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Exploring the Impact of Digital Technology on Women's Employment in Saudi Arabia

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By

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Abstract

Digital technology is revolutionising employment, creating new job opportunities while disrupting traditional occupations. Few studies, however, have examined the impact of technology on women's employment in developing countries. There is a scarcity of literature on employment opportunities arising from the digitalization of economies for women in Arab countries, especially in Saudi Arabia, from the leadership perspective. Hence, the aim of this study is to focus on exploring the impact of digital technologies on the employment opportunities in digital technologies for women of Saudi Arabia, where the unique political, social and economic characteristics of the state compound may contribute to employment opportunities and barriers against the successful participation of Saudi women in the labour market. This study explores the perspectives of leaders working in the government, businesses and the academic institutions about the employment opportunities created by digital technologies in the Saudi labour market for women.

This study has adopted a methodology based on the structuration theory to explore the complexity involved in the subject matter which warranted the selection of participants from three key social structures: government, businesses and academic institutions and the results of semi-structured interviews with 40 participants (13-14 participants from each group) guided the researcher to derive important findings presented in this study. The afore-mentioned three groups were selected based on their overwhelming role in shaping and implementing the digital technologies in the emerging Saudi economy. Additionally, participants at leadership positions from the respective groups including both men and women were included as participants in this study, so that an in-depth insight into employment opportunities for Saudi women could be gained to highlight not only the employment opportunities but also the potential barriers in the ways of Saudi women in exploiting the employment opportunities if they do exist as a result of digitalization of Saudi economy. Importantly, leaderships from the included three groups included in this study are supposed to decide whether Saudi women need to be integrated in the labour market, which justifies the selection of participants occupying the leadership positions in business, academia and government and involved in digitalization of Saudi society and economy were included in this study. Thematic analysis was adopted to analyse the qualitative data, while the interpretation of data was done using the theoretical insights from the structuration theory.

Based on the data presented in this study, the social structures of the Saudi society were theorized to play an important role in enhancing or hindering the Saudi women's participation in the labour market created by digital technologies. Participants believed that there are employment opportunities for Saudi women in different areas of digital technologies such as graphics, entrepreneurships, online businesses, e-marketing, robotics and artificial intelligence. It was found that Saudi government has introduced several affirmative action programmes for women in collaboration with academic institutions and businesses for training and educating Saudi women in digital technologies. This study found evidence supporting the widespread use of social media

as a marketing tool for home-based businesses, which could enable employment in digital technologies. The academic institutions in collaboration with businesses were found to be engaged in training women in digital technologies at vocational level, so that participation of Saudi women in digital technologies-assisted labour market could be made successful. The result showed some of the socio-cultural and structural levels barriers for a successful participation of Saudi women in the digital technologies-mediated labour market in Saudi Arabia. Among other obstacles that were identified involved the inadequacy of the educational curriculum for girls, particularly in science and engineering and technology-related disciplines. The finding of this study also revealed that career options were limited; family and community pressures and stereotypical attitude towards Saudi women's employment in digital technologies. The lack of separate working environment, childcare facilities at organizations could limit participation of Saudi women in the labour market created by digital technologies. Moreover, the lack of transport facilities for female workers were identified to be some other barriers.

This study has implications for governmental bodies endeavouring to foster the equal employment, education and training opportunities for Saudi women. The outcomes of this study could inform government of the potential socio-cultural and structural issues which could prevent the successful participation of Saudi women in the national economy and society productively. The results of study contributed to the practice by presenting the Women-Employment in Digital Technologies Promoting Structuration (WEDTPS) theory which was informed by the findings of this study.

The data from this study did not show the views of women aspiring to participate in the labour market generated by digital technologies, which may provide some additional insight into the women's positions on the utility of current training and skills programs arranged by social structures in terms of increasing the employment opportunities for women. This study does not specify or focus on particular type(s) of digital technologies; variations in terms of implementation and emphasis of industries on different digital technologies may affect the employment opportunities for Saudi women in different ways. This may limit the generalizability of outcomes of this study to a particular digital technology.

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Dedication

This thesis is dedicated to my lovely son Khalid Al-Talhi who has been by my side every step of the way in the struggle to reach this goal. I hope that he has a happy and successful life and a bright future.

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Abbreviations

BPTI	Badir Office - Badir Program for Technology Incubators
CCTV	Closed Circuit Television
CDSI	Central Department of Statistics and Information
CITC	Communications and Information Technology Commission
CNAP	Cisco Networking Academy Program
CRM	Customer Relationship Management
CS	Computer Science
CT	Communication Technology
DT	Digital Technology
ERP	Enterprise Resources Planning
ESA	European Space Agency
EU	Effat University (Private)
FDI	Foreign Direct Investment
GDP	Gross Domestic Product.
HRDF	Human Resources Development Fund
HRM	Human Resource Management
IBM	Information Business Management
ICT	Information Communication Technology
ICT (2)	Institute of Computer Training
IT	Information Technology
ITU	International Telecommunication Union
IWBs	Interactive White Boards
MC	Ministry of Commerce
MCS	Ministry of Civil Service
ME	Ministry of Education
MH	Ministry of Health
ML	Ministry of Labour (sic)
MOOCs	Massive Open Online Course
MSA	Ministry of Social Affairs
NASA	National Aeronautics and Space Administration
NCEDL	National Centre for E-Learning and Distance Learning
OECD	Organization for Economic Cooperation and Development
p.b.u.h.	Peace Be Upon Him.
PIAAC	Programme for the International Assessment of Adult Competencies
PNAU	Princess Norah Bint Abdulrahman University
PT	Public Training
PTO	Public Training Office
SAGIA	Saudi Arabia General Investment Authority
SCOT	Social Construction of Technology
SEU	Saudi Electronic University
SME	Small and Medium Enterprises
SS	Secondary School
STEM	Science, Technology, Engineering, Math
T4EDU	Tatweer Project for Educational Services
TAQAT	The National Labor(sic) Gateway
TC	Technical College
TU	Taif University
TVTC	Technical and Vocational Training Corporation
UK	United Kingdom

UNDP	United Nations Development Programme
USA	United States of America
UNSECAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational and Scientific and Cultural Organization
UNO	United Nations Organization
USAID	U.S Agency for International Development
VET	Vocational Education and Training
WEDTPS	Women-Employment in Digital Technologies Promoting Structuration

PART I: OVERVIEW OF THE RESEARCH

Chapter 1: Setting Out the Research Context

1.1 Introduction

This research examines the impact of digital technology on women's employment in the Kingdom of Saudi Arabia (KSA). This topic is currently of great significance and interest because of the dramatic technology-driven changes that are taking place worldwide. This is particularly the case in Saudi Arabia, where technology is being promoted by the Saudi government as cornerstone of economic development. According to Van Besselaar (1997), the digital age is transforming employment. Human resource managers are concerned to recruit the people with digital skills and knowledge rather than the ones with experience in manual handling processes, a symptom of automation and digitalization of workplaces (Sabbagh et al., 2012). These changes have resulted in the creation of job opportunities for both men and women, and several researchers view the digital age as providing opportunities to increase women's participation in the labour market (Nakafeero et al., 2013; Perez Perez et al., 2004: Raja et al., 2013). However, Iglesias Fernández et al (2010) argue that such a possibility will not be automatic but rather it will require a range of measures taken at a policy level by developed and developing states designed to bridge the 'digital divide' between men and women. Hence, the participation and accessibility to the digital training and education is considered a key factor in empowering women via digital technologies, which may be affected by the cultural and social-economic norms of societies (Davaki et al., 2018). The women in developed economies may benefit more from the proliferation of digital technologies rather than ones in developing economies where they are supposed to assume the role of household wife (Yuen et al., 2014). The socio-religious norm is another prevailing factor which can affect the utilization of opportunities created by digital technologies for women (see section 2.6)

Ramilo and Cinco (2005) argue that there are several actors in the society such as government, policy-makers, educational institutions, employers and non-government organisations (NGOs) working for women equality, which shape the ways women may harvest opportunities generated by digital technologies. The information and communication technologies, according to Razavi and Qayum (2016), can level the playing field and open up new job opportunities and creativity for women. Indeed, occupations such as administration and clerical services, traditionally women's roles, have been radically changed or replaced by technology (West, 2015).

Although the Western world offers women a range of entry-level jobs in the service sector, but in the case of Saudi Arabia, such opportunities are only at the developmental stage. The KSA's government's aim of economic development through the development of ICT-based economic and social infrastructure may offer a wide range of job opportunities for women with ICT skills (Alshumairi et al., 2017; Abdulgahni et al., 2014). There are some challenges in the way of realization of goal of increasing the women's economic empowerment. The main challenge lies at the level of acceptance of society for allowing the work for women. The social institutions' support for women's work in the conservative societies such as Saudi Arabia can serve as a major barrier in the way of women's employment. Cornwall (2016) developed a model for women's economic empowerment in the developed countries, and described that the lack of support from the government, academic institutions and the employers could be a big barrier in increasing the women's equality at workplaces. Wirtschafter and Rafai (2018) argue that despite changes favourable at the political level for women's participation in the labour market, women might still face barriers at the social level for grapping job opportunities created by the ICTs's growth in the KSA. For example, women might face stereotypic behaviour of families and employers in the male-dominated society of the KSA.

Therefore, it is important to gain knowledge of how the participants experience the impact of ICT's proliferation on women employment in Saudi Arabia. The proliferation of digital technologies in Saudi Arabia, as part of Vision 2030, is transforming the medical, engineering

and technology-related professions due to penetration of digital technologies at large scale in Saudi economy and labour market. This is expected to disrupt the career opportunities available for male and female in Saudi Arabia, it would be interesting to explore the impact of digitalization on women's employment.

In IMFBlog, Dabla-Norris and Kochhar (2018) reported that technological advances are more likely to increase the gender gap in the labour market. They showed that women would be at higher risk of losing jobs or receiving less wages in the industries executing the automation of jobs. Dabla-Norris and Kochhar (2018) further highlighted bright spots for women in both developing and developed world as a result of technological changes in the fields which are predominately dependent on the women such as social services, health sector and education. This is because of the fact that education, health and social services sectors require interpersonal skills, computing knowledge and cognitive skills, which can be demonstrated by female workers comparable to male workforce.

Therefore, I would agree to Dabla-Norris and Kochhar (2018) that female workers can exploit the job openings created by technological advances if policy-makers in governments and education are well-prepared to equip women with knowledge and skills required for jobs in information and communication technologies. For example, women in France were able to grab the technology-related jobs due to portable individual learning programs, which help female workers to acquire the skills and knowledge necessary for competing for the technology-related jobs in tech-dependent SMEs. Similarly, Netherlands encouraged industries to train women workers for gaining higher positions in high-tech jobs through tax deductions scheme. The USA encouraged the entry of women workers in the scientific fields through "Girls Who Code" program. Similar measures can be taken by government in Saudi Arabia to train and educate Saudi women pursuing the careers in digital technologies. Currently, there is a lack of literature on programs and measures implemented by Saudi government in collaboration with businesses and academic institutions for training and educating women purely for the sake of increasing

their participation in the labour market, though there is much rhetoric limited to paperwork from the government to prepare inclusive workforce in digital technologies to boost the Saudi economy through proliferation of digital technologies. An in-depth insight into perceptions of government-based leadership dealing with market forces, employers in the market and the academic institutions most likely reveal the true mind-sets about the potential of increasing the participation of Saudi women in the labour market created by proliferation of digital technologies.

Like the developed world, the developing world has started adopting the digital technology for economic and social development; especially Saudi Arabia has included the development and adoption of ICTs for triggering the economic development (Neffati and Gouidar, 2019). ICTs are being introduced in almost all disciplines as part of the Vision 2030 which aims to achieve the economic technology through harnessing of the state-of-the-art digital technologies in the education, energy exploration and reformation of the industries in the country (INSIGHT, 2016). Ministry of Municipal and Rural Affairs emphasized the involvement of women and men on equal basis to play an active role in the use of leading digital technologies for converting the Saudi cities into Smart cities (Nurrunabi, 2017). KSA has already pledged the huge investment of $500 billion in order to modernize the ICT infrastructure in 285 municipalities (Khan, 2016).

The KSA's government in Vision 2030 stated the support for the wider-use of HR management systems for recruitment, training and management of employees, data-sharing applications for sharing information between government and private partners, mobile applications for communications and cloud applications for data storage (Nurrunnabi, 2017; Alshuwaikhat and Mohammed, 2017). These political measures are reported to create job opportunities along with social reformation including the active participation of women in education, social and health-care sectors in Saudi Arabia (Khan, 2016). In the Defence Industry, KSA's government signed a deal with Lockheed Martin Company for transferring the defence related digital technologies to

the local defence industry. The government officials state that the defence deal with the Lockheed Martin will directly contribute to opening thousands of job opportunities for male and female workers in Saudi Arabia. Small and medium enterprises (SME) contribute only 20% of GDP in KSA, while they yield 70% of GDP in the developed world (Hussain, 2018; Alkhoraif and McLaughlin, 2018). The government has established SME Authority which will deal with young entrepreneurs including women to market their digital technology-related ideas for promoting the growth of social, health and education sectors, develop training institutions for delivering specialized knowledge and skills to conduct businesses using the state-of-the-art digital technologies (Khashan, 2017; Hussain, 2018). The government is planning to extend 20% of funding to youth by 2030, which will enable them to develop their own hi-tech SMEs, which will create job openings for young entrepreneurs in KSA (Alshuwaikhat and Mohammed, 2017).

