and gap which are more conspicuous in ICT professions (Dehghan and Rahiminezhad, 2010). On the other hand, lack of employment, income and education will affect ICTs usage negatively (Cullen, 2001; Mossberger, et.al. 2003).

Sharma (2003) explains the reasons of women having less online access than men are all the usual gender-related variables such as time, money, control, learning opportunities, and other commitments and prioritizing others' needs. Apart from women's discrimination in many aspects of social life including in employment and education, the other important issue is the difference between male and female in income and salary. They usually have less income than men do and this can be seen not only in Iran but also in many countries around the world. According to Hilbert studies (2010, 2011), women are discriminated all over the world in the employment, income and education matters.

2.5. Potential for empowering women

In developing countries, there is an increase in the use of ICTs for development initiatives. Women's increased opportunities in developing countries in using Internet and online services can reduce their education physical barriers and allow them to receive a long-distance education via the MOOC system, the high quality online free courses in different disciplines (Antonio and Tuffley, 2014). Antonio and Tuffley (2014) argue that in order to overcome the Internet access barriers, many actions are required and to reduce Internet access inequality, we need to educate and teach people, on how to facilitate access and alter attitudes, which may hinder the access. The focus on women's empowerment is on increasing their power on decision making including having the access to resources, using them or controlling over distribution of benefits. ICTs particularly offer women to have a voice or participate in society and economic growth, and to reduce poverty. According

to Broadband Commission (2017), digital literacy improvement and confidence has been identified as a growth area in gender inclusion. In addition, this includes fully understanding of women's needs, developing their skills and confidence, investing in education and supporting educators, and supporting, promoting and empowering the female role models.

- **Women empowerment in rural areas**

One of the main regions that need consideration in improvement and empowerment are the rural areas, which based on Sandys' article (2005), by giving effective access to and use of ICTs in these areas, we can improve rural women's leadership in order to participate in the community and economic development activities. According to ITU report (2016), rural women's main barriers are limited infrastructure, affordability and education. Use of ICTs by women potentially can play a major role in rural poverty reduction (Antonio and Tuffley, 2014).

- **Women's economic empowerment**

Women's economic advancement promotes overall economic growth and ICTs provide new opportunities in this field. Creating business and employment opportunities in a comfortable environment for women in order to participate in development activities can be named as the examples in this growth and empowerment (Sandys, 2005).

- **Women empowerment by education and training**

By providing language and basic computer literacy as the prerequisites, all women can benefit from the use of ICTs for education and trainings (Sandys, 2005). Initiatives, which are focusing on women's education and teaching them computer literacy, are demonstrating the value of ICTs for women. Also according to ITU report (2016), we need more women in the ICT field to have more leaders.

- **Women's socioeconomic empowerment**

ICTs can provide many opportunities for women in different areas and business, including in health, science, technology and education (Sandys, 2005).

- **Women's political empowerment**

New technologies are used around the world in unprecedented ways not only for networking but decision-making, political participation and advocacy. Moreover, by having women and their organizations as the pioneers in strategic and by empowering ICTs usage, we can promote women's rights (Sandys, 2005).

- **Women empowerment on violence against them**

According to Sandys (2005), creating a virtual space can provide positive information about violence against women. It can be also a safe place for discussing or sharing their own experiences. ICTs role will be to identify and address the women's needs in order to enable them to trust and use ICTs as the effective tools for advocacy on violence against themselves.

- **Policy and regulatory frameworks**

Based on Sandeys' report (2005), gender issues should be identified and recognized in all aspects of development and implementation of ICTs policies and regulations.

3. Methodology and Research Design

"The Selection of the research approach is based on the nature of our research problem, the researchers' personal experiences and the audiences for the study" (Creswell, 2014, p.3).This chapter is about the philosophical assumptions that guide the research. It also explains the followed methodology and research methods, which were used for the collection of the data. Followed by a description about participant and the selection process, invitation and data collection, data analysis, validity and reliability and ethical considerations of the research, with identifying the researcher's role.

3.1. Philosophical Paradigm

Guba (1990) calls philosophical tradition or paradigm as a basic set of beliefs that is guiding action. Worldviews or what Denzin and Lincoln call paradigms (2011), or epistemologies and ontologies by Crotty (1998), are how a research shapes and how the phenomena are interpreted in a study. The three dominant paradigms in the field of information system research are positivist, critical and interpretive (Klein and Myers, 1999). Orlikowski and Baroudi (1991) describe positivist approach as the evidence of a formal proposition, which measures quantifiable variables' and all ways to investigate phenomena in order to represent selected inhabitants. In a positivist approach, it is believed that facts are important and only the observable and measurable things can be counted as data. According to Howcroft and Trauth (2005), positivist researchers believe that science is value neutral and objective, it is separating fact from value and especially is concerned with having perfecting methods in order to collect facts, which are value-free and unbiased.

The interpretive approach believes that research tries to understand, interpret and explain phenomenon (Klein and Myers, 1999). One of the main tasks in interpretive research is seeking meaning in context. It is up to the researcher to choose which context to retell or what story she wants to tell to the audience (Klein and Myers, 1999). According to Klein and Myers (1999), interpretive research is about understanding of human thoughts and actions. Interpretivism sees human behavior as the outcome of its subjective interpretation and it focuses especially on actors' definition of the situations in which they act.

In critical approach, reality is assumed to be historically constructed which is produced or reproduced by people (Myers, 1997). According to Howcroft and Trauth (2005), the critical theoretical orientation frames the research purpose in critical theoretic concerns' context such as power, control and domination, and empowerment and emancipation in addition. Critical IS researchers are trying to expose the existing contradictions and conflicts and aim to reveal privileged groups' interests and agendas, hinder the misuse of IS and promote empowering and liberating IS design and use (Cecez-Kecmanovic, et al., 2011). Interpretive and critical IS researcher agree on the role of values and beliefs in producing facts and are not like the positivists who believe in value-free facts. Meanwhile critical IS researchers criticize both positivist position of having a research based on objective, value-free facts and interpretivists' value-neutral claim (Howcroft and Trauth, 2005). The critical research approach rejects both the objectivism

of positivist approach and subjectivism and relativism of interpretive approach. Howcroft and Trauth (2005) argue that the critical research approach can be a way to bridge the positivist and interpretivist objective-subjective approaches.

The reason of using critical approach in this research was according to Howcroft and Trauth's (2005) description, its specific role in the context of IS research and in creating knowledge as a change catalyst, to help and give voice to the users, play an active form to transform IS practices and assist users in emancipation themselves. As a critical researcher, I found a dialectic relationship between human beings with the concrete social and material realities. Actions and situations in IS practices such as here required a deeper investigation to uncover and expose the hidden layers of social reality, conflicts and contradictions inherent in social reality. Critical theory helped me to see and envisage the desire changes in digital gender gap in the society by informing empirical inquiries, to find and interpret the facts and barriers, which strengthens it (like a map). In addition, it helped me to study the potential ways to empowerment, by assuming that human being is creative and adaptive with the potential to think and act or resist against the established culture and social structure as Howcroft and Trauth describe (2005). A *critical research methodology* is as an overall strategy of conceptualizing and conducting an inquiry, which engages with studied phenomena, constructs and justifies relevant knowledge and differentiates the critical from other research paradigms (Cecez-Kecmanovic, et al., 2011). According to Orlikowski and Baroudi (1991), emancipatory project in IS is not new and it is a common theme between critical researchers who work on the equality and inequality issues. I found critical approach as a convenient way to apply in my gender related thesis, since inequality issues are more in the IS related professions and ICTs as stated by Howcroft and Trauth (2005) too.

3.2. Research approach

Research methods can be classified in various ways and one of them is using the quantitative-qualitative dichotomy. Quantitative research methods are evolved in natural science in order to study the natural phenomena. Quantitative methods' examples are fairly accepted in the social sciences. They include various survey, formal methods, laboratory experiments or numerical methods like mathematical modeling (Myers, 2013). Qualitative research is built based on the assumption that individuals formulate social reality in the meaning and interpretation formulations which are temporary and circumstantial (Gall, et al., 1996). In quantitative approach, researchers try to generalize the results, while in qualitative research understanding and interpreting the data is the aim. Creswell (2014) explains in qualitative approach the meaning of a phenomenon can be defined based on the views of participants. It is an approach to explore and understand the meaning of a social or human problem that is given by individuals or groups (Creswell, 2014).

In this research, I have chosen the *qualitative approach* as my research requires a deeper understanding and study beyond the social surface appearance and using a quantitative research approach cannot fulfill this aim. Qualitative approaches provide in-depth, contextual information on the "how" and "why". This kind of approach was very useful in my research to understand the current situation in the attitudes and social-cultural norms underlying gender issues, violence against women, discriminations,

challenges and barriers women face in access and support related to the online services and technology in general. Qualitative research can be critical if it makes the contradictions within the social phenomenon conceptually and analytically clear. According to Bhavnani et al. (2014), there are different ways in which "critical" can be used in relation to qualitative research. For this purpose, they suggest few ways that critical approach is used in qualitative research context, such as critical approach in a liberalism format, expansion of politics or a professionalized research endeavor and perspective. Here, based on Howcroft and Trauth (2005), I positioned critical theory as a viable analytical and practical tool in its relation to qualitative research to review ethically the complex socio-economic, cultural, political gendered values which are embedded in ICTs and Information System' construction and implementation.

3.3. Data collection

According to Hart (2005), in a research design, achieving a methodological logic requires a coherent and reasoned connection between our choices and also the philosophical tradition, approaches and the methods that we use for data collection.

3.3.1. Participants

A *purposeful selection* has been made between the users of one of the large Internet and mobile operators of Iran in Tehran. The reason of choosing this company and location was the researcher's connection with the users through one of the managers. According to Creswell (2014), the reason of choosing qualitative research is to select participants purposely which helps the researcher to understand the problem and the research question more. Participants have been selected purposefully because of their knowledge and experience in using the ICTs and Internet on a daily basis for a long period as the end users, also their language and e-skills, and their ages. Therefore, I believed that they could be a rich source of information for this research study (Creswell, 2014). These all gave me the variety of choices in selecting the participants I was looking for, in the shortest time. Ten participants were invited among the users of the Internet operator company. They were all well educated, with the age between 25 to 40 years. Due to the summer and vacation time, only five persons showed their interest in participation. Four of them were women, one was university graduated and housewife, the second one was a General Physician who had her own company, and the other three persons, two women, and a man were working at mobile operator company.