According to UN estimates' (UN Report on Women and Work, 2017), women participation in the ICT-related employment has increased since 2009 in both developing and developing countries. The report further provided some data regarding the women's employment prospects in the ICT sector in the future in the USA, for instance, it was reported that future employment market will create 90% ICT-jobs in the market in various professions (e.g. high-tech companies, engineering, medical services) which requires information tools and communication infrastructure for achieving of business objectives (UN Report on Women and Work, 2017). These UN reported data highlight the potential of digital technologies in creating the job opportunities for women in the digital technologies-dependent organizations. As the proliferation of digital technologies is also mediated in the Saudi society through various government-sponsored initiatives such as Saudi Vision 2030, which predicts the employment opportunities for Saudi women in the labour market. Are the Saudi women ready to exploit such opportunities? Are there any supportive mechanisms developed by relevant stakeholders such as government, educational institutions and businesses such as training programs for Saudi women

to enable their participation in job opportunities created by digital technologies. These questions are yet to be answered. Therefore, this research work endeavours to investigate the potential of digital technologies proliferating in Saudi society in increasing employment opportunities for Saudi women.

Several researchers contend that there are barriers to women in pursuing the careers in ICTs-related jobs which might include biases in recruitment and evaluation process, gender-science stereotypes, the lack of access to flexible working hours, imbalances in work-life policies (Davaki, 2018; UN Report on Women and Work; Eyben and Napier-Moore, 2009). These barriers will be detailed in (Chapter 2, section 2.6) Careers in digital technologies).

Porter (2013) pointed to the fact that barriers and opportunities offered by digital technologies such as information and communication technologies vary from region to region, which means that outcomes of studies focussing on relationship between women employability and digital technologies in western and developed world cannot be extrapolated to women in the developing countries in the Middle East where women are under-represented in ICT-related field and Science, Technology, Engineering and Mathematics (STEM). Also, there is dearth of research that emphasise on how women's economic empowerment can be mediated as a result of digitalization of Saudi society and economy, what measures are being installed or planned to increase women's participation in the labour market, and what kind of uncertainties or challenges are faced by women to negotiate their access to the labour market.

The women's participation in the labour market for increasing their independence and self-reliance is often termed as economic empowerment, while the freedom for expression of thoughts is termed as social empowerment (Buvinic and Furst-Nichols, 2016). The latter is out of scope of this thesis, and I will focus on the economic empowerment of Saudi women in the Saudi society. The feminist researchers have emphasized that empowerment of women cannot be achieved unless the deep understanding about the power relationships between institutions responsible for asserting the 'control over material assets, intellectual resources and ideology' is

achieved (Baltiwala, 1994, p. 129). Several researchers have asserted that state institutions and organizations which are involved in distribution of knowledge, power-sharing and economic stability of the countries are direct stakeholders in the process of controlling the employment mechanisms for women (Khan, 2014; Cornwall, 2016; Buvinic and Furst-Nichols, 2016). The feminist researchers argued that State's control over the curricula and delivery of the necessary knowledge and skills to women is an important factor which determine whether they can qualify for the participation in the labour market (Baltiwala, 1993). Hence, the government institutions controlling the labour market and regulating employment policies in Saudi Arabia are mainstream stakeholders in the regulation of women's employment in the digital era ushered in Saudi Arabia since 2000.

Feminine researchers theorize that a large-scale mobilization of political forces can play a vital role in paving the ground for the success of women's employment in any social setup; for instance, legislation at the level of labour market, campaigning for socio-cultural changes in favour of women's employment in conservative societies such as Saudi Arabia, and provision of right training and education to women can be taken as starting steps for improving women's' employment prospects in the given labour market (Kabeer, 2014; Sen, 1997; Rowlands, 1997). Hence, applying these steps to the context of Saudi Arabia, it can be argued that Ministry of Education and the Ministry of Labour can be considered as important stakeholders for increasing employment prospects for women in Saudi Arabia. The women's access over the intellectual resources comes under the direct purview of the academic institutions which are directly or indirectly regulated by the powers residing within the state structures (Cornwall, 2016). This places academic institutions in the central position in considering the prospects for employment for women as part of economic empowerment's movement.

Rowlands (1997), another proponent, that real empowerment of women within a particular social-cultural set-up "must also include the processes that lead people (women) to perceive themselves as able and entitled to occupy.... decision-making space. So that the people affected

come to see themselves as having the capacity and the right to act and have influence" (Rowlands, 1996, p. 87). The arguments of Rowlands can be conceptualized in the context of understanding employment opportunities for women in the Saudi socio-cultural setting if the beliefs and values prevalent for the status of women at the organizational levels such as state institutions academic institutions and business organizations are flexible enough in giving more space to women in the labour market. The entitlement of space and right to act and influence for women within socio-cultural system is always coupled with economic empowerment of women.

Furthermore, the women's economic empowerment can be realized in the modern times through the increased exploitation of women in the employment opportunities created by the digital technologies. Khan (2014) argue that digital technologies offer leverage to the enhancement of women's economic empowerment if labour market is properly regulated with the goal of providing right and space to the women. Simultaneously, the careless approach on behalf of state institutions towards manipulating the digital resources can cast an unpleasant repercussion on the employment prospects for women resulting from the digital technologies. For instance, business organizations and academic institutions focussing on the skills development for men rather than women can create dynamics of internalized oppression leading to social inequalities and reducing the women's capabilities to utilize the employment opportunities resulting from the digital technologies (Suwana, 2017).

Therefore, Cornwall (2016) quoted Heinsohn and Somma who accentuated the centrality of the 'assets; and opportunity structures' for achieving the empowerment for women in this way: "Empowerment is the process of enhancing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes. Central to this process are actions which both build individual and collective assets and improve the efficiency and fairness of the organizational and institutional context which govern the use of these assets" (p. 345).

In other words, the capacity of women for joining and /or continuing the employment in the digital technology related skills and competencies largely depends on the capacity building mechanisms available for women within the formal institutions such as government institutions, academic institutions and business organizations (Batliwala, 1993). Moreover, fairness of institutions and organizations governing the management of knowledge and skills-related intellectual assets is critically important for assessing the efforts for increasing the employment opportunities for women (Batliwala, 1994; Andrea, 2016). Simultaneously, it is equally difficult to ascertain the fairness of an organization or an institution in terms of allocating the right and space to the digitally skilled women in the labour market unless the researchers employ the methodological tools which qualitatively gathers the deep insights into the beliefs and values of people involved in regulating the delivery of knowledge and skills of women in the digital technologies (Cornwall, 2016; Buvinic and Furst-Nichols, 2016), This mandates the application of qualitative approaches rather than quantitative in order to gain the deep insight into the perceptions of academic, business, and government groups regulating the delivery of knowledge and skills of Saudi women (Cueva Beteta, 2006).

Supporting the arguments of Rowlands (1997); many feminist researchers also upheld the handy knowledge of the perceptions of three important stakeholders affecting the employment opportunities for women as a result of digitalization of society: government institutions, academic institutions and business organizations (Cornwall, 2016; Buvinic and Furst-Nicholos, 2016). They further argue that government institutions are responsible for regulating the formal laws and policies governing the dynamics of the labour market such as the Ministry of Labour, while the academic institutions and business organizations controlling the women's access to resources and opportunities such as educational bodies and business groups implicated in developing digital skills and competencies.

Taken together these data suggest employment opportunities for women or concept of economic empowerment of women need to be dealt with careful approach towards locating stakeholders in

the relevant processes and collecting their perceptions in relation to the right and space for women in the labour market. The theorists have emphasized the role of government bodies, academic institutions and business organizations in developing and strengthening the skills development programs for women leading to increasing their capabilities in the labour market created by the digitalization of society (Mahnkopf, 2017; Antonio and Tuffley, 2014). Therefore, I have focussed on ascertaining the prevalent perceptions cherished by the formal institutional structures (e.g. government organizations, businesses and academic institutions) in relation to women's participation in the labour market created by digitalization of Saudi society. Therefore, the current research project intends to address the following research question: what are the perceptions of participants involved in developing, regulating and controlling digitalization and employment in digital technologies-related policies in their relevant organizations about impact of digital technologies on women's employment in Saudi Arabia?

1.2 Statement of Research Problem

Saudi Arabia's economy is considered to be oil-dependent economy. However, the increasing competition of oil prices and fluctuations in the demand-supply production of petroleum products initiated by the USA and Russia has greatly influenced the future role of oil sale in boosting the national economy (Khan, 2016). This situation made the government authorities and economists in Saudi Arabia to rethink of strategies aiming to bolster the national economy, and one of the key strategies was to develop and proliferate the digital technologies for supporting operations and functions related to government, education and commerce (Khashan, 2017). The examples of applications of digital technologies in different domains of the society may include e-government, e-learning, and e-commerce. The digitalization of society requires the continuous supply of the labour force having competency in digital competencies and skills to the run the digital technologies-dependent operation in all three sectors: government, education and business (Muzafar and Jhanjhi, 2020).

The major issue is the gender inequality in the Saudi labour market; women's participation in the businesses and the employments within public and private sectors is very low compared to other Gulf countries (INSIGHT, 2016). This situation can threaten the government plan to boost the economy through increasing the gender equality in the labour market. The equal contributions from male and female citizens can help wean Saudi Arabia off the oil-dependence for generating the revenues.

The proliferation of digital technologies within Saudi Arabia provides a hope for policy makers and other relevant stakeholders to increase the women's participation in the labour market, thereby reducing the gender gap in the companies which are dependent on digital technologies for the business operations (Al-Roubaie., 2018). The existing literature has highlighted the potential of digital technologies in providing the employment opportunities for male and female on equal basis. For example, there is a report published by European Commission on "Digital Skills in the Workplace" which has highlighted the creation of jobs as a result of digitalization of economies and societies (European Commission Report, 2017). The report further showed that digitalization has transformed jobs in science, engineering, agriculture and manufacturing sectors, which have caused the loss of jobs either due to the lack of skills on behalf of employees, or simply the replacement of human capital with the digital technologies. A report issued by Urban Institute claimed that millions of jobs will be created and millions of jobs will be lost as a result of new technologies such as IT and advanced robotics (Urban Institute Report, 2018).

Though the afore-cited data from Urban Institute and European Commission raise the probability of employment opportunities in digital technologies for women globally, but there is no empirical data to show as to how this would happen. Employment opportunities in digital technologies for women are context-specific and may vary depending on variations in mind-sets of employers, government-based policy-makers' initiatives in changing the workplace settings and social perceptions and extent of participation of academic institutions in the whole process

of educating women to take up employments in digital technologies. Therefore, there is a need to explore what the stakeholders involved in digitalization, employment and skilling of women perceive about the employment opportunities of women in the labour market resulting from the proliferation of digital technologies.

Moreover, the claims made by foregoing reports were also supported by a survey on the disruptive technologies published by McKinsey Global Institute, which showed that 12 disruptive technologies including IT (internet of things), mobile internet, Cloud, Advanced robotics, Next-generation genomics, 3-D printing, advanced materials, renewable energy, automation of knowledge work, advanced oil and gas exploration and recovery, autonomous and vehicles have become the precursor to generate new job opportunities which can equally benefit male and female workers. The economic impact of these technologies has recorded to be 14 trillion dollars on the global economies, which is predicted to be 30 trillion dollars by 2025 (McKinsey Digital Report, 2019). The claims made by McKinsey Global Institute are not comprehensive and predictive, but are also based on in-depth analysis of the industries in the developed and developing world. Taken together, these data suggest that issue of increasing women's participation in the Saudi labour market can be resolved through investigating the factors which can help promote gender equality in the local labour market in Saudi Arabia.

In order to promote participation of women in the labour market, government has taken many steps such as allowing women to drive independently, traveling of women without male chaperons/custodians (*mahram*). The lifting of bans on free movements of women are expected to increase the women's capability to acquire knowledge, skills, and job search for women in the high-tech industry (Rashad and Kalin, 2019). Prince Crown, Salman, also pledged to increase the women' participation in the labour market to 30% by 2030, which will further expand the job opportunities for unemployed women with IT skills (Rashad and Kalin, 2019).

Wharton (2017) showed that females in Saudi Arabia are well-educated and comprise of 60% of the university-level students, however, the women's participation rate is recorded to be as low as

10%. It is not clear as to why the participation rate of women is low, which factors contribute to the low level of participation of women; whether the female students gain the digital skills as part of their formal education; to which extent the educational institutions offer skills to female students to gain the prospective jobs in the digital -dependent organizations, and to which extent HRM policies are aligned to integrate the digitally skilled women in the workplaces. There is an inadequacy of literature regarding the measures or policies undertaken at government level, business-community and the academic institutions for preparing the skilled women work force which can directly contribute to the establishment and perpetuation of digitalized Saudi economy and Saudi. Therefore, perceptions of stakeholders including government, businesses and academia are critically important to assess the impact of digital technologies on increasing the women's employment.

To the best of my knowledge, currently, there is no empirical data regarding the institutional mind-set (businesses, academia and government bodies) in terms of accommodating digitally skilled women for the employment opportunities created by the advent of digital technologies in Saudi Arabia. Moreover, to date, there is no research work available in the KSA to show as to how training and working through digital technologies are useful in promoting women's inclusion at the workplaces and induction of women as entrepreneurs in the labour market. This research work is interested to investigate the impact of the ICT's growth resulting from the Vision 2030 on the creation of new job opportunities for women in the KSA. This research project intends to reveal the facilitators and barriers for women in acquiring the ICT-related job opportunities, and propose the way-forward for promoting the women's access to ICT mediated job openings in the KSA by considering the key stakeholders in the socio-political setup of the country.

1.3 Aims of the Research

The current research work has the following aim: To explore the impact of digital technologies with focus on information and communication technologies (ICTs) on women's employment in Saudi Arabia.

In the context of my research work, digital technologies are defined as information and communication technologies (ICTs) which are used for increasing operational efficiencies of public and private sector organizations.

The afore-mentioned aim will be achieved by formulating the following objectives:

1. To assess the training opportunities available for Saudi women for development of ICT-related knowledge and skills.
2. To explore the impact of ICT's skills on the employment opportunities in digital technologies of women in Saudi Arabia.
3. To determine the barriers/challenges faced by Saudi women in exploiting the digital technologies-created employment opportunities.