3.3.2. Interviews

Following the qualitative approach, the method that I used for collecting the data, was the *qualitative semi-structured* interview.

Interviewing users gave me the required data to explore and understand the current situation regarding the usage and access to the computer and specially Internet between both genders. It also provided suggestions for bridging the gap between the genders and empowering women as well. According to Hart (2005), interview is the obtrusive method to generate valuable and in-depth qualitative information that is usually conducted between a small numbers of participants. Interview results were analyzed by finding similarities and differences between participants' responses and I tried to relate each individual's response to the big picture set by my research questions.

Before conducting the interviews, I prepared the interview guide and Informed Consent form (see Appendix A & B). The interview guide consisted of ten to thirteen exploratory questions, which were prepared in advance in order to guide me through the interview procedure. The interviews were semi-structured so depends on the participants' response; some changes have been made to the questions. The consent form and invitation were sent to participants by email and discussed with them individually in order to make every point clear. All the signed informed consent forms along with the interview transcriptions and audio recordings are archived in a folder.

3.3.3. Conducting interview

The interviews were semi-structured and were conducted through Skype, as it was not possible for me to travel to Iran at the duration of the thesis preparation, in order to conduct face-to-face interviews. However, the participants have given me the permission to audio record the interviews and use the camera. There was no video recording and I assured participants that the only reason of using camera is to give both sides the feeling of a face-to-face interview, to comfort them and have a friendly atmosphere during the session. On the other hand, this gave me the opportunity to notice their behaviors and reactions during the interview. Each interview lasted between 30 to 40 minutes. During each interview, I tried to initiate a discussion with the participant and to understand participant's perspectives and reflections on the phenomenon under-study. I was taking notes while asking questions, and observing participants' expressions and body language in the same time. This gave me the opportunity to see behind their words and extract additional information such as potential tension or satisfaction of the participants during the interview. Key terms and phrases of each interview were jotted down with the interviewee position, age, gender date and time of interview in order to help me during the analysis of the data. Right after each interview, some more notes were added to the notebooks. All interviews went very smooth and my participants felt ease and no pressure during the interview.

The following table shows the schedule of all conducted interviews.

Table 1: Interview Schedule

#	Interviewee	Gender	Current Designation Employed/ Unemployed	Education	age	Duration
1	User No. 1	Female	Unemployed	Electronic Engineer	40	32 Min
2	User No. 2	Female	Self-employed-Physician	GP	36	39 Min
3	User No. 3	Female	Product Development Representative	DBA Student	27	38 Min

4	User No. 4	Female	Sales & Marketing Representative	Electronic Engineer	37	40 Min
5	User No. 5	Male	IT Project Manager	Master in Information Technology	34	37 Min

3.4. The Researcher's Role

In a qualitative research, the focus is on the meaning each participant gives to the phenomenon under-study, not the meaning that we, as researchers, bring to the research or what the existing literature shows (Creswell, 2014). As the researcher, in a critical approach, I tried to be separated from the research process, in accordance with the chosen methodology (Swaminathan & Mulvihill, 2017), to do the interviews observation and transcription without any influence or misinterpretation. I collected the information without jeopardizing or exposing participants or my point of view and I tried to remain unbiased as much as possible.

Meanwhile, it is impossible for the researcher entirely to be neutral and according to Denzin and Lincoln (2011) statement, in a qualitative social science research, the researchers' interpretation prevails. Therefore, the researcher's experience, knowledge and prejudice should be brought into the consideration. I, as a woman who has born, grown up, and lived in Iran for a long time, should confirm that during the interpretation of the data, sometimes my pre-knowledge and experience might have influenced the research. It can be visible only in few parts during data interpretation, which I was agreed with participants' opinion and had the same experience as them. Furthermore, I did not omit from or add any new idea or suggestion to the collected data. During the interpretation, I tried to make a connection between the empirical findings with literature in order to come up with the suggestions on how to solve the existing problem and give a better understanding to the reader about the concept.

3.5. Data analysis

The analysis and interpretation is based on the collected data. Data analysis is the process of interaction between the researchers with the collected data, to help researcher identifies and extracts themes and subjects for generating patterns through the raw data (Hart, 2005). Lichtman (2013) argues that in qualitative research we use an inductive strategy to help us in examining a natural setting and get the opinions and feelings of the people we interviewed. Hence, data analysis in the qualitative research is inductive and iterative. My task as a qualitative researcher was to organize and make sense of the data. Based on Lichtman's explanation (2013), there is no right way to do the analysis of the data as no one is more or less expert at doing the analysis than the other persons and organizing the collected data is a challenge itself. There is no clear rule to obey or to know how to begin the data analysis and it is not obvious how we should begin (Lichtman, 2013).

In this research, I followed *Lichtman's thematic analysis*. The process started from Codes, moved to Categories and ended up with meaningful Concepts in accordance with

Lichtman's three Cs analysis. More specifically, Lichtman suggests six steps for the analysis of data, which I used them accordingly:

1. Initial coding
2. Revisiting or examining initial coding
3. Initial listing of categories
4. Modifying the initial listing based on additional rereading
5. Revisiting the categories and subcategories
6. Moving from categories to concepts.

The following figure illustrates the data analysis process I prepared to show the procedure, based on Lichtman's three Cs methods.

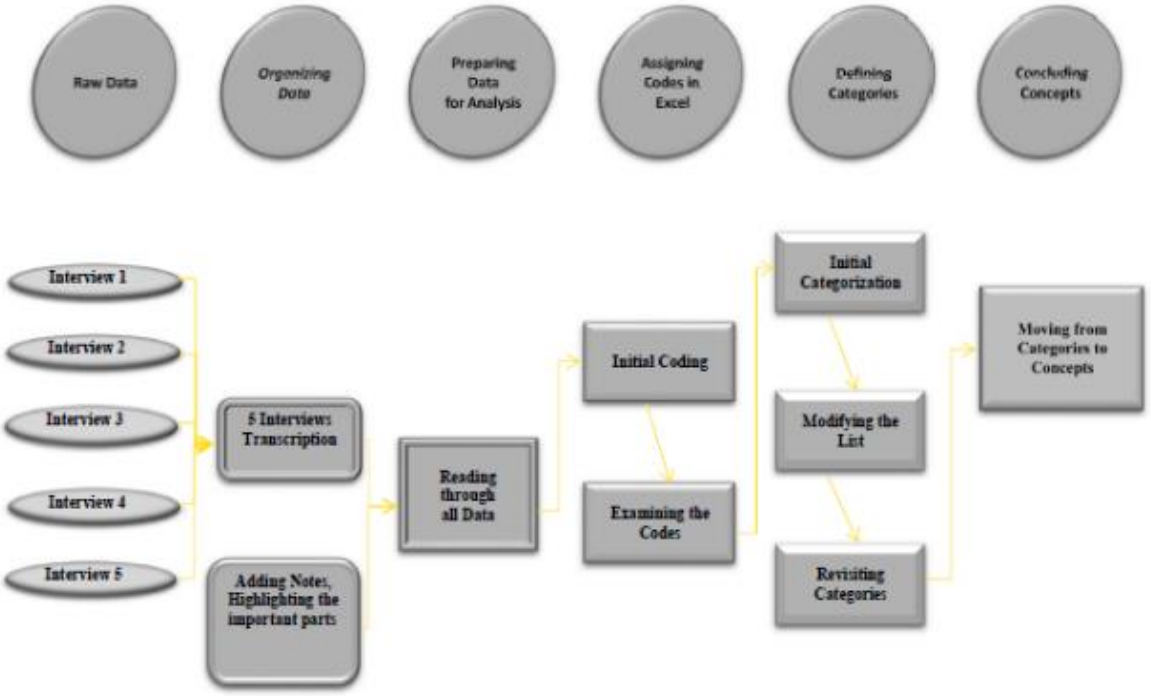

Figure 1: Data Analysis based on Lichtman's 3 Cs (Lichtman, 2013, p.252)

My small data set let me follow a manual process of data analysis, instead of using any software for coding. The transcripts were deconstructed, codes were extracted, and then categories emerged through the codes. After reviewing the categories, some of them have been deleted as they were not relevant to the research questions, some were merged with other categories and some were modified. Finally, the main concepts have been extracted out of those categories.

3.5.1. Interview Transcription

First a word-by-word and verbatim transcription has been done for all the interviews and I tried to do this process as accurate as it should be. According to Creswell (2014), the transcription of the raw data began in order to know the general ideas of participants.

At the next stage, I read the content of the audio recordings' transcriptions carefully to ensure the impression of the credibility and overall depth and use of the information. Then I matched them with the notes and made the final files ready to be used for data analysis.

3.5.2. Thematic Analysis

Following the methods of Lichtman (2013) to make a meaning from the data, I used the 3 Cs model and developed Codes, Categories, Concepts based on the collected interview data.

- Coding

First step was to do the initial coding by making an excel sheet to start the coding. Using Excel made it easier for me to organize and filter the elements when needed. By going through transcriptions and notes, except the repeated parts or those, which were not related to the topic and problem area, I built my Excel sheet. In the next step, a code has been given to each statement. Lichtman (2013) explains how the researcher applies selective coding in a way that her choices are made according to the most important codes. Then I chose a small number of codes in order to represent the key concepts, which are drawn from research raw data. In the next step, I revisited the codes by going through the statements and through each code once again to delete the duplicated codes while unifying the ones, which had the same meaning. I ended up with 62 codes that represent the collected data.

- Category

In this stage, I did the setting based on categorizing the initial codes in relation with the research questions, problem area and my research purpose. A description has been given to each category based on the detailed information about the people and their thoughts with more focus as I wanted to link the codes with the categories based on the thesis subject. After I categorized all codes, in the next step, I reviewed all the categories to modify the initial listing based on additional rereading, in order not to have the similar categories. This way was very helpful as I found some discrepancies, for example, one code was in two categories. After fixing problems, deleting duplicates and merging similar ones, I ended up with 16 categories.

- Concept

In the last step by reviewing the categories and whole procedure, I decided to reshape the categories as readable and less as possible. Therefore, with some small changes and merging the categories with the related subjects, to each other, I condensed the categories into 5 concepts. Coming to this point, as a researcher, it became easier to trace the data and discuss about it. It became more organized, and in a way to be more understandable for the reader as well. These concepts were the ones, which appear as the thesis major findings. The table of coding, based on Lichtman's 3Cs, can be found in the Appendices section, Appendix C.

3.6. Reliability and Validity

According to Gibbs (2008), qualitative validity is when the researcher checks for the accuracy of the findings by using certain procedures. Multiple validity strategies and

approaches can be examined to enhance researcher's ability in order to evaluate the accuracy of findings and the proof of the research accuracy. Quantitative researchers apply statistical methods to establish validity and reliability of research findings, but qualitative researchers apply methodological strategies to ensure the findings' trustworthiness (Noble and Smith, 2015). Creswell and Miller (2000) address validity with terms such as *credibility, trustworthiness and authenticity*. Guba and Lincoln substituted reliability and validity with a parallel concept of trustworthiness, which contains four aspects: credibility, transferability, dependability, and confirmability (Guba and Lincoln, 1981; Guba and Lincoln, 1982). There are specific methodological strategies within the above aspects for demonstrating a qualitative research, and I, as a researcher, used them to describe what I did in this regard in my research.

Credibility means to ensure the correct recording of the phenomenon (Shenton, 2004). It is the most important aspect in establishing trustworthiness. It asks the researcher to link the empirical findings with reality clearly, in order to demonstrate research findings' truth. I began with studying more about the subject in order to get a deeper understanding of the phenomena and to be sure that my judgments did not affect the findings. Participation in the research was voluntary and anonymous. Participants were informed of the possibility to withdraw from the project at any stage. The project has been introduced to the participants and I explained the reasons of inviting them to this research study. In order to address ***transferability***, a rich and thick description has been used to explain the research findings and offer different perspectives about the concept in order to give my readers a more realistic and richer understanding and also bring the shared experiences to the discussion (Creswell and Miller, 2000). By reporting the research activities, readers can have an overview about the employed methods and their effectiveness, if findings are consistent and if it makes the study repeatable by other researchers. This term is called ***dependability*** (Shenton, 2004). Whole process within the research project was documented in details. According to Miles & Huberman (1994) in a qualitative research, the researcher is usually the data collector and data analyst, which gives the potential for researcher bias. However, I tried to reduce the possible biases by involving participants actively to check and confirm the results, which is called member checking. In this research, I have shared the document with the participants, in several stages, for their review and confirmation; the interview transcriptions, findings, data analysis when coding, categorizing and data interpretation. The outcome of the research should be based on the interviewees' perceptions and responses and not on the researcher's potential bias or personal motivations in order to insure the ***confirmability*** (Shenton, 2004). Thesis findings were based on the perceptions of the participants, and I tried to remain unbiased as much as possible. I considered personal biases that may have influenced the findings; acknowledged biases in interviews, also ongoing critical reflection of methods in order to ensure sufficient relevance in data collection and analysis, and had a precise record keeping with ensuring consistency and transparency in data interpretation. I also tried to include rich and thick verbatim of interviews transcriptions to support findings; clarify data analysis and interpretation process and engage with other researchers' literature to reduce research bias. The full procedure including data analysis, same as the interview transcription, was thoroughly documented. The transcripts have been checked repeatedly to know if there was any obvious mistake, also codes were coordinated and crosschecked (Creswell, 2014).

However according to Rolfe (2006), the quality judgments consist a research text's subjective reading, and the responsibility for evaluating research lies with the reader more than the writer. Although this does not stop the researcher to appraise the quality of her own work, but it suggests that, her reading has no more authority than the research's readers have. No single paradigm can accommodate all qualitative methodologies and each study can be justified only based on its own merits (Rolfe, 2006).

3.7. Ethical consideration

In addition to build a trust with research participants, they need to be protected and guarded against misconduct that might reflect their organizations or institutions, in order to cope with the challenges and new problems (Israel and Hay, 2006). According to Forman et al. (2008), there is an obligation for the researcher to respect informants and participants' rights, values, needs and desires. I tried not to harm anyone or particularly put participants at risk. I tried to contribute positively towards participants' welfare, to respect their rights and dignity, to be fair enough to everyone about the benefits and risks of the research and to be sure that they understood their rights and roles in the research (Hart, 2005). I started the design of the research by having a clear definition about the topic, considering the alternative methodologies and examining them. I tried to employ all literatures as relevant as they are, choose the right data for collection, select the findings independently and justify methods by choosing the correct ones. In addition, the standards of authorship maintained by acknowledging all organizations and people who involved in the project (Hart, 2005).

Prior to beginning of the research by respecting everyone, I obtained written consent form from participants for the data collection before doing the interviews, which aimed to create a confident and friendly relationship between participants and me. They were all fully informed about the research purpose, methods and tools that are used in this research process. I tried to treat them all equally and fair without prejudice or putting them in a stressful condition, and to be unbiased as possible. In order to avoid any mistake, I checked and verified all sources to ensure the accuracy of the data and information, and to be self-reflective in a reasonable way. A permission has been taken from participants for audio recording the interviews, the final version of everyone's interview and audio recording is sent to them for an approval and feedback. While writing down this master thesis, I used proper citation for other researchers' ideas, avoiding misconduct by falsifying, fabrication, plagiarism or omitting any data. In addition, I tried to safeguard participant's personal information and did not use confidential information without their permission and approval, in order to protect the confidentiality.

4. Empirical Findings

Chapter 4 consists the findings generated through thematic analysis of the semi-structured interviews and documents review.

4.1. Empirical Findings

After doing full data transcription and data analysis based on Lichtman's (2013) method, all the process has been transferred to an excel sheet (see Appendix C). Data analysis helped me to find out the main subjects discussed by participants during the interview and bring them in specific concepts.

Five concepts presented here are emerged from the analysis of the collected data:

Concept 1: Usability and accessibility of ICTs and Internet

Concept 2: Traditional and social norms favoring men are above all barriers women face in accessing digital technologies

Concept 3: Women are less in engineering and technology related education and careers

Concept 4: New generations perceive digital gender divide more and act against it

Concept 5: Government and society need to take an action

At this stage, I described the empirical findings through each concept. I tried to explain the relation between each concept with the participants' thoughts, to clearly show the reason behind my choices. Here I began with the questions about ICTs & Internet, and participants' perception about these new technologies and their effects on women's life. In the next stage, I asked them about these technologies and services' accessibility and affordability. Questions number 1 and 2 in the Interview Plan are related to the Internet and ICTs usage (see Appendix B).

4.1.1. Usability and accessibility of ICTs and Internet

Replying to the questions related to the ICTs and Internet, all participants mentioned that there is a high percentage of the ICTs and Internet usage by most of the members of their society, using "almost everyone has access".

Participant #1 said: *"Nowadays almost everyone's using computers, Smartphones, laptops, tablets in order to communicate with the others and world. Having access to the Internet is vital."*

Participant #2 described people with different age range, in the families who can afford the systems and service's costs, are using the Internet and online services. *"Everyone is using the Internet every day, from old people to the kids. I don't mean that everyone has access to it, but the families who can provide the costs, almost all the family members have smartphones and use Internet."*

Almost all of them agreed on the positive effects of the ICTs and Internet on people, especially their influence on women. They all discussed that how using these facilities, will help people to expand their knowledge, to be socially active, have group discussions and exchange knowledge by communicating with others. Moreover, how using these facilities can change citizens' opinion from restricted traditional beliefs, to believe in gender equality.

Participant #2 explained that not all people use the online services only to communicate, many of them use it to study and work: *"many people use it not only to communicate with the others but to search, to study and to work. I'm using online services in my Institute."*

She added how the society and women can take advantages of using technology: *"In a country like Iran that has a lot of problems and economic issues and is almost isolated, getting in touch with the world and understanding technology and science is very important. It even can change the way many people are thinking about the culture differences, having restricted and limited opinions about different genders or patriarchy."*

She described the Internet advantages that how technology can empower women, to have more freedom in making decisions and in having a word: *"The new ideas can improve the current system , allowing people especially women to grow in the society, participate in the important issues more, work, have their own income and independency and their rights. Women can have more freedom in decision making, in having a word, in raising their children and in society. They can study, if they don't have time, they can study online, and they can learn different language, get familiar with the other nationalities and cultures and then transfer this information to other family member."*

Participant #3 believed: *"women in Iran are more informant and up-to-date than ever, regardless of all the economical and socio-cultural obstacles that limit them."* In addition, explained: *" Information Communication Technologies have enabled women to gain more knowledge and be more socially active and informed. They have provided men and women with an incredibly vast amount of information and news on different topics that are available to all groups of people with no discrimination. Nowadays, women are able to browse different web pages and acquire information they need in literally any field of interest from psychology to science, lifestyles, cuisine, and even philosophy."*

Participant #1 discussed that how Internet and technology can help women to see the inequality and use it to empower themselves and act against it: *"with having direct and indirect communication with the world, more discriminations and inequalities can be seen and it can empower women to have a voice and participate in the economy growth and make important decisions for themselves, their children and society."*

Based on each participant's point of view, the Internet penetration rate is almost the same and there is not a huge gap between genders in this regard, but, the reasons behind using Internet and online services are different.