1.4 Research Questions

In order to address the forgoing objectives, the following research questions are developed:

- What is the role of government, business and academia in providing women with the digital knowledge and training in increasing digital skills they need to participate successfully in labor market in KSA?

- What do government, business and academia perceive to be the career/employment opportunities available to Saudi women that enable them to successfully participate in and contribute to the new economy created by the application of digital technologies?

- How do government, business and academia perceive the challenges facing Saudi women and what effect these challenges have on their success in a world of work dominated by information technology?

1.5 Significance of the Study

Most of the studies have explored the women, technology and employment from the perspective of developed countries such as the UK (Valenduc, 2011; Kofmann, 2012; Belt et al., 2000; Webster, 2000), the USA (Lasen, 2010; Trauth et al., 2009), and Australia (Roan and Whitehouse, 2007; Lang, 2007; Bandias and Warne, 2009), however, there is a scarcity of literature dealing with the impact of evolving digital technologies on the women's employment opportunities in the developing countries such as Saudi Arabia (Metcalfe, 2011). In a global context, men dominate the technology field while relatively few women are creators of technology-based hardware and software thus women are predominantly consumers rather than producers of technology (Porter, 2013).

Moreover, this study contributes to the understanding of complex interplay of government, business and academic institutions for improving the employment prospects of Saudi women in digital technologies as a consequence of evolving digitalization of Saudi society. Hence, this study suggests a way-forward for the Saudi government, businesses and academic organizations which are keen to increase digitalization and women's participation in the digital-oriented labour market, especially in the digitally transformed educational system which is the goal of Vision 2030.

Previous feminine theorists have put forward only prepositions highlighting the importance of government, business organizations and the intellectual assets (academic organizations) for increasing the empowerment of women in social contexts (Cornwall, 2014; Baltiwala, 1993;

Baltiwala, 1994; Rowlands, 1997), but none of existing theorists have tested such prepositions in the evolving digitalization of societies and the resulting employment opportunities for women in the developing world such as Saudi Arabia . Therefore, a unique contribution of this research work to the existing knowledge is to provide some theoretical contribution informed by the empirical evidence in the context of digitalization of Saudi society, which emphasizes the mobilization of the organizational resources within the labour market, government bodies, and academic institutions for increasing the women's access to the intellectual resources, organizational assets for enhancing the women's employment opportunities

This study has therefore set out to address a problem that is of practical significance to the Kingdom of Saudi Arabia (KSA) today. It has done so in a number of important respects: the need to address structural imbalances in the Saudi labour market; the role of women; and the social and economic problems created by these issues of gender imbalance in terms of equality of employment opportunity.

More broadly speaking, the potential is for this study to inform future policy-making by suggesting a series of strategies applicable in a Saudi organisational context. These strategies can then be designed to avoid the potential negative impacts of digital technology on women's employment prospects and thus to advance women's careers within digital technology.

Furthermore, the study's rich and deep analysis of data from the Saudi context provides a holistic view of social and cultural phenomena in terms of understanding participants' attitudes and experiences from academic, government and business groups in relation to digital technology. Although as an interpretive context-specific study, it is not possible to claim universality, the findings have a great potential to be applied to a wider framework of understanding women and technology.

1.6 Context of the Study

As this study is being conducted in Saudi Arabia, it is appropriate to introduce the geographical and cultural aspects of the Saudi Arabia. This will enhance the understanding of women's position and situation through the lens of social and cultural values. In this section, geo-political, socio-cultural and economic aspects are discussed for gaining an insight into the prospects of women's employment in the future labour market in Saudi Arabia.

1.6.1 Characteristics of the Kingdom of Saudi Arabia

The significance of a country's geography, politics, legal system, religion, society, culture, economy, education and demographic characteristics cannot be overstated being that they play a central and decisive role in the day-to-day lives of its citizens. The setting of this study is a developing nation, notwithstanding its dominant global position in oil and gas resources and reserves.

It is government policy to diversify the economy, although it remains to be seen to what extent women will participate in this economic development, given that other social and cultural factors potentially affect women's participation, in addition to the initiatives and policies that may apply both positively and negatively to Saudi women in terms of technology and employment. For this reason, in the sections below, the researcher provides an overview of Saudi Arabia's characteristics so as to facilitate the reader's understanding of the context of the study.

1.6.1.1 Geography

The Kingdom of Saudi Arabia (KSA) is located in the Middle East, in the south-west of the continent of Asia. Its northern neighbours are Jordan, Iraq and Kuwait, while its southern neighbours are Yemen and Oman. It is bound to the east by the Arabian Gulf and the Gulf States of the United Arab Emirates and Qatar; to the west is the Red Sea (Hamdan, 2005). It has a land area of more than two and quarter million square kilometres.

Figure 1. 1 Map of Saudi Arabia. CIA World Fact.

The terrain is largely uninhabited, sandy desert with a harsh dry climate with great extremes of temperature. Saudi Arabia is the largest country in the world not to have a river, and fresh water is limited, which has prompted the development of extensive seawater desalination facilities (Bowen, 2014).

1.6.1.2 Population

The total population of KSA is greater than 29 million of which approximately 30% are non-Saudis. Over 47% of the population is under the age of 25, meaning that it has one of the youngest demographic populations in the Gulf region (Cordesman, 2003). Moreover, this "youth bulge" is forecast to grow, inevitably leading to a growing number of job-seekers in the future and pressure on the job market.

The following figure illustrate the age structure of the population of Saudi nationals.

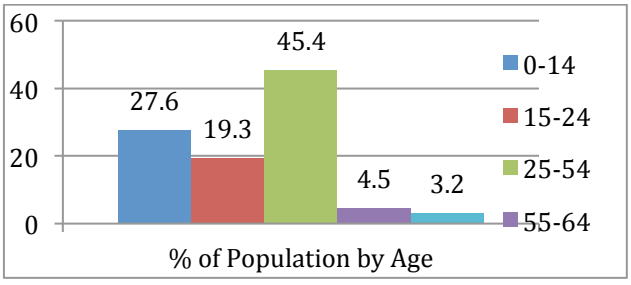


Figure 1. 2 : Saudi nationals by age group. Central Department of Statistics and Information. By author.

Figure 1.2 divides the total population into five age groups, with over 92 per cent of the Saudi population being under the age of 55 years.

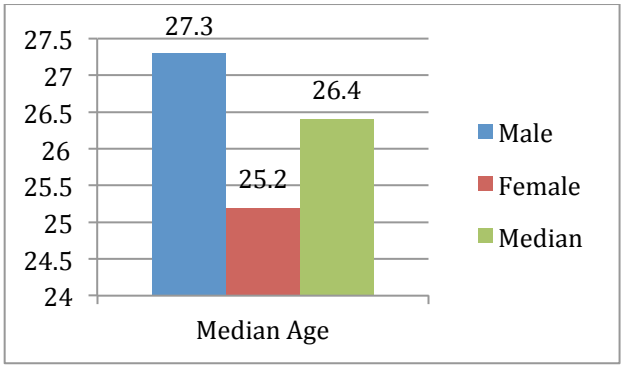


Figure 1. 3: Median Age - male /female. Source Central Department of Statistics and Information. By author.

Figure 1.3 illustrates the ratio of male to female median age and clearly shows the young age of the population, with females being the lowest median age group.

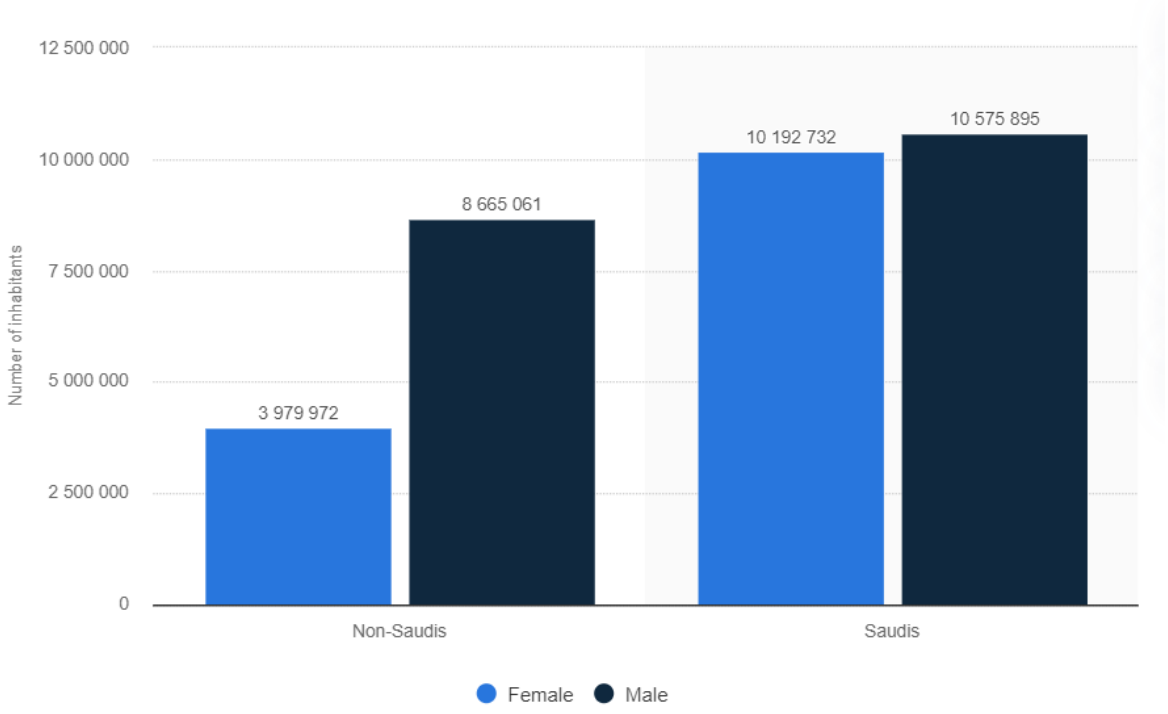


Figure 1. 4: Population Number based on Gender and Nationality in Saudi Arabia

[Source: Statista 2020. https://www.statista.com/statistics/616737/saudi-arabia-population-by-gender-and-nationality/]

If there is one segment of Saudi society pushing for reforms, it is young women. Their demands for greater personal freedoms and more say in Saudi public life will be the biggest driver of social and economic change in the coming years (Ramady, 2010). The guardianship system, as well as society's strict gender segregation, will be difficult to maintain given the government's oft-stated intentions to bring women into the workforce and to create a more diversified, knowledge-based economy less dependent on oil (Murphy, 2012; Reguly, 2014). Under the Saudi Guardianship system, a male family member, normally the father, husband or brother must grant permission for a woman to study abroad, travel and other activities. The understanding of the guardian system can enable me to discuss the potential barriers which might be revealed by this study due to inherent rules imposed by guardians on the female members of Saudi society. In addition, the guardian system established in accordance with social norms of society may also show the difficulty of government's efforts to provide economic empowerment to the Saudi women as a result of digitalization of Saudi economy and society. The data gathered from this study will further highlight the nuances of the barriers imposed by guardian system on the way Saudi women think to aspire for digital careers.

1.6.1.3 Politics

Saudi Arabia is an Arab Islamic state created in 1932 under the rule of an absolute monarch, King Abdul Al-Aziz Al Saud. Subsequently, every monarch has been a hereditary son. The reigning monarch today is King Salman whose official title includes 'Custodian of the Two Holy Mosques', King Salman, is both the Head of State and Prime Minister. A large hereditary royal family and a Shura Council (also known as the Saudi Consultative Council) support him. The Council is comprised of 150 members appointed by the monarch for four-year terms and includes many members of the royal family. The Islamic Clergy also provide counsel for the King through the Senior Council of Ulema (Maisel, 2013).

The governmental process is based on the Ashura, which follows the teaching of the Qur'an (Koran) that enables the king and his advisors to work together to resolve all issues. There are no political parties and suffrage is restricted to males over 21 years of age. However, in 2013, the late King Abdullah (the previous monarch) appointed thirty women to the Council. Later again, in 2015, women were granted permission to field candidates for local government and vote in municipal elections (Mandeli, 2016).

These developments in the political system suggest a new recognition of women's role in the public sphere and are part of a broader trend of evolution of opportunities for women. Nonetheless, these are still very new developments and their impact on the wider society remains to be seen.

1.6.1.4 Economy

Saudi Arabia's economy is oil-based, with the Kingdom possessing 25% of proven world oil reserves. Saudi Arabia is the world leader in petroleum production, as well as fifth in natural gas reserves and ninth in natural gas production. The energy sector is the main economic driver, with the State having control over all major economic activities. However, the government is pursuing a path of diversification which has been translated into substantial investment in higher education (Ramady, 2010).

Moreover, Foreign Direct Investment (FDI) plays an important role in economic development, infrastructure and employment. Saudi Arabia has introduced an 'Economic Cities' initiative to promote investment, development and diversification to enable the economy to attain the status of an 'advanced' economy. The government has now launched a new vision for a vibrant society, thriving economy and ambitious nation in an initiative known as 'Vision 2030'. The primary objective is to implement a strategy to curtail the Kingdom's dependence on oil.

When implemented, Vision 2030 is expected to provide further opportunities for women in employment. Nonetheless, if it is to succeed, it will need to balance the interests of the

government, the business elite and the religious establishment, who frequently have different perspectives on women's role in the new economic structure (Kayed & Hassan, 2011).