Participant #2 argued that women are using the Internet more for networking than men: *"I do not see any difference in its usage between men and women in our society, but the reason of using it, is different. Usually women use it to chat, to use Facebook, Instagram more than men, and men use it more for work and jobs related to the IT."*

Participant #3 mentioned that not only Internet usage rate is almost equal between the genders, but also the ICTs possession is. *"Nowadays with the development of IT and communication technologies, the Internet's penetration rate has elevated beyond expectations. While in the old days few people possessed mobile phones and even fewer had access to internet, today almost all different groups of people regardless of their social class, economical status, educational level, and age group; not only have access to all the new enabling devices, but also are using internet on a daily basis."* Adding: *"I believe there is not much difference between men and women regarding internet usage. They almost equally possess the required devices (laptops, tablets, iPads, smartphones, etc.), have access to the internet, and have the incentives to use it."* She continued by explaining the different reasons of using the ICTs and Internet: *"They use it in different ways: women mostly use Internet to communicate and to gain some knowledge about lifestyles (applications like Telegram, Instagram, etc.), where men mostly use it to follow news and business related items."*

Participant #5 argued: *"We need it for different reasons for example usually people are using Internet for communication through different social network pages, sometimes they surf Internet to get to know about a special issue or to study about something, sometimes to keep themselves up-to-date or to read different news about the world's situation. I think everyone has almost the same portion of usage, in a family…"*

He added: *"The positive outcomes of using these technologies are higher than their disadvantages in general. Internet has changed the world faster than any other technology and many people around the world are online most of their time. People have learned to use them for upgrading their knowledge, regardless of the reasons behind it and this made an evolution in the society."*

Concept's Conclusion

- Accessibility and affordability are not major problems in the society, almost everyone has access to these technologies, but not usability
- Penetration rate between genders is almost equal and fair
- Internet and ICTs are changing people and their positive outcomes are more than their disadvantages
- Internet and ICTs have a positive influence on everyone, especially on women's life and can help to bridge digital gender gap and to empower women

At this stage, I tried to find out the reasons hindering women's access to or use of the ICTs and Internet. All participants had similar opinions. Interview question number 4 was related to this issue directly, participants had many discussions regarding the problems in the society. The importance of this subject came clear to me while everyone was talking about it, during the whole interview process.

4.1.2. Traditional and social norms favoring men are above all barriers women face in accessing digital technologies

Here participants argued about different obstacles women face on their way in accessing to and using technologies, mentioning still in some families' patriarchy governs and women's autonomy is a question, with all cultural and traditional norms that exist in the country.

Participant #1 explained how social norms and traditions can create different obstacles for women not only in having access to or using the ICTs and Internet, but to feel insecure to use them and how "men's word" should be obeyed based on the stereotypes and cultural norms: *"In a country like Iran, with its own beliefs and traditions, there are many issues, which I think, needs to be reviewed. The gender gap between men and women does exist, still in most of the families only men's word exist. Most of the women as long as living in their parents, they need to obey the father's choices and when they marry, it's the same only from father will change to their husbands. Government try to keep the society and communities as closest as possible, the latest example is blocking Telegram and calling it the reason of almost all of the country's problems!"*

Participant #3 added: *"our cultural values entail and encourage women to stay socially inactive and put all their energy in raising their kids and caring for their families"*

Participant #5 argued: *"except the access to and usage of the ICTs with most of the people, yes there are some men's rules in the society, stereotypes and norms, rooted from old and traditional families, made it easier for a government like the rulers we have now in Iran, to use them for their own benefits."*

All the participants agreed on the discriminations and inequalities based on the cultural and social norms, which give the right to men to control women. Society and cultural mindset, and government opinions about gender differences with relating them to Sharia and Islamic rules and affairs, which are all in favor of men, usually are the important barriers, which women faced and still are facing in the society.

Participant #1 talked about Islamic rules and restrictions: *"these family restrictions are all because of the society and cultural mindset and I can say unfortunately because of the government closed mind about Islamic rules and affairs."*

Participant #2 said: *"I should add the restrictions coming from the government usually by the name of Islamic rules, which in the 21st century ask women to obey their husbands and for going somewhere take the permission first, or men should know with home they are talking to or many other things."*

In addition, some talked about the insecurity women feel based on the cyberbullying, which based on their talks, almost all women faced it at least once.

Participant #1 said: *"The other issue is what we can call cyberbullying, which can be seen everywhere and I can say almost every woman in Iran experienced it at least once."*

Participant #2 added*: "Sexual and social harassments are a lot and all of us had a bad experience in this regards, before was outside at the streets, now in online, these even can create problems between the couples."*

Poor literacy, language or computer skills could hinder everyone especially women, to enter to the society. These obstacles can take their confidence in using the ICTs and Internet and being active, as they want to, in all social activities especially in technology world.

Participant #1 said: *"I should say even when they have none of the said problems, their poor English skills and also Internet and computer skills in many cases make huge problems for them."*

She added: *"All these kind of problems make some women feel insecure and embarrassed to use the Internet."*

Participant #2 argued: *"Still many people cannot talk or understand English or have very limited skills when it's coming to the language or computer skills."*

Participant #3 discussed how digital gap could create lack of confidence in women, when they do not have enough knowledge about computer skills and literacy: *"Capacity and skills: Women are not so confident or risk taking in dealing with technological devices. For example, they fear if they push this button the whole device will break down, so they just don't."*

They also discussed the poor network coverage and high prices as a problem for many families with lower income and the issue of censorship.

Participant #2 continued: *"Internet is very slow and in a low quality and expensive here. And the percentage of censorship is very high; you do not have access to many websites."*

Participant #5 argued: *"Government makes a lot of censorship and limiting Internet user's access to many sites and pages."*

Our male participant emphasized on the role men should play in bridging this gap and inequality.

Participant #5 said: *"it was a great pleasure and experience for me and a kind of reminder to feel the importance of this subject and also the role of us as men in removing this gap."*

Concept's Conclusion

- There are different barriers in women's way to succeed. From traditional patriarchy and socio-cultural norms to illiteracy or poor language and computer skills.
- Women's autonomy is still a question.
- All those inequalities and barriers can take women's confidence to try to participate in the society, have a voice and to feel equality.
- There are some issues related to the security or poor network coverage, and ICTs and Internet high price.

At this stage, we discussed about women in technology. Interview question number 3 was about education and work in STEM fields and why women are less willing to study and work in technology related and ICT fields. While all participants agreed on the discriminations and problems on their way in these fields, some showed their objection about the question itself.

4.1.3. Women are less in engineering and technology related education and careers

Here participants argued all reasons that women and girls cannot or do not choose to study or work in technology related, engineering and ICTs fields.

Participant #1 said: *"This is very obvious in our society that even when women want to study such topics the society won't allow them. There are many obstacles in the way of studying for women in these subjects and even when they do, there is very less job openings for them comparing to men. Even if they do, then there are many problems in the workplace, family issues and so on."*

Participant #2 explained that: *"at school many of my friends who were very good at math and physics and liked these fields were been advised by the parents, teacher not to study technical fields because there is no job for them and there are actually men's job!"…" or at the end women should stay at home and take care of their babies!"*

Participant #3 argued how she does not agree with this question by saying: *"I believe women would love to study these fields, to become experts, and have a job in the related area, but some external factors impede them."*

She added: *"it is mostly the external factors that either discourage or even stop women from following some studying STEM and become experts in them."*

Participant #5 said: "*I had many classmates and female friends who love technical fields, studied STEM fields and running to the marketplace to find a suitable job, though as a man I can accept, they have many problems specially after finding the job."*

Meanwhile he explained how the number of these women are increasing in the society positively: *"But their number are growing and they did not give up in pursuing their dreams, which is really good."*

Many factors have been discussed in the interviews, which are showing how women are struggling in finding a suitable job and remain in a technical job. All participants have mentioned discriminations at work place in recruitment, position, compensation and benefits, and the ways of treatment in general.

Participant #1 said: *"the last organization that I worked, there was discrimination and gender gap obviously, there was a huge difference between me and my male colleague in the treatment, acceptance, empowering and income, no need to say that I was the one who faced those inequalities."*

Participant #5 confirmed the problem: *"I as a man can say, it is not easy for women, especially in the technology area to work, though they are usually very smart."*

Between the participants, three of them faced those discriminations at work. They all described those problems as the reasons which make women's business life harder especially in the STEM fields and one of them decided to quit, one is working in a non-related field, while the other one is still struggling.

Participant #2 confirmed the problem with two stories: *"I have some friends who studied IT and work in totally different fields, and when I asked them, they told me because it is not easy for them to be in an office full of men who are thinking mostly that you do not belong to there, it's not about the manger or salary only."*

She continued: *"In my husband's office, he says that almost every woman's paid less comparing to her male colleagues even when they are equal in study background or position and usually higher positions are for men everywhere. He is a university professor too and always saying why women are less active in the tech. related careers and even when one can pass all the barriers and apply for a tech. position, how the policies, obligations, gender differences based on the board members points of view will force them to leave, usually by immediate instruction from a high member that this position will not accept female candidates."*

Participant #4 talked about the problems women usually face at work, especially after marriage: *"They can find jobs but even after finding it, one of women's problem is after*

getting married or having babies, which almost none of the companies agree to let women go earlier or come later. Nurseries for example are open only from 8 to 4 and office working hours usually are at least 8 to 5, imagine how they should manage to put the kids there and run to the office or after the working day."

She added: *"in the cases they have find the related job at the luckiest time, they will get almost ¾ of what male employees get, men can do overtime workings easily any time or travel to other places based on job requirements, but this is a huge problem for women, due to family duties. Technical jobs required usually these kinds of actions, which favors managers, that's why, they prefer in order to have less headaches and any problem, just recruit men and pay them extra, instead of being fair and understanding to the female employees."* And: *"at work there is still a huge gap and difference in the way employers treat people, in the way they pay them, recruit them and in the positions, obligations and allowances. I confirm that in our society even in the metropolis like Tehran or other large cities there is a huge difference and discrimination about women in society and work between."*

Concept's Conclusion

- STEM fields (science, technology, engineering and mathematics), is one of the areas that gender inequality can be seen and is affected by gender gap
- The reason of bringing this part separate was its importance for women, which is impacted by digital gender gap
- There are many obstacles for women and girls especially in these fields, from studying to finding desired job in the marketplace or looking for an academic career
- Also society, families and teachers in many ways stopping women by calling technology related fields as men dominant positions

Going to the next concept, I asked few questions from participants that how their organizations or society react in improving ICTs usage and against digital gender divide, in interview questions number 6 to 9. While they were talking about the advantages of using online services, they all mentioned that there are some changes in people's perspective, by the help of new technologies which many people especially new generation benefit from that. Emphasizing on these changes and their effects on women's empowerment led me to the forth concept about new generations in general and women's perception particularly regarding digital gender gap and the way to act against it.

4.1.4. New generations perceive digital gender divide more and act against it

Participants all discussed that by the help of technology, we can see a difference in many people's opinion and actions. Internet is changing people. By saying that society is created from them, therefore they can make a difference by changing themselves. They discussed the needs to believe in each other and the equality, to empower each other. Participants discuss how empowering women plays an important role in the economic growth and future of the country. They all confirmed that digital gender gap exists and it is not easy to end it up.

Participant #1 said:*" I think we should start from ourselves, it will not be easy at all, but women should believe in themselves, they should believe and accept that they are equal to men first, before they can change the others. Women should empower each other."*

She added: *"Women can play a very important role in the economic growth and future of the country."*

Participant #2 explained: *"When I believe in something, I will teach it to my children, students and so on. I need to believe in the equality by studying it, and believe that how it can change my life, my children's and many more. I should treat my daughter and son as the same. Society means us; we should change our closed tradition and cultural mind and try to step with the other people in the world. If we all try to do so, it means society will change and then government has to follow."*

Participant #4 argued: "As a result of this process, people especially women in Iran are more informant and up-to-date than ever, regardless of all the economical and socio-cultural obstacles that limit them. To be more specific, although our cultural values entail and encourage women to stay socially inactive and put all their energy in raising their kids and caring for their families, today women are more socially active: broadcasting their thoughts and beliefs in different social networks, working long hours out of their home, and more cognizant of their rights and abilities. They have the freedom to express themselves and do not keep quiet just because the social pressure the old cultural values put on them."

Participant #5 said: *"New generations are different."* Adding: *"New generation comparing to the old generation has more freedom to access and use technology in general, but it's all based on their parents new ideas and their more open mind, parents and people who had less skills and knowledge about technologies, who were illiterate even in their own mother tongues, women who had many restrictions in leaving the house and needed permissions from their male partner or parents."*

Participants argued that there are some doors open to women comparing to the past and previous generations and there are more freedom in choices and actions for women. Some participants discussed about the positive outcome of these changes that can be seen in some organizations too.

Participant #1 said*: "I think we should start from ourselves, it will not be easy at all, but women should believe in themselves, they should believe and accept that they are equal to men first, before they can change the others. Women should empower each other."*

She added: *"people's look to the subject is going to be changed, and it is good. Our generation comparing to the older ones have many freedoms, which were not easy to get, but valuable."*

She explained how a new look can make difference even in the organizations: *"people's look to the subject is going to be changed, and it is good. Our generation comparing to the older ones have many freedoms, which were not easy to get, but valuable."*

Participant #2 explained: *"Women and other people try to do it. There are many barriers on the way but many people's mind are changing, they talk about the reports, new technology in other countries and they feel the differences with the other side of the world. They use Internet a lot to communicate and inform each other about the latest news , governments wrong or right actions, president or ministers talks, even by sarcasm, but*

they do and these can help them to change, to try to be more fair. I read many articles or comments from male writers about being fair with women and empower and support them in reaching their needs."

Participant #3 argued: *"Recently with the advent of ICT and OTT applications that have enabled people to be more heard and more informed, different groups have started broadcasting contents on how to acquire some skills necessary to have a better life, to be more prosperous, and to fight inequalities: things like Telegram channels, Instagram pages, and different applications producing and broadcasting information about psychology, social skills, women rights, and so forth."*

Participant #4 said: *"In the new generations, almost literacy and skills in language and technical issues are the same in men and women."*

They also reminded the important role of women in the society and economy growth, adding how they resist against inequality.

Participant #1 said: *"Women can play a very important role in the economic growth and future of the country."* She added: *"*In *between, many people and specially women try to resist and talk about being fair, equal and…"*

Participant #2 argued: *"we try to empower the women and girls who are coming to us, having free talks about equality, differences and what everyone can do to close these gaps."*

Concept's Conclusion

- With the help of new ideas women can play an important role especially in economic growth and improvement
- New generations and women take this issue seriously and act against digital divide
- There are some doors open to women comparing to the previous generations and there are more freedom in choices and actions for women
- Women should believe in themselves and empower each other, believing in equality and act against inequalities

At the last stage, all participants emphasized on the needs that government and society should take action in empowering women, and fighting with digital gap, which all have been discussed through interview questions number 9 to 12. Earlier participants' also described the role of the government and society in widening gender gap, based on all these thoughts, the last concept has been created.

4.1.5. Government and society need to take an action

As the last concept, we discussed about the role that government and society can play to bridge gender gap and especially by the help of new technologies.

Participant #1 believed that: *"Society should work on its norms and obligations, many policies needs to be rewrite about gender differences and inequality.* Adding: *"Society needs to give them a way to show themselves and support them by providing more jobs to them. The cultural gap is what that needs to work on. The government should work to bridge the existed digital gap by empowering women and act against the violence against women and girls and encourage them to study in the related fields and also by having an easier and more accessible and cheaper Internet and ICT systems."* And: *"They should*

work hand in hand, study women's needs based on the global point of view and try to empower women, support and help them to have a voice."

Participant #2 in addition talked about patriarchy and how society needs to work on it: *"They should revise the mindset of patriarchy and this needs to be changed from schools."* She added: *"In a sentence to improve women in literacy and skills, work and education."*

Participant #3 said: *"Unfortunately, there is no governmental program dedicated to any of the mentioned groups regarding the encouragement of ICT and internet uses."*

Participants discussed that the policies and strategies must be revised after studying women's needs and government should develop gender-responsive strategies and policies. They explained many ways to improve the system to bridge the current gap and empower women accordingly.

Participant #1 said*: "Encourage women and girls in entering to the STEM fields more, give them the possibility to have a fair and equal treatment from the society and organizations, to participate more in social activities and value their actions. The government to add English as the obligatory lesson during the school and university, also teaching e-skills free of charge to everyone interested. This is the technology era and it will not be stopped in the world, so we need to try hard to close this gap internally first and then try to reach to the worldwide level."*

Participant #2 added: *"Having facilities to everyone and women and girls to study and to be well educated, make online services more safe for female generation, add ICT courses to the school subjects, reduce Internet costs."*

Participant #3 counted the ways to bridge the gap in this way: *"By providing equal opportunities in education and job, By designing and implementing different projects dedicated to empowerment of women (providing the good digital content, and to foster digital literacy in women), By initiating cultural reforms, By better regulations that are designed specifically to empower women."*

Participant #4 said: *"They invite technology specialists from around the world and let women to join to talks as men and be active as men and without any worries or obligations."*

Participant #5 described the requirements as this: *"By having more effective and relevant policies, upgrading society's knowledge by better understanding of the gender equality, by removing the restricted rules and norms, by empowering women in ICT field and encouraging them to study and make their careers more in STEM and specially ICT."* Adding: *"Government should study and address needs of women and support them and use digital tech and have them in decision making positions."*

Here also they talked about the impact and negative effects of the digital divide on everyone and especially on women.

Participant #4 said: *"Digital gap influenced everyone's life, especially women. Being far from the world, social restrictions & men's first all made women to feel embarrassed or to be forced not to be present in their own society and participate in decision makings, This affects them not only individually but also in all the responsibilities and actions they can take against the negative issues related to their community such as keeping them poor*

literate and far from reality, forcing them to stay at home and not joining the others, having no right to talk all making them poor and in a knowledge and economical poverty." She added: *"Digital divide will affects each person in the society, I'll give you some reasons: The people who usually have all the latest technology have a better standard of living, they are usually more successful, rich countries with having skilled people who know how to use these technology and these people will bring their skills to the workplace which will boost the income of the country, wealthiest people in the society use these technologies to make their businesses run more smoothly, they have lots of connections and a wide network mostly by the help of the Internet. Now if we look at our country with the huge gender gap, we will see how digital divide affects women lives negatively."*

Participant #5 described the subject as this: *"Digital gender gap forces and stops everyone and especially women from what they can do, who they are and how they can help the future generation and country. Digital gap is a big issue in many countries; I believe it affects everyone in the society and women more, because of the existence barriers and norms. The poor ability to manage knowledge or to innovate, ways towards development and growth and narrowing the differences between us and other societies especially economically are all the ways to lead us to the poverty. It is widening the skills and educational gaps, creating more and more discriminations between gender in the job market and participation in society and advance their knowledge. While overcoming digital gender gap, women can find themselves more active & progressive in their society, more informative to fight against poverty, biases and discriminations."*

Concept's Conclusion

- Government and society have an important role in bridging digital gender gap
- There is a need that government, society and organizations work together and take a serious action against this gap
- What was done is almost nothing
- Policies and strategies must be revised after studying women's needs and government should develop gender-responsive strategies and policies.
- Government should support women with addressing those barriers, and finding the ways to empower them
- Gender gap has negative effects in technology world
- Overcoming this gap can be a help to fight against poverty

In general, almost all participants had the same opinion about the positive effects of the ICTs and Internet on women's life, and the reasons behind the existing digital gap with calling traditional and socio-cultural norms as the main reason in creating this gender gap. When it came to the suggestions and the ways to bridge the gap, they approached many ways to do it, stressing that it will not be an easy task but everyone should take an action against it.

5. Discussion

In this chapter, a discussion is made about the core research findings in relation to the research questions. Findings will be critically examined in the light of the previous studies outlined in the background and literature review.

5.1. Discussion

In order to have the outcome of empirical findings and connect them with the research questions and thesis problem, I did the interpretation based on the data collected and the literature I reviewed and gathered earlier. Employing the qualitative critical approach gave me a deeper understanding of users' perspective. It examines particularly, the meaning and debates in association with the term critical, comparing and emphasizing notions and practices related to qualitative research and social analysis (Bhavnani, 2014).

In order to reply to the first research question, "*How does digital divide impact women's life in Iran?"*, I designed two sub-questions, which helped me to reach to the results easier by finding the correlation between research questions, empirical findings and supporting literature. The second research question is used to support the importance of digital gender divide and discuss the suggested potential ways to bridge this gap based on the current situation.

Concept 1 and 4 helped me in resolving the first sub-question. *How ICTs and Internet affect women's life?*
Concept 1: Usability and accessibility of ICTs and Internet

Concept 4: New generations perceive digital gender divide more and act against it.