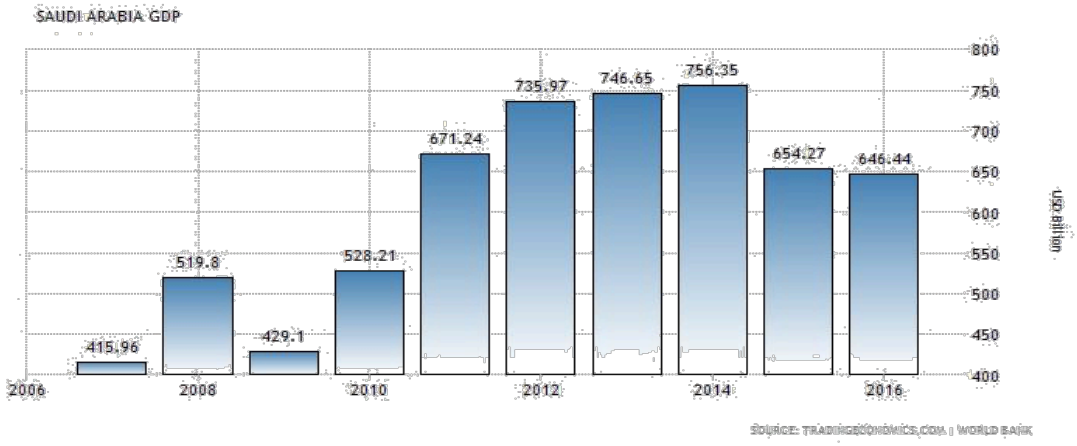


Figure 1. 5: Gross Domestic Product 2006-2016. World Bank Group .

Figure 1.5 illustrates the change in the total value of all goods and services (GDP) of the Saudi economy over the period 2006–2016, highlighting a reduction in GDP in 2007 and 2009, reflecting the impact of the global recession. The economy subsequently recovered and in 2014, the economy was some 75% larger than in 2009.

At the time of writing, however, Saudi Arabia had experienced a serious budget crisis resulting from the collapse in the oil price. This government crisis has resulted in deep cuts in spending and a rush to accelerate diversification of the economy through the Vision 2030 plan.

King Salman's easing of the guardianship law in 2017 has also served to enhance women's participation - particularly in education, employment, business and commercial records - enabling them to invest and create their own business. Yet even in this context, Saudi women's participation in the labour market is low, despite many young Saudi women having achieved higher education in Saudi universities or by studying abroad.

Nonetheless, these developments should be linked to a key goal of Vision 2030; namely, expansion in the domains of finance and technology. According to Samuel (2017), one key example of modernisation through the plan is the Kingdom entering into an agreement with Japan's Softbank (SFTBF) to spend over $45 billion on technology.

Moreover, the government has established and invested over $100 million in local technology companies, while there is remarkable development in entrepreneurship and investment, which offers women a great chance to challenge the male-dominated culture. Indeed, some Saudi women have moved to the informal high-tech and Internet-based economy (see section, 2.3.4) through the application of Instagram for trading (Rahman, 2015).

1.6.1.5 Society and Culture

The language of Saudi Arabia is Arabic for a conservative Islamic country based on traditional family values (Odine, 2013). There is a strict code of behaviour based on a patriarchal tradition and ultra-conservative notions of gender roles. These traditions have undeniably imposed constraints on women's education and employment, in terms of whether and where they are allowed to study or work, in what fields, and under what conditions (Le Renard, 2014). Recently, many developments have happened, which has paved the way for women's employment. For example, the Saudi government has lifted the ban on wearing hijab for women at the public places, which means that they can perform their work-related activities without any discomfort, and labour market is more likely to welcome female workers without hijab which may disrupt their functions as a worker within organizations (Alhamad, 2014; Alhareth et al., 2015).

Furthermore, the ban on travelling of women abroad or within Saudi Arabia with permission of or in the company of mahram (guardian) has been removed by Prince Salman, which enabled women to travel for seeking jobs and studying abroad without social pressures from families (Molana-Allen, 2019). Another important social change is the lifting of ban on driving of women. Women in Saudi Arabia can drive cars, which can be helpful for them to find or do jobs requiring women to drive vehicles (BBC News, 2018). Why is this discussion important to this

research needs clarity?, what happens to women's ability to engage in economic activities, freedom of movement, their agency etc. can be point of discussion.

1.6.1.6 Education

Education is provided by the State and is gender segregated. General education starts at age six, with six years of Primary schooling, followed by three years Intermediate education and ending with three years of Secondary education. Further and higher education is available through technical and vocational colleges alongside universities (Hamdan, 2005). The first university, King Saud University in the capital, Riyadh, opened in 1957, but there are now over sixty higher education institutions throughout the country (Smith & Abouammoh, 2013).

In the past, Saudi women generally studied only the humanities at school and university. Correspondingly, Saudi society and culture urged women to have one aim; namely, to become teachers (Hamdan, 2005). Today, however, the government is trying to balance male/female education and to encourage women to participate to a much greater extent in the labour force. In 2010, the education budget was increased which has affected the system of education positively by increasing opportunities for women to study abroad (Al-Rasheed, 2010).

The structure of the education system continues to impose several constraints on the choice of subjects and the curriculum that Saudi women can pursue, particularly in the hard sciences. In addition, there are socio-cultural norms and local traditions, such as male authority, family and society's perception and culture, which influence women's choices.

The current literature identifies how the education sector has shifted to apply digital technology, such as STEM and e-learning in the facilities and the process of learning and teaching (see chapter 2).

1.6.1.7 Employment

According Layard et al. (2005) the labour market is a place that combines employers and employees to perform a specific job or activity. Historically, the labour market for women in Saudi Arabia has been limited because of socio-cultural practices. Nonetheless, the recent expansion of economic diversity in KSA has now enabled the government to open up opportunities for women in various fields, particularly education and health.

Both men and women now use technology and telecommunications, including social media apps, to create goods and services projects, including e-stores and business start-ups. El Mallakh (2015) indicates that women tend to head small projects in order to have a job and to supplement the family income by using modern technology. El Mallakh's (2015) also claim is that online trade has a positive impact on self-employment in KSA. Conversely, Al-Rasheed (2010) is clear that for women, self-employment and 'traditional' employment are still the widely accepted choice of women rather than trying to compete in the modern male-dominated technological workplace – having male workers and leaderships in top positions of firms. The concept of self-employment is related to using one's own ideas to set up business for securing the income, while the traditional employments are the forms which involve working for companies to earn the handsome income.

It was reported in the Arab News (2015) that "a total of 806,000 Saudi women are now employed across twenty sectors in the country, according to figures at the end of 2014". Of this total, the clear majority of women were in education (71%), while human health and social services accounted for thirteen per cent (13%); and the presence of women in public administration, defence and social security accounted for only 5%.

Nevertheless, it is reported that some women now work in diverse fields, such as production, manufacturing, mining, agriculture, forestry and fishing (Arab News, 2015). Nonetheless, the main employer of women in KSA is the government, particularly in the education and health sectors. These employment preferences are confirmed by the figures for 2014, which indicate among females aged 25 and over, that 42 per cent were working in education (teachers), 32 per cent in human health and services (nurses) about 29 per cent in manufacturing. Moreover, these statistics underscore the outcome of a gender-segregated society, which contributes to segregation of occupations in which traditional 'gendered' occupations for women prevail, such as teaching and nursing.

According to the Ministry of Labour (2012), Saudi nationals prefer to work for the public sector where employment conditions and pay are more attractive. Conversely, foreign workers dominate the private sector under conditions that are less attractive. This dichotomy distorts labour market competition thereby creating challenges to full participation by male and female Saudi nationals in all sectors of the economy.

In the case of Saudi women, Alhamad (2014) indicates that in 2011, the rate of unemployment was 35 per cent compared to only 7.4 per cent for men. Certainly, culture is a critical factor in the access to suitable jobs (see section, 2.6.1); however, the government has taken a significant step to address this problem by introducing a 'Nitaqat' Saudisation programme whereby private sector enterprises are required to employ Saudi nationals in varying ratios to their total workforce as part of a phased programme (Al-Asfour and Khan, 2014; Alsheikh, 2015).

The Nitaqat programme does not specifically target women, but it is expected that the requirement for firms to make up their quota of Saudi nationals will encourage them to recruit

women as well as men. However, the programme has had mixed results so far, with many enterprises complaining that the speed of implementation is too fast.

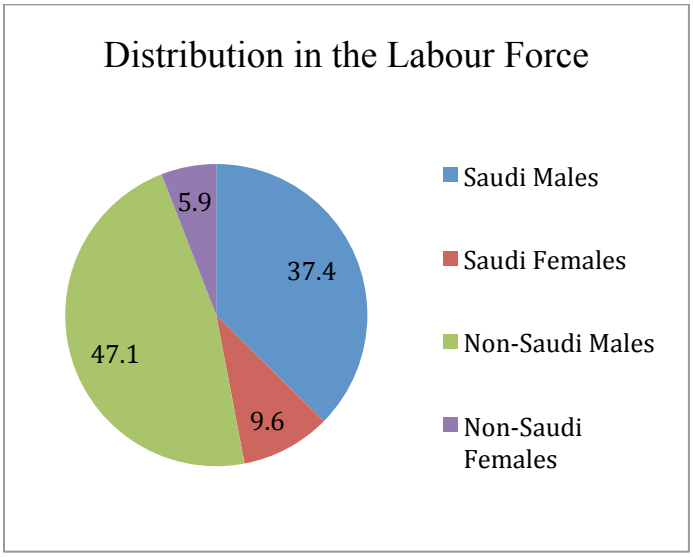


Figure 1. 6: Distribution in Labour Force. Source - Central Department of Statistics and Information. By author.

Figure 1.6 illustrates the wide gap between Saudi males and females and that Saudi nationals make up only 47% of the labour force. The finding that Saudi women make up less than 10 per cent of the labour force illustrates the extent of this problem of gender inequality.

After having discussed the characteristics of Saudi' culture, society, economic and employment situation, the next section will present literature relating to the digital technology.

1.6.1.8 Digitalization of Saudi Economy

The digitalization of Saudi society is planned in response to the rapid-drop in the oil prices globally, which is an attempt to shift the dependence of the country from oil exporting to the one innovator and implementer of the digital technologies for driving the economic growth (Youssef et al., 2020). There are some other factors which led Saudi Arabia to adopt and implement the digital transformation for achieving the economic growth. Firstly, the Saudi Arabia opened up its borders for the foreign investors, which resulted in the growth of firms and multinational

companies with the promise to hire the Saudi nationals for development of national workforce (Sabbagh et al., 2012; Amuda, 2020).

Secondly. Almost half of Saudi population is under 25 years old, which suggests that young and enthusiastic workforce is available to fulfil the workforce needs of the firms using and investing in the digital transformation of the country. With growth of private sector, it is expected that more than 80% of the Saudi population will be employed with a net increase in the per capita income (Woishi, 2019).

According to survey report issued by Reddy and Minoiu (2009), the per capita income is decreased for more than 50 out of 100 households in the Saudi Arabia between 1960-2001, which has increased the economic pressures on families and the government alike to seek some alternative solutions to fund the families' budgets. The digitalization of Saudi economy brings some ray of hope for the families to improve their economic status through allowing women to develop careers in digital technologies if the opportunities are actually generated by digital technologies in Saudi labour market (Insight, 2016).

Secondly, due to lifting bans and restrictions on movement and education of women in the local and foreign universities, the skilful workforce in different areas can be derived from the Saudi females who are aspiring to achieve their economic growth. As recorded in 2018, Saudi population consists of 10.2 million females, which is almost equal to Saudi men (10.6 million), which can directly contribute towards the economic growth of country as a result of digital transformation thorough setting their businesses or can pursue careers in firms using and developing the information and communication tools (Al-Helayyil et al., 2016; Statista, 2018). This can add to the employment opportunities for women aspiring to start careers in the digital technologies. Currently, there is no evidence as to which extent the digital transformation has opened up opportunities for Saudi women, as argued by Al-Helayyil et al (2016), which warrants further research to look into this issue. Has the digitalization of economy as envisioned

by government increased the employment opportunities for women? This question is yet to be answered by the empirical evidence. With growth of digitalization in public and private sector, I hypothesize that digitalization has impacted women pursuing careering in digital technologies in terms of increasing employment opportunities for them.

There are five main sectors which are being digitalized as part of the Vision 2030 in order to digitalize the Saudi economy (Figure 1.7). The public institutions providing social services to the communities in Saudi Arabia. The government has dedicated 1.6 billion US dollars to develop the digital infrastructure for facilitating the e-government services to the residents in Saudi Arabia. The development and application of e-government services ranging from payment of utility bills to the recruitment of employees via the e-platforms and assessment tools are more likely to improve the employment opportunities for both male and females (Vision2030.gov.sa; Alharbi, 2019). It will be interesting to understand the landscape of the employment opportunities for females aspiring to pursue careers in digital technologies, especially from the viewpoints of participants from the governmental agencies responsible for managing the employment opportunities for Saudi citizens.

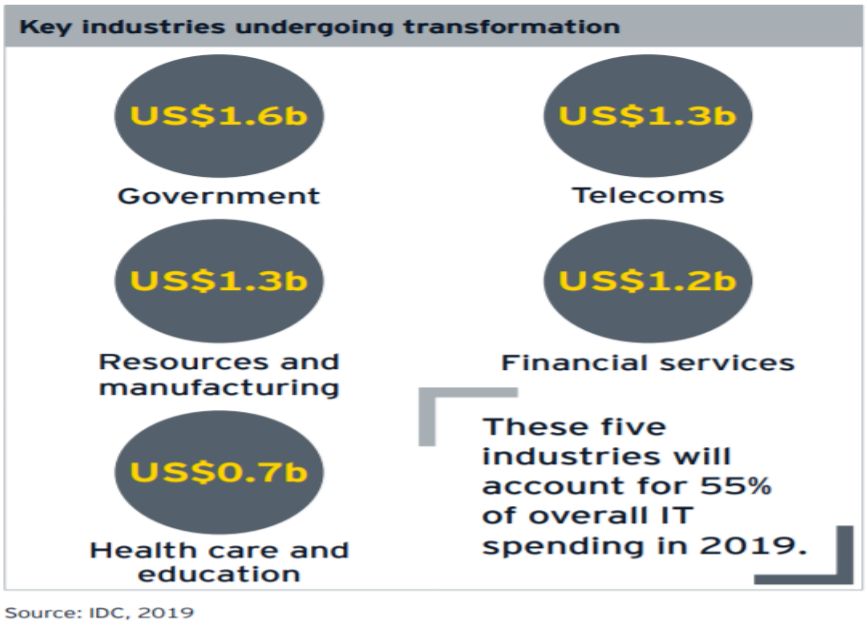


Figure 1. 7: The spending on digitalization of various sectors as part of the Vision 2030.

Some other sectors, which are being heavily digitalized in response to the digital transformation initiatives, are telecommunication sectors and financial services in Saudi Arabia. The government has reserved to spend 1.3 billion USA dollars for digitalization of telecommunication, and 1.2 billion US dollars for digital transformation of financial sector (Carlton, 2019). The development of resources and manufacturing of products locally using digital technologies attracted grand sum of 1.3 billion dollars for resources and manufacturing industries, and 0.7 billion US dollars investment in digitalization transformation of health care and education sector. These sectors are implementing digital technologies including robotics, big data analytics, cognitive artificial intelligence, 3D-printing and internet of things, and e-commerce (Carlton, 2019). Amuda (2020) argued that traditional modes of working will experience slow-down, and innovation accelerators will be in position to account for the more than one third of labour market in Saudi Arabia. These data indicate that female workers or women aspiring to pursue career in digital technologies will be in better position to grab such opportunities if they possess the right level of skills and qualifications. Currently a scarcity of knowledge in relation to scale and scope of employment opportunities arising of digitalization of afore-mentioned five sectors experiencing for females pursuing careers.

1.7 Scope of the Study

This study will focus on the employment opportunities arising from the digitalization of Saudi economy. Three sectors are particularly involved for assessment of employment opportunities for women as a result of digitalization, which include government/semi-government organizations.

The digitalization may impact the job opportunities for women in software and hardware developments, working through digital technologies, and learning through technologies, educating through digital technologies, and pursuing careers in digital technologies. This study will only focus on the Saudi women's pursuance of careers in digital technologies.

Fundamentally, the pursuance of careers will depend on the abilities, competencies and capabilities of women in digital technologies. Therefore, employment opportunities resulting from digitalization of Saudi economy for women aspiring to develop careers in digital technologies either through training or educational programs within or without the organizations will be under debate in this study. Hence, this study does not involve all women in Saudi Arabia.

Similarly, this work does not intend to explore the employment opportunities available for the Saudi women from the women perspectives, instead it intends to elicit perceptions of senior leaders including men and women from government, semi-government organizations and start-ups established through the use of digital technologies. Of note, the time frame in which data was collected, the Saudi economy was started to be modernized using the digital transformation of Saudi Arabia, so only limited set of organizations within government and public sector started to digitalize their operations via the state-of-the-art information and communication technologies. This justifies the tripartite approach assumed by this study involving decision-makers from academic, government and business start-ups to explore the employment opportunities available for Saudi women aspiring for career opportunities in Saudi Arabia.

1.8 Structure of the Thesis

This thesis is structured in four parts comprising of eight chapters (including this chapter), as outlined below:

Part I Introduction

Chapter One is an overview of the study.

Part II Literature Review

Chapter Two is focused on the relationship between technology and employment as a function of Human Resource Management. After an initial overview of technology and its evolution into

digital technology, the study concentrates on the role that new information communication technology plays in employment and application or access to employment, while examining the impact of both educational technology and the technological workplace itself in terms of the partnership between government, academia and business to advance the cause of female workers in Saudi Arabia.

Chapter Three pays specific attention to international developments in the relationship between technology and employment, followed by a more specific study of the impact on women internationally, regionally and in Saudi Arabia.

Then, discusses the theoretical background to women's employment in technology today, such as the social construction of technology theory, technology domestication approach, and the structuration theory and the knowledge gap addressed in this study.

Part III Research Methodology

Chapter Four discusses the research design, which includes the research scope, the research paradigm and the justification for adopting the interpretive paradigm. It also outlines the research strategy, my research approach and ultimately, the methods and criteria of data collection and sampling selected for evaluation of the quality of qualitative research.

This chapter also discusses the process of data collection and analysis, which includes alongside qualitative data analysis and issues around data collection, and a critical reflection on the status of this project within the research field.

Part IV Findings, Discussion and Conclusion

Chapter Five sets out the research findings and conducts a critical analysis in the light of both general and specific questions.

Chapter Six discusses the findings in application to the three research questions.

Chapter Seven is the conclusion. The first part of this chapter provides a summary of the research objectives and the main research findings, followed by a discussion of the implications

for policy-makers: government, businesses and academic institutions, and then contributions to the practice. The final section addresses areas for future research.

1.9 Summary

The Saudi women's employment opportunities is affected by multiple factors, and one of the key factor is the organizational leadership/leaders who are actively involved in forming and implementing employment policies about Saudi women as a consequence of digitalization of the organizational functions. Therefore, any endeavour aiming to find out whether proliferation of digital technologies in Saudi society and economy has potential to create the employment opportunities for Saudi women in digital technologies cannot produce robust outcomes unless and until the opinions and views of organizational leaders are sought to analyse any impact of digital technologies on employment of Saudi women. This study is particularly interested in eliciting views and perspective of the leaderships from three key organizations which have important stakes in digitalization of society and economy of society: government, businesses and academic groups. As there is no previous research undertaken in this regard in gulf countries, especially in Saudi Arabia, therefore, this research work aims to explore the impact of digital technologies with focus on information and communication technologies (ICTs) on women's employment in Saudi Arabia.

The next chapter will present the literature regarding the employment opportunities in digital technologies and potential barriers in the way of women's exploitation of employment options resulting from the digitalization of Saudi Arabia.

PART II: LITERATURE REVIEW

Chapter 2: The Impact of Digital Technology on the Modern Workplace and Employment Opportunities for Women

2.1 Introduction

This chapter encompasses a review of the existing body of research literature dealing with employment opportunities created by the proliferation of technology for women in Saudi Arabia. This chapter has been divided into eight sections. First section will explore the evolution of information technology in modern employment (section 2.2), and later on, I will discuss the various professions arising from the applications of digital technologies in different market sectors (section 2.3). The section (2.4) has reviewed literature regarding the opportunities for women employment resulting from the digital technologies. The state of women employment in the digital era has been discussed in section 2.5; and barriers to women's employment are elaborated in section 2.6. The section 2.7 summarizes the chapter.

2.2 A Brief History of the Concept of Digital Technology

Digital technology can be thought of in terms of 'bits' existing alongside a single base that involves two processes. These processes have a binary code made up of combinations of the digits 0 and 1, where digital information is recorded automatically in binary code (Schmar-Dobler, 2003). More generally, the concept of digital technology is now understood in terms of categories such as ICT (Information Communication Technology), information technology or computing, information management, electronic tools, data processing or storage, social media, online games and digital devices and resources (Avgerou, 2008; Chan, 2007). Looking to the future too, the concept of digital technology is now starting to encompass, inter alia, logistics, artificial intelligence, data management, customer relationship management and so on.

Since the appearance of Homo sapiens and the use of simple stone tools, man has used technology to survive, improve his quality of life and for protection (Foley & Lahr, 2003; Gill, 1995). Technology has continued to spread and develop exponentially in our daily life - and now in global terms (Gill, 1995) - although until the advent of the Industrial Revolution, technological advances were relatively slow.

Nonetheless, every epoch of human civilisation has produced inventions building upon the technologies of previous eras (Segovia Pérez et al., 2019). Some inventions, such as the steam engine, were notable for producing a paradigm shift and accelerating the pace of technological development. In fact, technological advances have helped humans in many areas of life, such as in education, health, industry, agricultural, tourism and communications (Greenwood, 1997). For example, in the nineteenth and twentieth centuries, the introduction and application of radio and telegraph resulted in accelerated economic and social development (Kranzberg et al., 1976).

The speed of technological change further accelerated with the development of the silicon chip and the introduction of the binary computer processor, so giving rise to the era of digital technology (Arroyo Prieto and Valenduc, 2016). Mansell (2002) emphasises that data transmission speed depends upon the ability to compress and store it in small devices, so impacting upon the way people communicate, learn and work. Indeed, West (2015:1) reminds us that, “Robots, artificial intelligence, computerized algorithms, mobile sensors, 3-D printing, and unmanned vehicles are here and transforming human life. People can decry these developments and worry about their ‘dehumanising impact’, but I need to determine how emerging technologies are affecting employment and public policy”.

The speed of technological change in every aspect of life is now breath-taking, to the extent that our current epoch has been labelled “The Information Age” or “The Computer Age”. In economic terms, this period has been characterised by a shift from the traditional industries emerging from the Industrial Revolution to an economy based on the digitisation of information (Webster, 2006). Moreover, the speed of change and innovation is expected to continue and will have a strong impact upon everyone everywhere. Bold projections are now being made for the future involving long-distance manned spaceflights, to the extent that NASA and ESA now plan to use advanced technology to travel to the planet Mars in the 2030s (Thronson et al., 2014).

The next section will throw light on the ICT professions which have arisen as a result of digitalization of societies.

2.3 Mapping ICT Professions

Mapping of ICT profession is important in order to allow an insight into the sectors in which proliferation of ICT has created the job opportunities. Valenduc and Vendramin (2005) posited that it is difficult to distinguish between the users of the ICT and the ICT professionals due to widespread usage of ICT tools in almost all services and industries. Go Digital (2002) described three-layer skills model to differentiate ICT professionals from the users of the ICT tools. The first layer is the digital literacy which involves the knowledge and experience of performing daily tasks using the digital instruments, which can either be used within or outside of the workplaces for learning and maintaining the better quality of life. The second layer of skills is related to applied ICT skills which involves the ability of the users to implement the ICT tools for performing specific tasks in the workplaces, and trainings are provided to upgrade the skills in the event of changes in the workplace settings. The third layer belongs to the professional ICT skills which are required by industries and services for creating, developing and implementing and managing the ICT instruments. Some scholars suggest that all three skills are

needed by professionals in order to be ICT professional (Valenduc et al., 2007; Preston and Bogg, 2010), however, many others agree to the presence of applied skills and professional ICT skills to become an ICT professional (Birbaumer et al., 2007; Vendramin et al., 2009). I would support the argument of the latter, as the digital literacy has become hallmark of the common users who have ability to use the digital devices for performing daily tasks, nevertheless, industries and services not only require the applied ICT skills for executing specific activities, but also they need professional ICT skills for managing the software, hardware and networks which are essential for business processes and transactions (Tattersall et al., 2006). The applied level ICT skills are provided to the employees through on-the-job training or vocational training. The e-commerce design of business depends on both applied and professional skills, while multimedia design of businesses requires all three skills, digital literacy and professional skills (Collet, 2011). In the context of this research, I intend to explore the Saudi women's training and skills in ICTs or any potential arrangements for such trainings in place from perspectives of government, business and academic groups in order to assess the impact of digital technologies on Saudi women's employment.

Moreover, ESDIS (2002) provided a comprehensive definition of ICT professionals, which covers the applied and professional skills: "ICT and e-business specialists, including different education/skills levels – university (3rd level) or technical education (2nd level) or specialised vocational training". The issue is that advanced level users may have attain some applied or professional level skills, which makes it practically difficult to distinguish the advanced users from professionals in the evolving information society and emerging ICT professionals. This is partly due to the overlap between the business and technical skills which are largely intertwined. Bibby (2000) has further drawn the distinction line between ICT users and ICT professionals based on the extent of the business domain knowledge and ICT knowledge possessed by an individual.

Freeman and Aspray (2000, cited in Bibby, 2000, p. 13) proposed the criterion for distinguishing advanced user and the ICT professional in the following way: if more than half the value created by a worker involves his or her ICT knowledge, then this person is considered to be an ICT worker. If less than half the added value to the work, then we regard the person as an ICT-enabled worker. The ICT professions are divided into two categories including ICT-enabled occupations and ICT occupations depending on the ICT knowledge and business domain knowledge used during creation of business value for the customers (Valenduc et al., 2004) (Figure 2.1).

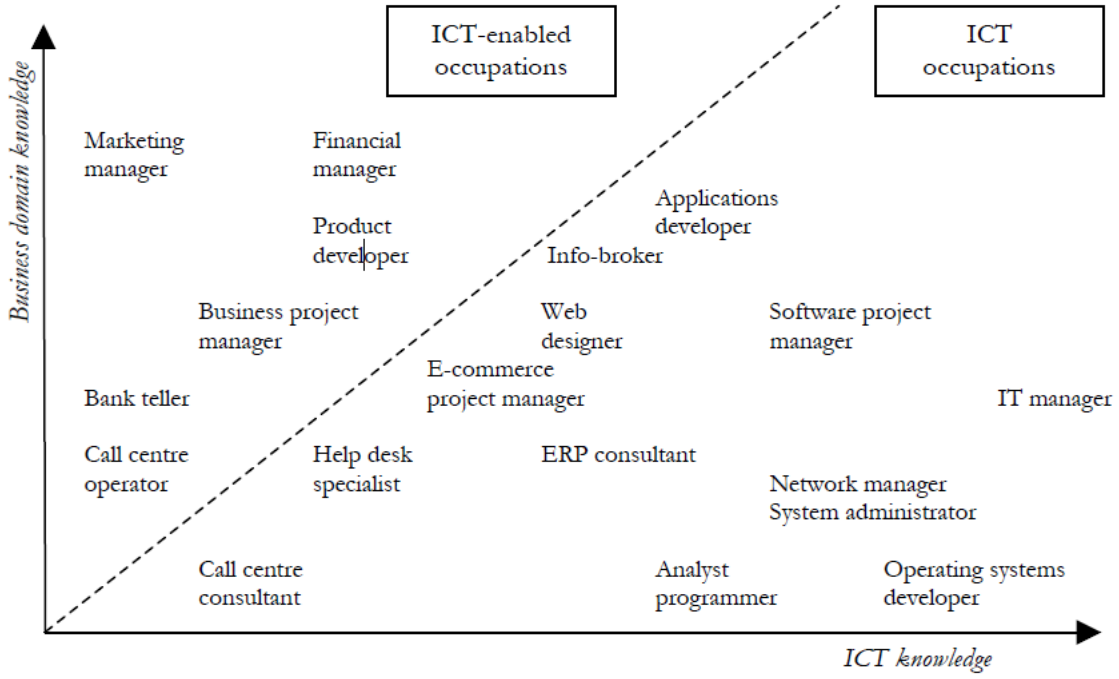


Figure 2. 1: The ICT occupations and ICT-enabled occupations. Source: Valenduc et al (2004).