According to the empirical finding, ICTs and Internet have changed positively many users' lives in Iran. E-services such as e-banking, e-health, e-government, and e-learning in addition to the other facilities provided by online services, all create easier ways of communication and engagement for everyone in their daily life. When it comes to a subject such as gender divide, which has old traditional roots in the society, using the new technologies can be the best and fastest way to bridge this gap. Using ICTs and Internet can improve people's life and work in many aspects. With a large amount of users around the world, it is obvious how accessing to the online services can help everyone in their personal and community activities and women are not exception here. The APC (2017) report also confirms this subject by describing that ICTs and Internet are the pervasive and affordable connectivity way, which disable users to benefit from them, participating in society and engaging with others for development and well-being.

In addition, results show that using ICTs and Internet have many advantages for women in Iran. They are more informant, wise and up-to-date in many subjects related to their personal life or their society and country and they have more freedom in their choices and decision-making. The more they interact with the online services and communicating with the others through Internet, the more they believe in their abilities, rights and their

portion in the economy growth and the future of their children. New technologies change many users' perspectives and they believe more in equality and empowering women. These changes can be seen everywhere, in family members and at work and society. ICTs offer women to have a voice, participate in the society and act against gender gap and poverty; these can be seen in the new generations. According to the participants, now comparing to the past, more women believe in themselves and try to stand against inequalities and insist on what they need, want to choose and on equal conditions with men in the society. These changes are not fast and easy, but people intend to do so. The outcome of society members' points of view can be seen in the new generations, who have more freedom in choice and action and according to OECD report (2018) this choice should be given to the women too. More people are familiar with the ICTs and Internet skills, which help them positively, they are encouraging their children to attend to the English courses and subjects related to the ICTs. Women study in one of the STEM fields and specially ICTs, and apply for the related jobs more than before. Based on findings and one of participants' thoughts, women should stand against inequality and pursue their dreams, then everyone will accept it, same as driving cars by women, which in the current time it is something normal but years ago, there was not many female driver and they faced many problems to get this right for themselves.

As results demonstrate and according to the literature, being connected to the Internet becomes a part of everyone's daily life. Many women are using Internet as a place to do a business or their social activities. Hilbert (2011) and APC report (2017) support this idea that ICTs are the irreplaceable tools for use and every day more people are joining to these technologies' users, enjoying online services for various activities such as education, work and business, and social engagement. Internet and ICTs have a direct correlation with women's success in business and society. Those offer new opportunities for development and empowerment in different fields such as education, environment and business (Hilbert, 2011).

Results demonstrate that women are using the Internet in many areas of their lives at both personal and professional levels. In general, women use the ICTs and Internet more than men use, and believe that these technologies have helped them in achieving self-satisfaction and empowerment. They use online services more for socialization and networking, to expand their social ties beyond family and their culture. They also use the Internet for studying and expanding their knowledge more than men do. However, high rates of accessibility do not imply necessarily high rates of usage (Antonio and Tuffley, 2014).

I used the two concepts from empirical findings, Concept 2 and 3 to reply the second sub-question. *What are the reasons behind digital gender divide?*

Concept 2: Traditional and social norms favoring men are above all barriers women face in accessing digital technologies.

Concept 3: Women are less in engineering and technology related education and careers.

Gender digital divide is one of the significant inequalities in the 21st century (Antonio and Tuffley, 2014). Prioritizing men for technology use, language issues, lack in skills and knowledge, literacy gap, technology gender-based violence, and low confidence in exploring technology are the main barriers that prevent women to have access to or using the Internet and ICTs. The idea of men having control on technology and information, and ICTs, as a domain of men's activity has been limited women's opportunity to learn access or benefit from these technologies and systems (Antonio and Tuffley, 2014).

According to the empirical finding, there are many reasons behind digital gender gap in Iran. Women's accessibility, affordability and literacy percentage differ in privileged and underprivileged regions. Gender gap is more noticeable in ICT professions and Dehghan and Rahiminezhad (2010) support this by defining how family traditional beliefs and privilege of having men over women in society, in addition to the civil laws are effective in widening the digital gender gap and give women less freedom in participation in the society, business and country's economy. Such gaps are mostly due to a number of non-technological and non-physical barriers. The current situation demonstrates that there is not a difference in the ICTs and Internet penetration rates between genders and almost everyone in the society have the possibility to access to or use digital technologies, but usually the ways women are using computers and Internet is different from men. To support this issue by literature, we have Popovich, et al. (2008) gender balance study that had the same outcome as this research study.

Evidences show a correlation between traditional and cultural norms, with digital gender divide. Still a persistent gender gap does exist, when it comes to the socio-cultural norms. Although almost everyone has the same portion in Internet usage but still many women struggle from existence norms. Social and traditional norms likely explain why actually women feel these barriers more. Results also show that these norms have been used against women, by the government, authorities and in labor market. The "male dominance" and "patriarchy" are the phrases used by participants to describe problems women face when engaging with these new technologies. Technologies are considered as men's territory and these kind of ideas limits women's opportunities to have access, use or benefit from technology. Melhem, et al. (2009), and Antonio and Tuffley (2014) studies are confirming this subject by adding that more autonomy of use, allow women to get more benefits from online services. Societal expectations and cultural norms can influence the possibility of having access to or using the ICTs and women's role, access to education, status, income and empowerment. These are keeping women away from being active in their society and in decision-making. Social and cultural norms hindering them to pursue their dreams when it is coming to the education and finding a job in the technical fields and specially ICTs (Antonio and Tuffley, 2014).

Based on the empirical finding, many women like to study and work in STEM fields, but the cultural norms stopping them or put many barriers on their way to succeed. Although women participation in the ICT-related professions is increased but still, there is a large gender gap among professionals in STEM fields, with having the least percentage in careers related to one of those fields. According to Dehghan and Rahiminezhad (2010) and Hilbert (2011) everyday, women are facing serious cultural, social and economic challenges that limit their usage or prevent their access to ICTs and to get any benefit from them. Based on a deep correlation between digital inequalities in ICTs and Internet usage with gender and pre-existing inequalities at a societal level, there

is a need in using Internet by women in order to remove the barriers which impede them to be present in the digital world (Hilbert, 201; Ono and Zavodny, 2007) Women's unfavorable conditions in education, employment and income are the reasons behind having less access to and use the ICTs and lack of those characteristics will affect ICTs usage negatively with increasing the digital gap. Antonio and Tuffley (2014) supporting this by adding that controlling these inequalities can lead to women's actively appearance and success as technology users.

As a result of the findings, many women in developing countries face gender-related discrimination more in comparison with their counterparts in developed countries. They are more likely to be unemployed or to have fewer opportunities in employment and education (Chadwick et al., 2013). There are many restrictions, policies and civil laws, which give women less freedom in participation in the society, business and country's economy. Domestic responsibilities, society's existent norms, traditional discriminations and women's unfavorable conditions related to employment, income and education, affect women negatively and create gender related stereotypes and inequalities especially at work and in the ICTs and technology field. Such process can be led to women's deprivation on the jobs and professions, which have been allocated to men. Hilbert (2011) and Sandys (2005) studies completing this discussion by adding gender discrimination have a negative impact on women in socio-economic or political empowerment, and in labor markets, which can be named as a hinder to women's education, training or business opportunities.

Results demonstrate also obtaining English competency, digital literacy and ICT skills are the areas that still many of the users, and especially women need improvement and practice. Although there is an improvement in accessibility and affordability between the ICTs and Internet users in Iran, but still language and computer skills remained unchanged (Shariati et al., 2017) and these are the areas which government and society must take an action. In addition, based on the findings, there is a need to act against online gender-based violence such as cyber-bullying through social media platforms, smartphones, emails and the Internet. The importance of this subject has been described in the APC (2017) report too.

With the help of the two above sub-questions, I could conclude the answer of the main research question here. "*How does digital divide impact women's life in Iran?"*

Digital gender divide has a negative impact on women's life. Pre-existing inequalities and gender gap, in addition to the discrepancies on women's way to use or access to the ICTs and Internet will worsen the situation for them. Fairness is something that is hidden when it comes to the gender gap, and this is more obvious in digital gender gap (OHCHR, 2018). According to the findings these problems, make women feel embarrassed and force them not to be active in the important issues related to themselves, everyone and their society. Their participation in decision-making is lessened and even when they try to get something, usually the results are not as they wish for. Results also show that digital gap have a negative effect on women's financial situation. New technologies make life easier and people who are facilitated with those technologies usually have a better standard of living. Digital gap is widening the skills and educational gap, creating more discrimination for women in the marketplace. Sandys (2005) and Davaki (2018) describe that one of the outcomes of the digital gap is the poverty. Women's poor ability to use and manage knowledge, also to access to the ways towards development and growth, in

order to bridge the differences between societies especially economically, are all the ways, which lead every society to the poverty. The report by UN (2018) confirms the important role of women in the industry, economic growth and in ICTs, towards a sustainable future, that needs to be recognized well as still there is a wide digital gap between men and women.

Accordingly, in every society first we need to know the reasons behind digital gender gap and their effects on genders in order to know how to reduce this gap. Here the potential for empowering women and bridging the digital gap is discussed by answering the second research question: *How can the existing digital gender gap be reduced?*
Concept 5- Government and society need to take an action, in addition to concept 4, helped me to finalize this part.

Based on McKinsey Global Institute (MGI, 2015) the subject of gender inequality is "a critical economic challenge" that should be come to the considerations and if women do not achieve their economic potential fully, it will have negative impact on the economy. The importance of gender equality, empowering women and ICTs and Internet's potential role as facilitators of sustainable development has been considered in United Nations' Sustainable Development Agenda for 2030 (UN, 2018).

Results demonstrate that in order to overcome the digital gender divide, we require actions form individuals, government and society. Although there are many benefits in bridging digital gender gap, yet government policies and implementation do not consider it as an important issue to take a clear action against it. APC's report (2017) confirming this important issue by describing that both society and government must take an action against technology gender based violence and inequalities.

Results show, in order to reduce digital inequalities, we need to educate and teach people, to understand their needs, know the equality and act against discrimination. In addition, to understand women's needs, develop their skills and confidence, invest in education and capacity-building initiatives, and implement digital projects to facilitate women in using ICTs. Here the importance of English language and e-skills should be considered in addition to the Internet and ICTs usage skills. Antonio and Tuffley (2014) and Shariati, et al. (2017) report show that around 90 percent of jobs require ICTs skills and most of Internet content is in English, and digital literacy and confidence improvement as the growth areas in gender inclusion, the importance of English competency and E-skills are all obvious.