Hence, according to Freeman and Aspray's approach, ICT professions can be characterized by the requirement of the ICT knowledge rather than dependence on the business domain knowledge.

ICT professionals can perform a broad range of tasks which can be divided into four main categories: designers, developers, extenders and supporters. The designers design the systems,

while developers construct and implement the software, hardware and network components. The extenders modify the specifications of the systems' features according to the requirements of customers. Supporters perform the maintenance repairing and manage the sustainable operations of the software/hardware components (Valenduc et al., 2004). Women in general, and Saudi women in particular may find the employment opportunities such as application developers, supporters and personnel involved in maintenance of systems resulting from the proliferation of the ICTs (digital technologies) in Saudi labour market.

Taken together, ICT professions are dependent upon the ICT skills of the professionals, especially Saudi women within the digital industry and services in digitalizing economy of Saudi Arabia. The ICT knowledge is considered more important from the perspective of employability of individuals rather than business domain knowledge. The emerging ICT tools and systems have created the job opportunities in the domains of systems' design, development, extension and support. It is acknowledged that all fields of ICT are unable to provide equal job opportunities for female workers in ICTs sector, which is due to the perceived barriers in the way of women's employment in the digital technology sector (see section 2.4 for further details).

The ICT professions span over the emerging professions resulting from the e-business, multi-media and Internet as well as the classical professions such as teaching, clerical jobs and reception-related jobs (Figure 2.2). Widening Women's Work in Information and Communication Technology (WWW-ICT) encompasses four main categories of profession: core professions, Internet and multimedia professions, applicative occupations and advanced users (Vendramin et al., 2004; Valenduc et al., 2004).

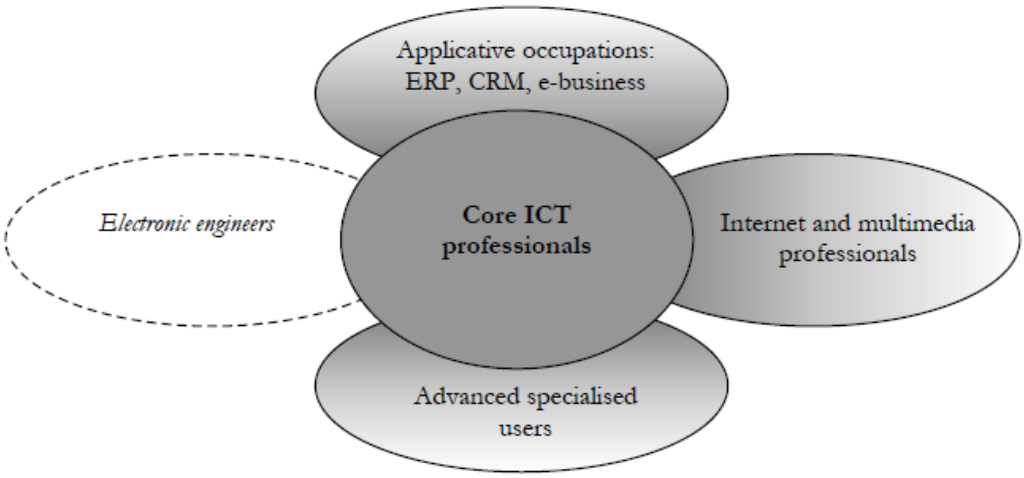


Figure 2. 2: A map of ICT Professions. Source: Valenduc (2004:p40)

Core professions: Core professions require the expertise and services of ICT experts in the software development, networking, products and systems.

Internet and multimedia professions: Internet and multimedia professions depends on the experience and skills of ICT specialists who provide services in the areas of graphics, design, advertisements, development and implementation of multimedia tools for communication and connectivity at the organizational level, maintenance of online and multimedia services and products.

Applicative occupations: Applicative occupations use the services from ICT professional who can provide applied level skills for running the various applications for such as electronic commerce for advertising the products and services to the internet users, customer relationship management (CRM) tools for managing relationships of organizations with customers, and enterprise resources planning for utilizing the organizational resources effectively.

Advanced specialised users: The advanced specialized users offer assistance to the desktop-publishers, information brokers and desk consultants. They have qualifications to serve as 'symbolic analysts'.

Electronic engineers: The electronic engineers offer services in the domains of telecommunication, development and maintenance of visual/audio and light equipment, automation and control systems. The main difference between core professionals and other

professionals shown in the Figure 2.2 comes from the mode of acquisition of skills. For example, core professionals acquire ICT skills through their education, and mostly are graduates in ICT discipline. However, the peripheral groups obtain their ICT skills through mixed curricula, in combination with professional, commercial and communication skills.

Boundaries shown in the Figure 2.7 are not tight, as core ICT professionals can apply their skills to become internet and multimedia professionals, and can be hired in the applicative occupations to become ERP, CRM and e-business consultants and managers. Similarly, the professionalism and training of advanced users, applicative professionals and Internet and multimedia professional may categorize them into the core ICT users (Valenduc et al., 2004).

The present research work intends to explore the employment opportunities in ICTs-related digital technologies based on perceptions of participants from government, business and academic groups with a wide experience in working with a range of professions involving ICTs' proliferation at different levels. Views of participants might shed some light on the employment opportunities for Saudi women in one or more above-described ICTs professions in Saudi Arabia.

2.4 Digital technologies and Employment Opportunities for Women

In recent times, digital workplaces have started to operate effectively within those organisations taking the time and resources to invest in skilled workers and their tools. Today's digital workplace thus integrates technology with business processes and administration requiring a corresponding focus on managerial techniques and high-tech employee skills (Garside, 2014).

More recently, the evolution of women's participation in the highest levels of digital technology development has emerged in a pronounced way in industries rapidly using digital technologies for running the business operations such as e-enterprises, e-government and e-financial services

(Faulkner and Lie, 2007). Jeong and Breazeal (2017), the founder of the Jibo Personal Robots Group at Massachusetts Institute Technology Media Lab and who teaches in USA, claims that the future of robotics is bright. She points out that nine women - namely, Cynthia Breazeal, Lydia Kavraki, Fei-Feili, Andrea Thomaz, Ruth Schulz, Ayanna Howard, Ayorkor Korsah, Stephanie Lacour and Marita Cheng - have supported and designed the processes of robotics and artificial intelligence and created new models of computer vision including prosthetics.

Indeed, Ehrlich confirms that digital technology has had a huge impact on human resources as the most important assets of any business enterprise; the resources who walk in and out of the door at the end of each working day to keep every organisation operation (Ehrlich, 1997). In realisation of the significance of the relationship between employees and digital resources, Tarafdar and Gordon (2007) point out that organisations should now employ digital technology to assist human resources management to manage the multiple processes required of the modern work-place.

The Fourth Industrial Revolution marked by the unprecedented growth and development of digital technologies has almost disrupted every business sector thereby creating the employment opportunities for women (Howcroft and Rubery, 2018). Schwab (2017) reveals that emerging markets in MENA (Middle East & North Africa) region and Asian countries, the job opportunities are on the rise due to the application of digital technologies, and promise of higher wages will attract women in both high, medium and low wages sectors. It was shown that the high wage, medium wage and low wage positions require the digital technologies-related skills in the emerging markets in Asia and Middle East (Nordin and Norman, 2018). However, attraction for women for the high-wage IT jobs will still hold the promise for women (4%), while the attraction for medium and low wage IT jobs will decline by 11% and 7%, respectively, for women in the mature markets.

Organization for Economic Cooperation and Development (OECD) the forecast of job opportunities for women in the industries using digital technologies for women holding the college and universities level-qualifications will be attracted by employers in the mature markets by 2030 (OECD, 2017). Nevertheless, the women having secondary education or lower than secondary education such as certificates and diplomas will not be able to benefit from the job opportunities mediated by applications of digital technologies by 2030. This situation is found to be inverse for the emerging markets where the growth of digital technologies is nascent, which will result in attraction of women with college/advanced degrees, diplomas and certificates (Dabla-Norris and Kochhar, 2018).

Interestingly, the women holding qualifications lower than secondary education will be attracted significantly higher than the ones with associate or college level degree-holders by 2030 (OECD, 2017). These data clearly indicate that mature markets have already attained substantial developments of digital technologies, and women participation in the profession requiring skills and training to work with the digital technologies is higher. However, participation of women in religiously conservative societies such as Saudi Arabia is not well researched area, therefore, it is critically important to glean in-depth knowledge about the employment avenues created by proliferation of digital technologies in Saudi labour market.

Based on the literature survey, the women are most likely to have employment opportunities created by different digital technologies which are discussed in detail in the subsequent subheadings.

2.4.1 Digital Web/Multimedia Tools and Employment Opportunities For Women

Roan and Whitehouse (2007) critically appraised the role of digital technologies in enhancing the employment opportunities for women in Australia. They reported higher representation of women in the careers of web or multimedia professions, and most of them were filled in the clerical roles, whilst women were under-represented in more technical roles relating to the design of software and games in the multimedia companies. The reason for women not making inroads into more technical roles might be related to the lack of education and training. Valenduc (2011) argued that women with artistic abilities are more likely to find their employment in the computer games industry, as most of the job roles in the design of games are reliant on the artistic conception behind the development of products. Geneve et al (2009) found that women are also making inroads into technological careers relating to the role of consultants in the IT companies, however, the rate of progression of female workers is slow compared to male workers.

These data indicate that Saudi women might have the employment opportunities as consultants, educators, designers, and trainers in the field of multimedia web tools. The opportunities might be present as graphic designer and web-tool designers, but there are no data in the context of Saudi Arabia, whether the opportunities arising from the digital web technologies are available for Saudi women. In a similar vein, Saudi women may also opt to be part of the media industry, and can undertake creative jobs while being inviable. However, there is a limited empirical evidence in this regard, showing the availability and exploitation of employment opportunities created by the creative media industry e.g. social media for Saudi women, Therefore, the outcomes of this study contribute to revealing as to what extent Saudi women are able to exploit opportunities offered by media industry.

2.4.2 Software and Hardware Development Tools and Employment Opportunities for Women

The new software and hardware are being developed to control warfare aircrafts, aeroplanes, smart cars, building smart cities such as Neom city Project in Saudi Arabia (Farag, 2019). The digital ICTs tools such as sensor technology are also being designed for education and healthcare sectors to provide the education and health services effectively to citizens (Iroju et al., 2013; Olaronke and Oluwaseun, 2016; Van den Akker et al., 2012; Akker et al., 2012). The workers are needed to participate in the research and development of new software and hardware. The women with expertise in the software development can easily fill in software development-related positions in the local and multi-national high-tech companies across the globe (Arivanandan, 2013).

Bose (2019) published in Technology Trends that boom in the development and proliferation of technologies in the last two decades resulted in the creation of new job opportunities for females. It is reported that Technology sector in April 2017 showed 627, 00 unfilled positions, which were mainly due to the lack of the male skilled workers (Bose, 2019). The females with right set of skills and knowledge can fill in these posts in the companies working with digital technologies. Most of the job opportunities are being created in many ICT areas involving software development, the use of the software, cybersecurity and the applications of cloud computing (Brynjolfsson, E., & McAfee, 2011).

Scuotto et al (2019) are of the view that women can stand up to chance to grab the job opportunities in the afore-mentioned ICT sectors. Clark (2013) reported in agreement with Scuotto and his colleagues that cloud computing, software applications and cybersecurity professions are in a high demand for skilled male and female workers, which indicate that gendering of these professions might be possible in the future provided females are provided with required education and training.

Drawing on the above-mentioned discussion, it can be concluded that software and hardware tools in different areas of digital technologies such as cloud computing applications have increased the employment prospects for women. However, to which extent Saudi women are able to exploit the job opportunities created by the software and hardware development tools in Saudi job market is yet to be elucidated. The data from this study will shed light on whether Saudi women are perceived to exploit the job opportunities in the software and hardware development in Saudi market.

2.4.3 Artificial technology and Opportunities for Women

Kaplan (2015) surveyed the employers and found that artificial intelligence and machine learning are the key digital technologies which are changing the way business works, as these technologies are being used in decision-making process. Infosys Consulting firm, while reporting the results from survey of 1000 ICT-decision-makers and seniors executives at various firms in seven countries at the World Economic Forum, demonstrated that artificial intelligence is at the forefront of creating job opportunities, which can be helpful in inducting women at the leadership positions in the SMEs (Report on Artificial Intelligence, 2017). However, some authors also reported that negative impact of the artificial intelligence and machine learning on the jobs in the high-tech companies (Bose, 2018; Roan and Whitehouse, 2007). Most of the authors have voiced optimistic view of the applications of artificial intelligence tools in terms of generating the employment opportunities in the future (Varley, 2018; Holtgrewe, 2014).