Based on the empirical findings, cultural and traditional norms, patriarchy and male dominance fields are big barriers in women's empowerment. These norms still exist in Iranian society and have a deep influence on people's mindsets and are big challenges for many Iranian women. In addition, government and society use the existing laws and stereotypes in accordance to some sharia and Islamic thoughts to benefit the conditions against women's right. Women should understand gender equality concept better, they should believe in themselves and, government and society should take actions against these norms. Among the ways needed to be developed by government against digital gender divide Dehghan and Rahiminezhad (2010) and Shariati, et al. (2017) mention that government plays an important role here and in order to reduce the gap, they should assess strategies, policies and plans, and allocate budgets for gender equality considerations. There are many areas, which needs women's empowerment in rural areas, socio economic and business, training and education, and political issues. Sandys report (2005)

confirming this by saying ICTs provide many opportunities for women in different areas in order to bridge the gap, we need more female leaders. Results also demonstrate some other issues which society and government should take actions against them. They need to understand the important role of women in society and economic growth of the country by empowering women in general and particularly in ICTs and technology fields. Rowntree's study (2018) supports this by describing that governments need to involve women more in Technology sector and decision-making, as more women are needed in ICT field. Providing equal opportunities in education and work to women, treating them equal to men with supporting them, taking action against inequality and violence against women, and giving fair access to the users are included in the requirements towards bridging digital gender divide. Additional consideration needs about the problems related to the ICTs and Internet access such as high price of their facilities, poor network coverage, quality and capacity. Sandys (2005), Antonio and Tuffley (2014) and ITU (2016) researches are describing the importance of these subjects.

It is clear that there is a need for further engagement of public, private and multiple stakeholders, as well as all users and women themselves, in ways that they can overcome the identified barriers to empower women.

5.2. Discussion overview

Summarizing the outcome of empirical findings, literature support and the researcher's understanding here are the main issues to be noticed:

- Internet and ICTs have a positive effect on women and the more women interact with the technology and ICTs, the more they communicate with the world and participate in society, decision making and economic growth.
- There are many reasons behind digital gender divide and there is a direct correlation between digital gender divide and socio-cultural and traditional norms.
- Those norms and inequalities are widening the gap and hindering women's access and use of technologies and ICTs in education, business and work, and social activities.
- A male-dominated culture in Iran with having government's support, holds back women and usually social norms try to push them into traditional roles.
- Digital gender divide has a negative impact on women, by minimizing the gap, we can empower women and fight against inequalities and poverty.
- Women should believe in equality and themselves. New generations act against the inequalities and gender gap.
- Government and society's role are also important in bridging digital gender divide, by revising the policies and rules, understanding and addressing women's needs.

5.3. Reflections on the discussion

Based on the collected data from the articles, reports and interviews an outstanding result could be gathered showing the important role of ICTs in women's life and the outcomes of digital gender divide on the society and economic growth and the benefits of reducing

this gap in order to empower women. I could find the answers for my research questions through connecting the empirical findings with reviewed literature.

I would like to revisit the researcher's role, with emphasizing that my previous experience and knowledge might slightly affected on writing the interpretation of the data and discussion. I have experienced many problems related to the gender inequality and discriminations women encountered. Moreover, I could feel exactly what participants were talking about, how this subject can affect them negatively and how women empowerment is important to this society. Working on this research study was an advantage to me, letting me to gain more knowledge and learn about the interesting and important subject of digital gender divide in the Middle East region and especially in Iran.

6. Conclusion and Future Research

In this section, general conclusions about the research study, including what we have achieved in this master thesis are presented, followed by some ideas and suggestions for further research.

6.1. Conclusions

In digital gender divide theme ICTs are recognized in supporting gender equality and women's empowerment, but in many countries, women can access and use ICTs less than men do. Despite the potential benefits of women's role in the industry and economic growth and in ICTs, there is still a wide digital gap between women and men. In our study, traditional norms and socio-economic gender inequalities are exacerbating gender gap in Iran, with the norms favoring men. The people who have little or no access to the Internet, confront social and economic inequalities and the created digital gap separates society into the people who are able to take the advantages of the new ICTs, and the ones who are not, and in our case, women are among this group. Those discriminations make many problems for women in many aspects of their social life in education, employment and income as the main reasons of the inequalities in ICTs usage (Hilbert, 2011). Yet many governments do not consider the importance and benefits of correct ICTs penetration among their societies in their plans, to take serious actions against inequalities.

This study sought to answer the following research questions:

1. How does digital divide impact women's life in Iran?
    - How ICTs and Internet affect women's life?
    - What are the reasons behind digital gender divide?
2. How can the existing digital gender gap be reduced?

In this master thesis, the aim was to explore the existing situation in Iran regarding ICTs and Internet access and usage in order to identify the key factors and characteristics behind digital gender gap and their effects on women's life and to suggest improvements based on the empirical findings and evidences.

ICTs and Internet have a positive effect on women's life and their professional career. New technologies enable people to acquire new skills and knowledge, ensuring equal and fair access to the ICTs and Internet, which is apart from being a human right; it would also empower women in different aspects. The Internet and ICTs can support women's access to education and other social services, and contribute to their fair employment, economic independence, sense of equality, ability to participate in decision-making, and livelihoods sustainable development. However, in digital field, women's full potential in terms of social achievements, economic growth and human rights, is not yet possible due to persistent gender inequalities.

Digital Gender Divide is created by the inequalities and disparities in use of the ICTs and Internet between the genders, which according to the findings, socio-cultural stereotypes can worsen it. Although the Internet penetration is almost equal in both

gender, there are many factors yet need to bring to consideration. Issues related to digital gender divide are very important in terms of discussions in technology and information society. However, many governments particularly in developing countries such as Iran, give little consideration to this matter, in terms of taking adequate action for gender issues' inclusion in technology and ICT policies, strategies and plans for policymakers. Iranian society has still a male-dominated culture and in such a patriarchal society, having government's support, the dominant discourse is based on a power relationship that women's interest is lesser and subordinate to men. Women are held back by cultural and traditional beliefs, and social norms continuing to push them into traditional roles. Their low participation in the digital labor market is also a key challenge. Furthermore, there are other issues that needs consideration, building culture and awareness about literacy and digital skills competency, particularly amongst women are as such.

While digital gender gap affects women's life negatively, bridging it certainly will be a matter of fairness and opportunity for women. It is not an easy task, but, by understanding the right meaning of equality, everyone can act against it. New generation play an important role regarding to change the negative mindsets to the benefits of ICTs and technology usage by women. Everyone, including women, society and government can take positive steps towards bridging this gap. However, these conditions cannot guarantee women's transformative empowerment, enabling them to challenge all barriers such as dominant gender relations through equality in decision-making.

6.2. Research contribution

This research is a contribution to support previous studies about digital gender divide in the developing countries and especially in Iran. In previous articles, the key factors which impeding women from using or having access to the ICTs and Internet have been described, in addition to the ways to bridge this gap. The current work added on previous studies, by highlighting the characteristics they discussed earlier and examining this gap through participants' opinions. In this research, in addition, the positive role of the ICTs and Internet on women has been discussed, showing some positive changes in new generation and women's mindset, which can guide them to the empowerment, freedom to talk and persistence in pursuing their dreams. By the help of online services, women's contribution has increased in accepting more responsibilities, believe in equality, decision-making and taking actions towards the country's economic improvement and growth. In this thesis, government's little proportion in taking actions against gender gap has been studied and through our participants' lens who all were well educated, the outcomes of this problem has been discussed clearly. The findings of this research can be useful for further researches as there might be differences between people's point of view in different generations and in different regions. This research was focused on a specific age range in the capital of Iran, Tehran and the results are based on this group of people's opinions only. There might be some differences in the outcome of the other groups' findings, for example; there might be more pressure on women, from the traditional and cultural norms in access to and usage of the ICTs and Internet in more unprivileged or less educated groups of them.

6.3. Further research

Obviously, technology is changing rapidly and people, who are away from the opportunities brought by ICTs and online services, will face problems more and more. Still digital gender divide is considered as a new phenomenon in Iranian society; therefore, there are many aspects that researchers from different disciplines can choose as the main subject for their future studies. This thesis focused on the society in a large city like Tehran and participants' points of view were limited in this region, therefore studying the other regions and rural areas will be a very interesting field, especially because there are not many studies about digital gender divide in Iran. In addition, the main factors and characteristics, which increase the existing gap, is an interesting area to be studied. Empowering women and gender gap in Iran and Middle East could be also promising areas for future researches. These are all relevant to a more comprehensive understanding of the phenomena and in relation to this research thesis.

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Appendices

1. Appendix A: Informed Consent form

Informed Consent Form for Master Thesis

Title of Research: Digital gender gap and empowering women in the digital age (The possibility of making slight changes to the title is declared)

Researchers: Behshid Hosami, Master Program in Information Systems, Linnaeus University, Sweden, Bh222gq@student.lnu.se

Date of Research: July - September 2018

Purpose of Research

To explore the mobile and Internet operator's users' perceptions in using the ICTs and Internet services to acquire knowledge about the existing digital gender gap and the reasons behind it. At a later stage, the outcome of the research could be used to in order to suggest bridging the digital gap between genders and women empowerment.

What you will do in this research

In this interview session, you will be asked to participate in a discussion through Skype between you and the researcher where you will be given the opportunity to express your perceptions regarding the use and access to the ICTs in general and Internet, particularly by women and girls in Iran. The interview will be conducted in English. The duration will vary depending on your engagement in the discussion. However, it will not be more than 60 minutes.

Possible benefits

I, as researcher, will gain knowledge and understanding about the existing situation regarding your perceptions of the current gender gap in Iran, in technology and digital world. You, as the information system's user, could be indirectly benefited by learning ways to improve and empower women in the society and economic growth.

Possible risks or discomfort

I do not foresee any risks or discomforts of any kind from your participation in this research.

Confidentiality and Anonymity

I ensure that your identity will not be revealed or accessed by others besides the researcher and Master Thesis supervisor. Although the collected and interpreted data will be published and presented at the final seminar and they will be reported in aggregated form. Therefore, confidentiality and anonymity are ensured.