According to the report presented by Madgavker et al (2019) at the McKinsey Global Institute, machine learning engineering roles are likely to increase with the applications and developments of the artificial intelligence technology. The role and responsibilities of machine learning engineers involves training models on large set of datasets, and using such models for language translation and speech recognition (Cartland, 2011). Columbus (2019) further revealed that

number of machine learning workers have increased by ten-fold between 2012-2017, and job advertisements requiring the machine learning workers have increased by 344% between 2015-2018. Fagella (2018) reported that 12% of machine learning jobs are women, and 18% of the women constitute 18% of the total workforce in the C-suite positions in artificial intelligence.

Based on the afore-cited data, the rising employment trend in the machine learning jobs offers tremendous opportunities for women in the high-tech sector. Currently, only 14% women are employed in the area of artificial intelligence and machine learning, and overall high-tech sector employ 20% of women in the labour force (Zafarino, 2018). This represents that artificial intelligence related jobs can be taken up by men if women were not be fully ready to grab the new job openings as machine learning engineers.

From the above data, it is clear that artificial technologies offer employment opportunities for both Saudi men and women, however, these technologies are complex and require a handy knowledge and skills from the users. The Saudi women with basic skills in digital technologies cannot gain the necessary skills and knowledge in the applications in the artificial intelligence. The artificial intelligence shares knowledge from the mathematics, statistics, computing and logics, suggesting the sophisticated set of knowledge and techniques required by Saudi women for pursuing careers in the field of artificial intelligence. The data gathered from this study might show the prospects of Saudi women for pursuing career opportunities in the area of artificial technologies.

2.4.4 Cloud Computing and Opportunities for Women

PWC - a UK based network of professional firms with expertise of conducting research in the labour market - predicted that overall job replacement mediated by the introduction of cloud computing and artificial intelligence tools will be only 1% by 2020 (PWC UK Research Report, 2019). Similarly, the Angus Loten, CIO of Wall Street Journal, argued that artificial intelligence

tools are about to create more employment avenues in the long run (Lachenauer, 2018). OECD PIAAC report (2017) showed that the skills in using and working with the cloud computing tools and artificial intelligence will be the most required IT skill in the future employment opportunities in the SMEs.

According to survey conducted by Robert Half Technology, the digital marketing skills and could computing skills stand at the 25% and 24% the most sought-after IT skills, respectively, at the SMEs in the developed world (Lachenauer, 2018). Based on the rising applications and continued developments in the cloud computing technologies and services, the USA-based Labour Department predicted the creation of around 1.4 million jobs required the skills and speciality in the cloud computing technologies (Lachenauer, 2018).

Ionescu and Andronie (2019) argued that increasingly, the use of the cloud computing applications, where they are putting risk of the certain jobs such as roles in the manufacturing industries, is the main driver in favouring the diversity and inclusion for positions requiring digital technologies-related skills in the SMEs. Moreover, more innovation in the field of cloud computing applications is bound to introduce diversity and inclusion at the workplaces in the SMEs in the both developed and developing world (Lachenauer, 2018).

Columbus (2018) reported that several sectors including services, financial services, high-tech, healthcare, education and manufacturing industries are pressurized by their management and clientele to use the cloud applications for data analytics (Figure 2,3). This means that industries shown in the Figure 2.3 will depend on the cloud professionals to carry out duties for data storage, data maintenance, and development of cloud applications. Subsequently new job openings as cloud analytics will be generated in the tech-dependent SMEs, which can offer employment opportunities for women professionals.

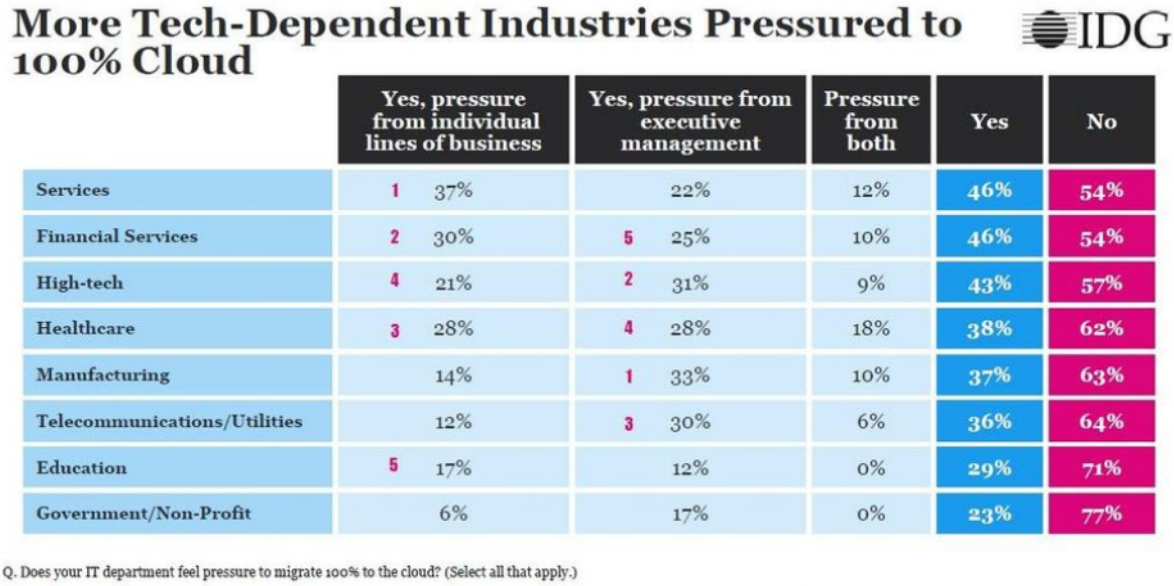


Figure 2. 3: Data Showing the Pressure on Companies for Adoption of 100% Cloud.

As a result of digitalization of Saudi economy and society, the cloud applications are also being widely developed and used in Saudi Arabia, which means that various sectors including the financial services, high-tech, healthcare, manufacturing and telecommunications/utilities, education and government organizations may offer the career opportunities in digital technologies for Saudi women. Of note, the career opportunities available for Saudi women in the sectors shown in Figure 2.3 largely depends on the extent and scope of the technologies in the respective industries and firms in the context of Saudi society. It will be interesting to reveal the nature and scope of employment opportunities available for Saudi women in the business, government institutions, and educational institutions as a result of digitalization of economy.

2.4.5 STEM Technology and Opportunities for Women

Ernst et al (2018) reported that digital technologies employed for the growth of science, technology, engineering, and mathematics are increasing the job opportunities for women. Agreeing to the point of view of Ernst and his colleagues, Holtgrewe (2014) reported that culture of organizations in favouring the inclusion of women in the workplaces is another key factor along with innovative culture for promotion of women's roles requiring the skills in the

use of digital technologies. Lachenauer (2018) quoted Khandelwal at the 'Grace Hopper Celebration India Conference' in this way: "Digitalization is a change for everyone, regardless of gender, and I encourage you to be open-minded and stay curious. Ultimately, the nature of women need to go through the change which will help women to get the roles across industries and more importantly, into positions of leadership".

The above discussion clearly highlight that new job avenues can be created as a result of increasing applications of artificial intelligence and cloud computing tools across SMEs in the developed and developing worlds. The developing world such as countries in the Middle East are increasing favouring the digitalization of science, technology, engineering and mathematics fields and SMEs engaging in the applications of digital technologies, which offers concrete employment opportunities for women.

2.4.6 Digital Technologies in Gaming industry

Moreover, Kerr and Kellerher (2015) investigated the women's employability in the gaming industry, and reported that gaming companies prefer to employ more women with capabilities of communication (both written and verbal), empathy, diplomacy and management of emotions. Jarret (2016) also posits that the social media tools are used by women to obtain fun and pleasures, however, the productively working with social media tools can represent an important form of 'women's work' (Jarrett, 2016). Duffy and Schwartz (2018) argued that transformations in digital media economies have given birth to new job opportunities for women working with digital media tools. They further found that the women with emotional and communication skills are highly valued and exploited by the digital media markets and economies, which indicates that growth of digital gaming industry can offer job avenues for female workers in both developed and developing worlds.

2.4.7 Educational Technologies and Opportunities for Women's Employment

Educational technologies are no longer about making the textbooks available online or the usage of tablets in the classrooms. According to Gomez et al (2014), educational technologies are set to refine the resources used in educating students, and ultimately will deliver the positive outcomes on the students' academic achievements and society. There are several educational technologies-related products have been created and launched in the education sector, such as video-contents, immersion technologies, tools for adaptive learning and gamification which have changed the ways students learn in classrooms and at homes (Yusuf, 2005; Laurillard, 2008). The digital skills relating to apply the gamification for enhancing collaborative skills and delivering socio-emotional learning, adaptive learning tools for tailoring educational programs to the individual needs, immersive technologies for mimicking the real-life settings while teaching courses relating to medicine and engineering (McMahon et al., 2015). Women in Saudi Arabia can obtain digital skills in the afore-mentioned educational technologies in order to find job opportunities in the education sector. The government, businesses and academic institutions appears to be logical partners in supporting the programs intending to support the digital skills of Saudi women.

Saudi Arabia has increased investment in educational technologies as part of the Vision 2030 program aiming to transform the education system with induction of digital technologies in schools, colleges, vocational training institutes and universities (Khan, 2016; Nurrunnabi, 2017). Companies involved in developing and delivering educational technologies are investing in their workforce's training to enhance the volume of services given to educational institutions ((Becker et al., 2017), which suggest that women can enjoy job opportunities in companies having expertise in development of technologies.

These data indicate the women in Saudi Arabia have employment opportunities due to the increasingly proliferation of educational technologies. Nevertheless, it is still in speculations whether the companies in Saudi Arabia provide the training opportunities to Saudi women for refinement of services given by educational institutions, and consider to give career opportunities to women in the digitalizing educational market of Saudi Arabia. The availability and exploitation of career opportunities by Saudi Arabia depends on the training in workforce for enhancing the portfolio of educational services offered by educational institutions in Saudi Arabia. The data from this study are most likely to highlight the level of career opportunities available for women in applications of educational technologies in Saudi labour market.

2.4.8 Social Media Tools and Employment Opportunities

The growth of social media technologies has given tremendous impetus to the opening of new job opportunities regardless of genders. It made possible working at home, especially for women. The women connected to internet can easily perform so many tasks such as marketing of products, providing teaching services, serving as marketing managers for companies located in different parts of the world. The availability of social media tools created the inviable labour for the workers irrespective of genders, and Crain et al (2016) further defined work mediated by social media as "activities.....workers perform in response to requirements (either implicit or explicit) from employers and that are crucial for workers to generate income, to obtain or retain their jobs, and to further their careers yet are often overlooked, ignored, and/or devalued by employers, consumers, workers, and ultimately the legal system itself (p. 6). The preceding statement of Crain and his colleagues carries a great significance in terms of highlighting the potential of social media application in empowering the individuals in society. The empowerment may come in the form of generation of income and expression of thoughts. The main focus placed by employers recently is on the advertising potential of social media

platforms, which help the women and men having expertise and skill in building their social networks to further their careers.

As the females in the male dominated societies such as Middle Eastern countries are preferred to stay at home, so the usage or working with the social media opens up new employment opportunities for women (Gandini, 2016). Several scholars have mentioned about the employability of the individuals, especially women, resulting from the use of the social media platforms (Corrigan, 2015; Duffy, 2017; Kuehn and Corrigan, 2013). The media industry is propelled by the networking skills of workers, which is recognized by the management of companies. The creative activities and posting of contents by the users of social media tools are greatly valued by the media industry (Jarrett, 2014).

Jones (2016)] argue that mostly workers on social media work for companies in the background, so they can be called as 'invisible workers. The workers on social media are primarily motivated by 'work for exposure' rather than for material gains (Corrigan, 2015; Duffy and Pruchniewska, 2017; Kuehn and Corrigan, 2013). In Saudi context, it is important to get the views of women to what extent they grab these opportunities to advertise their home-made products via the social media platforms such as YouTube, Instagram, WhatsApp, and Facebook,, to reach local and international employers as suggested by Creedon (2014) and to what extent social media facilitate Saudi women's social networking that increases empowerment coupled with economic gains through selling of domestic products to wider community.

Taken together, these data suggest that social media industry offers a variety of career opportunities for young women who developed the creative and networking skills through the applications of social media tools for communication with others. If Saudi women aiming to pursue careers in the digital technologies employ their networking skills to help companies advertise products, scale up the distribution and selling of products to the customers, they can

gain sufficient economic benefits out of that while sitting at homes and suffering the hassle of working and commuting with men for undertaking the firm-based workers.

From the discussion in this, it is evident that proliferation of digital technologies has generated employment opportunities, but there is no evidence about the extent the set of these employment opportunities is equally available in different socio-cultural settings. This warrants the need to explore the employment opportunities in different research contexts, and their level of availability for women belonging to a unique cultural settings. In addition, the employment opportunities arising from digital technologies will be available for those women who fulfil basic criteria of selection in terms showing the right set of digital skills and competencies and the training to employers. This means that available employment opportunities for Saudi women are conditional upon their digital education and training fitting into the employer's criteria or sufficient enough to kick off their start-ups. How much important is digital education and education for women's employment is elaborated from the perspectives of different researchers and scholars in the next section.

2.5 Digital education and Training for women's Employment

Putting aside for the moment national government initiatives to encourage women's participation in the new technological work-place, I will first emphasise in this section how vital it is to consider research which has cast the spotlight on school-level education on an international level as evidence that the outlook for women is not encouraging in the technology domain.

Here, Fountain (2000) and Corneliussen (2014) found that the exam results of high school girls indicate a decrease in technology subjects. Indeed, Fountain goes on to argue that there is a set of clear factors that interfere with women's ability to achieve in the technology domain. Corneliussen (2014) then adds a final factor of state education and employment policies, which

need to be updated to provide equal opportunities in the name of maintaining growth in the knowledge economy.