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Voluntary participation and withdrawal from the research

Your participation in the research is voluntary. Feel free to refuse answering any questions that you do not wish to answer. You may as well withdraw from the interview at any time or for any reason. The interview transcriptions will be sent to you for review and comments via email. You may request to withdraw during this stage but not later as the data is aggregated and prepared for publication. If you decide not to participate or you wish to withdraw, it will not have any influence on your relationship with us or Linnaeus University either now, or in the future. In case of your withdrawal, all collected data (written and recorded) will be destroyed immediately.

Questions

Please take your time to read this informed consent carefully to understand the information given to you. Do not hesitate to contact me if you have any more questions about your participation in this research. In case you would like to know more about this study, please contact me through email, Bh222gq@student.lnu.se

Consent

I have read about this research and I understood the nature of it. I consent to participate and to be audio-recorded during the interview. By signing this informed consent, I am not giving up my legal rights. My signature below indicates my consent.

*A copy of this Informed Consent Form will be sent to you for your record.

Signature of participant	Date
Signature of researcher, Behshid Hosami	Date

2. Appendix B: Interview Guide

Interview Guide

Opening and Welcome

Dear Participant, let me thank you first for accepting the invitation to participate in this interview. The research you have been invited is a master thesis research entitled "Digital gender gap and empowering women in the digital age". I hope that the informed consent form that you have received earlier by email, gave you an overview of the research topic, my role and aim of studying this subject and your participation.

Main Topic

Just to remind you, the main topics is about exploring users' perception on access to and use the ICTs and Internet services in order to acquire knowledge about the existing digital gender gap and the reasons behind it and suggest improvement and empowerment.

Interview findings

The results of this interview will be used solely for the purpose of the research. Your contribution will be shared only with my Master thesis supervisor and me. Your name will not be exposed during and after this research. I am thankful of receiving your signed informed consent form that allows me to conduct and audio-record this interview.

Interviewees' selection

You have been selected to participate in the research because of your knowledge and experience in having access to and use of ICTs, especially Internet on a daily basis for a long time-period, and your language and computer skills. Therefore, I believe that you could be a rich source of information for this research study.

Before we proceed, I will be happy to answer your questions, if there is any, about what I am going to do. Once again, let me thank you for offering your time and participating in this Skype interview**.**

Interview Questions

Please introduce yourself by stating your designation, education background and age.

1- Please specify the reasons of using ICTs and Internet between men and women in Iran in general. How do you see the Internet penetration between men & women? Why?

2- How does the ICTs in general and Internet particularly impact the lives of the people specially women in Iran?

3- According to the reports and researches, women are less willing to study STEM (science, technology, engineering and mathematics) and build a professional career based on them, why?

4- Please identify the main obstacles and barriers that women face in the society to access digital technologies.

5- How do you explain the digital gender differences at work and society?

6- How can we bridge the existing digital gender gap?

7- Please indicate if your company has set measurable targets for gender equality in access and use of digital technologies. What about the society?

8- Comparing 1 to 10 and one the weakest, how does society address the needs of women in terms of accessing and participating in digital technologies, including women and girls belonging to ethnic or linguistic minorities, those living in extreme poverty or of low income families, those living in rural or marginalized urban areas, elderly women etc.?

9- How does society encourage the development and use of digital technologies as a resource to empower women and girls to promote gender equality through ICTs? How does it support the creation of online content, applications and services that reflect women's needs and/or promote their rights? Please provide any relevant examples.

10- How does your organization try to expand equal access and enhance women's participation in digital technologies as users, designers, employees, decision makers, entrepreneurs, innovators and leaders? What about the society?

11- How should the society and organizations be productively engaged to bridge the gender digital divide and improve the online experience for women and girls? What are the responsibilities of all stakeholders, government and society in digital inclusion as a reality to insure the meaningful digital opportunities for everyone?

12- Is there anything else you would like to add?

Thank you very much for your valuable points and time.

3. Appendix C: Data Analysis Excel sheet (Table of the Codes)

No.	Code	Category	Concepts
1	Many people have access to the ICTs and Internet	Accessibility & Affordability	Usability and accessibility of ICTs and Internet
2	people use ICTs and Internet for different reasons and it is different between genders	Different reasons for using ICTs & Internet between genders	Usability and accessibility of ICTs and Internet
3	usage gap is reduced a lot and it's almost nothing.Society should treat people equal	Accessibility & Affordability	Usability and accessibility of ICTs and Internet
4	Using ICTs have many advantage. Related problems should be reviewed	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
5	Using ICTs have many advantage.It will empower women	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
6	In many places even women have more access to the Internet.	Accessibility & Affordability	Usability and accessibility of ICTs and Internet
7	people's opinion are changing. ICTs and SN open their eyes	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
8	people use ICTs and Internet for different reasons	Different reasons for using ICTs & Internet between genders	Usability and accessibility of ICTs and Internet
9	Women and men usually use Internet for different reasons	Different reasons for using ICTs & Internet between genders	Usability and accessibility of ICTs and Internet
10	Using ICTs have many advantage.	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
11	There are some changes in few organizations.people's opinion are changing	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
12	Using ICTs and Internet can close the gender gap.	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
13	Many people especially women are using Internet for doing business	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
14	people's opinion are changing.	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
15	Using ICTs have many advantage. people's opinion are changing. Life becomes easier.	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet
16	Using ICTs have many advantage. people's opinion are changing. New generations have more freedom	Advantage of using ICTs & Internet	Usability and accessibility of ICTs and Internet

17	Gender gap exists	many norms favoring men	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
18	Many women forced to obey men by families. Government does not help	Traditional norms & patriarchy against women	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
19	society and cultural mindsets are making many problems for women to access to or use the Internet	Traditional norms & patriarchy against women	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
20	Almost all women faced cyberbullying.	online violence against women	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
21	women feel unsecure and embarrassed to use the Internet for the problems they face	lack of digital literacy, skills or confidence	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
22	Sharia and Islamic rules are government's excuses in gender inequality	Using religion against women's freedom	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
23	People usually are illiterate or have poor literacy in language and computer skills	lack of digital literacy, skills or confidence	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
24	Women face many discriminations and inequality in their offices in treatment, acceptance, empowering and income	gender gap at work or society	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
25	Many women forced to obey men by families.	Traditional norms & patriarchy against women	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
26	People usually are illiterate or have poor literacy in language and computer skills.	lack of digital literacy, skills or confidence	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
27	Women's knowledge should be improved in literacy and skills, work and education	lack of digital literacy, skills or confidence	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
28	Men have an important role in removing the gap.	Men's role in gender equality	Traditional and social norms favoring men are above all barriers women face in accessing digital technologies
29	women have problems in studying STEM and also to find the related job	Study and work is not easy in STEM fields for women	Women are less in technology related and engineering education and career
30	Women face many discriminations and inequality in their offices in treatment, acceptance, empowering and income	gender gap at work or society	Women are less in technology related and engineering education and career
31	there are many intelligent women willing to study STEM & work in those fields	women's willingness in STEM fields	Women are less in technology related and engineering education and career
32	women have problems in studying STEM and also to find the related job or have many obstacles after finding a tech. Related job	Study and work is not easy in STEM fields for women	Women are less in technology related and engineering education and career
33	There are many discriminations between genders at work	gender gap at work or society	Women are less in technology related and engineering education and career

34	Digital gap stops women from being active in society.	gender gap at work or society	Women are less in technology related and engineering education and career
35	Gender gap exists	gender gap at work or society	Women are less in technology related and engineering education and career
36	women try to resist and talk about equality	women's action against inequality	New generation perceives digital gender divide more and acts against it
37	Women should empower themselves	women's action against inequality	New generation perceives digital gender divide more and acts against it
38	people's opinion are changing. New generations have more freedom	Less gender inequality in new generation	New generation perceives digital gender divide more and acts against it
39	people's opinion are changing. New generations have more freedom	Less gender inequality in new generation	New generation perceives digital gender divide more and acts against it
40	Women can play an important role in the economic growth and future of the country	Women's role in society	New generation perceives digital gender divide more and acts against it
41	People usually are illiterate or have poor literacy in language and computer skills. women attracted less to study STEM	lack of digital literacy, skills or confidence	New generation perceives digital gender divide more and acts against it
42	Using ICTs have many advantage. people's opinion are changing. New generations have more freedom	Less gender inequality in new generation	New generation perceives digital gender divide more and acts against it
43	Women should be improved in literacy and skills, work and education. New generations have more freedom.	Less gender inequality in new generation	New generation perceives digital gender divide more and acts against it
44	New generations have more freedom	Less gender inequality in new generation	New generation perceives digital gender divide more and acts against it
45	Internet fees are high and quality is low	Actions government must take	Government and society need to take an action
46	society needs to work on its norms and write new policies about gender gap	Actions government must take	Government and society need to take an action
47	Nothing is done by society or companies regarding equality or against gender gap	Actions government must take	Government and society need to take an action
48	Government acts very weak about gender equality. Government talks about digital gap between urban and rural areas.	Actions government must take	Government and society need to take an action
49	Government talks about digital gap between urban and rural areas. ICT Ministry talks about bridging digital gap	Actions government must take	Government and society need to take an action
50	Government and organizations should know women's needs and empower them	Actions government must take	Government and society need to take an action
51	People should learn English and ICTs skills at schools	Actions government must take	Government and society need to take an action
52	Poor literacy is a poverty	Actions government must take	Government and society need to take an action
53	Women should be improved in literacy and skills, work and education	Actions government must take	Government and society need to take an action
54	Government acts very weak about gender equality.	Actions government must take	Government and society need to take an action

55	Government should revise their mindset.patriarchy mindset should be revised and it should start from schools	Actions government must take	Government and society need to take an action
56	Government should revise their mindset.More facilities to learn technology	Actions government must take	Government and society need to take an action
57	Government should revise their mindset.More facilities to learn technology	Actions government must take	Government and society need to take an action
58	Government should revise their mindset.patriarchy mindset should be revised	Actions government must take	Government and society need to take an action
59	Gender gap exists	Actions government must take	Government and society need to take an action
60	Government limited people's access to the Internt	Actions government must take	Government and society need to take an action
61	Bridging gap should start now.	Actions government must take	government and society need to take an action