Continuing the focus on the international level, Nedeva (2013) points out that in their search for the best employment opportunities after graduation, young British women have received wide attention recently in the field of technological education and more generally in the STEM subjects. Yet the digital economy is global and even while the United States of America continues to dominate the sector, technology enables multinational collaboration, problem solving and partnerships. The United States, for example, employs a workforce from India, Russia, Eastern Europe, Southeast Asia and South Africa.

In her famous manifesto, Haraway (2000), championing the women's participation in the labour market, goes further in arguing that American women are starting to work with technology in male dominated digital sector. Moreover, the women of Europe are also beginning to work with new technologies. Hence, in looking at the nature of the gendered labour force, Williams and Edge (1996) pointed out that the flexibility inherent to technology tends to lead to equality between men and women. They concluded that flexible working nature afforded by digital technologies can serve as an important means for women's empowerment in the digital era. These arguments are important to gain an insight into the women's entry into the labour market of different developed countries, which is interesting to explore in Saudi context in order to have better understanding of employment opportunities offered by digital technologies to Saudi women. Though the cited studies have also addressed the equality concept of men and women in the digital market, however, my study does not address the research question relating to equality of men and women, as the digital sector is emerging in Saudi Arabia, therefore, it is logical to look at the potential employment opportunities for women.

I will also add that, more recently, the evolution of women's participation in the highest levels of digital technology development has emerged in a pronounced way. Jeong and Breazeal (2017), the founder of the Jibo Personal Robots Group at Massachusetts Institute Technology

Media Lab and who teaches in USA, claims that the future of robotics is bright. She points out that nine women - namely, Cynthia Breazeal, Lydia Kavraki, Fei-Feili, Andrea Thomaz, Ruth Schulz, Ayanna Howard, Ayorkor Korsah, Stephanie Lacour and Marita Cheng - have supported and designed the processes of robotics and artificial intelligence and created new models of computer vision including prosthetics.

Taken together, the education and training are key indicators for preparedness for women to exploit the job opportunities created by digital technologies. The women's participation in the developed world can be partially attributed to the equal opportunities for women in the education systems in the USA and other developed countries, however, several scholars argue that disparities in the male and female in the job market are still found even in developed countries, and participation of females in the job is not at par with the that of men (see chapter 2, section 2.6), which might be indicative of some flaws and weaknesses either in the training and education for women, thereby leading to lapses in delivery of digital competencies which are demanded by the employers. It is interesting to review the digital competencies and employment opportunities; therefore, the next section will illustrate the levels of digital competencies required by women for improving their employment prospects.

2.5.1 Levels of Digital Competencies for Women's Employments

According to a report, around 85-90% of the potential workforce will be required to possess the ICT skills in order to perform the key functions in organizations, thereby suggesting the development of digital skills and competencies is an important aspect of the policies and programs aimed at increasing the employment opportunities for women (Economic and Social Council of United Nations, 2018). According to report of Broadband Commission for Sustainable Development (2017), the major cause of low employability of women is poor digital competencies such adaptation and creation of digital technologies to suit to business needs, which results in employers giving preferences to men for fulfilling the ICT-related roles in businesses in OECD countries. The recommendations suggested that initiative aiming to put the

women at work must target the provision of necessary digital skills. Broadband Commission for Sustainable Development is an international agency sponsored by UNESCO (United Nations Educational and Scientific and Cultural Organization) and ITU (International Telecommunication Union), and aims to promote digital skills among users of digital technologies (Broadband Commission, n.a).

Some other researchers commented on the relationship between digital skills and employment opportunities for women in the labour market. Van Dijk and Van Deursen (2014) argue that digital competencies are not only essential for doing things within organizations, but they are also vital for creating sustainability within the social and civic domains of life. The requirement for women to perform the domestic work, quality of life and digital competencies are considered to be some important determinants for ability of women to start ICT-related careers and availability of employment opportunities in the in the future digital technology-oriented labour market (Pande and Wide, 2012).

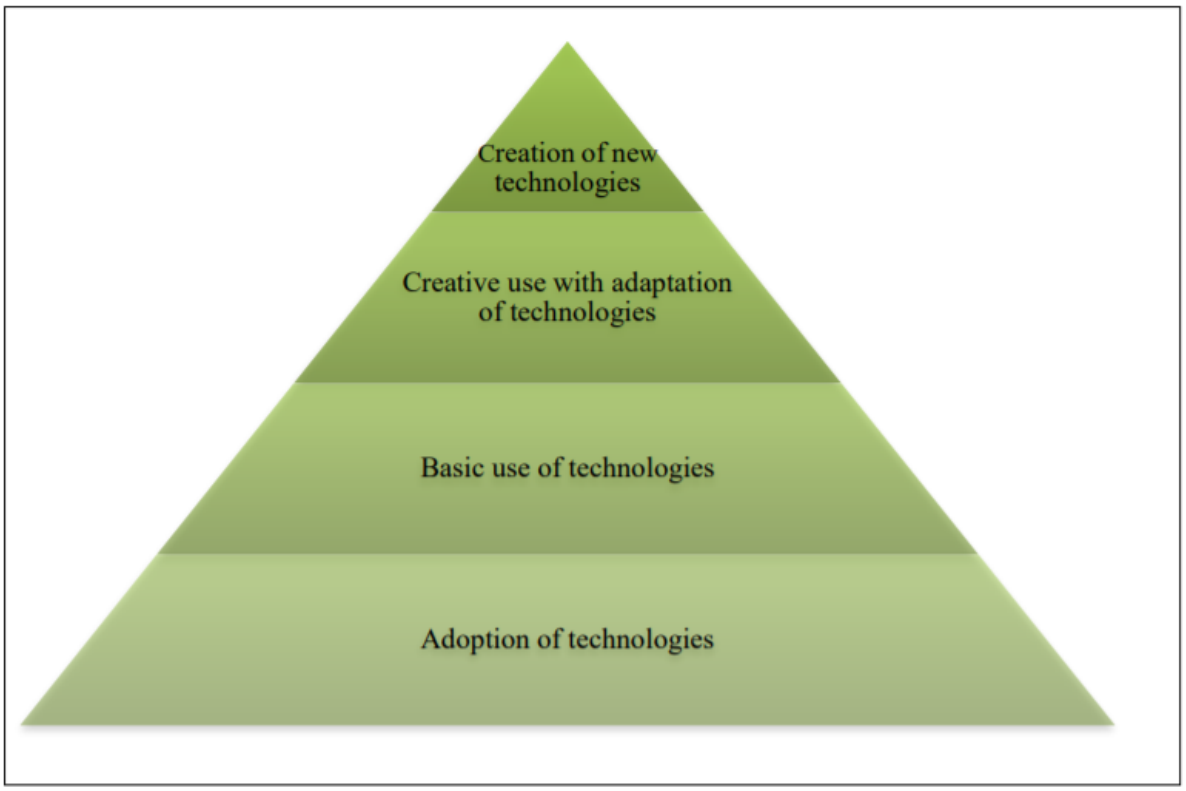
The employers may require digital competencies of different levels on behalf of women in order to consider them fit for performing the organizational functions (Pande and Weide, 2012). Therefore, Eshet-Alkalai (2004) places emphasis on the diversity of skills including the technical, social, cognitive skills in order to work with the digital technologies at workplaces and homes as well, indicating the complexity of the digital skills and competencies which is beyond the digital literacy. The digital literacy involves using the ICT tools for searching information, retrieving the required material, and ability to use the digital tools for communication with others. The concept of digital competencies has become multifaceted, and will keep evolving with the inventions of new ICTs tools and applications (Ferrari, 2013).

In order to exploit the future employment opportunities, Rowbotham (2017) articulate that women are required to enhance the adaptability to the ever-evolving landscape of digital technologies. He further pointed to the following major drivers which can play important role in determining the level of skills and competencies required by women to enter into or stay or retain the employments: data processing and diffusive power of sensing technologies, automation speed of the workplaces, development of ICT-enabled social media and communication tools, and reorganization of work environment with the aid of the social media applications allowing the emergence of online collaborative workplaces (Rowbotham., 2017).

Several organizations have attempted to define the digital competencies which are part parcel for the future job opportunities for women. For instance, International Telecommunication Union (ITU) emphasised that soft skills such as interpersonal, communication and leadership competencies are essential to occupy the leadership positions in the tech-dependent SMEs. The basic digital skills involving the use of technologies for communicating with colleagues and transferring of the confidential information the higher leaderships are required by women in order to obtain the clerical and floor managers jobs in the SMEs (ITU, 2018).

Work Economic Forum (2016) has reported the possession of the cognitive/physical abilities, basic skills involving the content processing competency, social systems and digital technology-aided problem-solving skills are harnessing the future job opportunities for women in the tech-dependent SMEs. OECD (2016) reported that girls cannot harness the potential job opportunities in the global labour market, unless if they have competency in understanding, using and adopting the digital technologies, and committed to the life-long learning process for adapting to the changing digital landscape, and competent in digital entrepreneurship, ICT-enabled communication skills and logical thinking.

DiMaggio et al (2004) described the four key levels which are important for enabling women to participate in the future labour market for increasing the economic empowerment, which include the adoption of technologies, basic use of technologies, creative use with adaptation of technologies, and creation of new technologies (See Figure 2.4).



TFigure 2. 4: The Pyramid of Digital Technological Skills. Source: DiMaggio et al (2004).

These skills of women at each level of the pyramid of ICT skills as shown in the figure 2.4 predict the availability of employment opportunities for women at different levels of their career, such as exploitation of job opportunities at basic and advanced levels will depend on the knowledge and skills possessed by women at the respective level of careers. Similarly, the promotion of existing female employees to higher level of digital career will also hinges upon the acquisition of skills by women. Hence, description of digital skills at different levels of digital careers as described in this section may help me to gain insight into the viewpoints of participants about the digital skills of Saudi women to harvest employment opportunities resulting from the digital proliferation in Saudi Arabia. The literature presented in this section will enable the current researcher to interpret the data effectively.

2.5.2 Skills at Adoption Levels of Technologies

The digital competencies required at the adoption of technologies level include the provision of basic education and literacy, and sufficient insight into working and utilities of technological devices and services (Gurung, 2018). The basic use of technologies level involves the women to show the basic understanding of software applications, security concerns of digital technological use, digital privacy, data storage methods and solving problems through the use of digital devices (Goransson and Rolfstam, 2013). Furthermore, women's competencies is not a standalone factor, there are some other factors such as skills of collaboration, communication, generation of novel contents which can complement the digital skills, and collectively can play a critical role in economic empowerment of women. The adoption level of skills in terms adopting technologies to meet their own daily needs is necessary for all women for their successful participation in the labour market (Barua and Barua, 2012).

Gurung (2018) revealed that digital literacy for all making the individuals and companies to adopt the digital technologies is a fundamental requirement for full participation in the digital society. The knowledge of the existing and emerging digital applications, privacy and security while using the digital applications equip the individuals with skills to extract the key and useful information from the internet sources rather than being a passive target for online advertisements (Gupta, 2015). The basic knowledge of working and functions of digital technologies are useful sources of improving efficiency of women in using the digital applications productively, especially for economic empowerment, and optimize the usage of various forms of digital devices for increasing the chances for employment in the male-dominated digital market (Leach and Turner, 2015).

The skills discussed in this section seem to be important for women to use the digital technologies at the adoption level which can be applied to perform digital technologies-assisted tasks to earn money. For example, women use social media to chat with their friends and family

members, which might be used to market products to members on social media to earn money. The acquisition of basic knowledge and skills can help stakeholders (businesses, government and academia in this study) to assess the suitability of digital career at earlier stages of digital careers to be pursued by Saudi women. Of note, women possessing digital skills at this level does not necessarily mean that they intend to pursue the digital careers resulting from digital proliferation in Saudi Arabia. Therefore, some advanced level skills are critically important for employers to consider females candidates for employment opportunities arising from the digital proliferation in Saudi structures (business, government and academia) as described by structuration theory.

2.5.3 Creation and Adaptation of Digital Technology

The levels of creating and adapting to the digital technologies are more suitable for the ICT professionals (Rashid, 2018). The women aspiring to embark upon the ICT-related careers are required to show the basic computing skills and sufficient understanding with the basic software and algorithms, codes, generation and dissemination of contents, working with teams, and promotion of logical thinking through the digital devices (Herbert, 2017). The employers will look at the afore-mentioned skills in order to evaluate women's suitability for particular positions in their organizations. The computing skills of women is interesting to be explored from participants' perspectives, as they may affect the availability of job opportunities for Saudi women arising from the digitalization of organizations in Saudi Arabia. Moreover, structuration theory also suggests as described earlier that organizational leaderships (stakeholders) interact with agents (women in my research work) to assess the preparedness of agents for joining ICT careers.

After having the expert knowledge and skills in creation and adaptation of digital technologies such can enable women to successfully grab employment opportunities if they have

programming knowledge, and skills (Clarke et al., 2012). The individual with skills of adapting to digital technologies can easily modify the functions of the existing digital devices and software to fit into their business needs, and is only possible if the companies and individuals had prior knowledge of the basic usage of such systems within a particular business environment. The individuals with basic understanding of algorithms, software and devices make use of the online sources for creating digital applications which satisfy the business requirements (Kane et al., 2015; Melhem et al., 2009).

Melhem (2009) argue that professional degrees in Computer Science is not essentially for women to be ICT professionals, however, the college level courses in programming languages, and statistical knowledge or industrial level training in using the big data analytics and statistics are prerequisite for women to become skilful in creating and adapting to the digital technologies. Rashid (2016) demonstrated that labour market in developing countries are in need of individuals who are able to modify or redesign the digital technological devices and tools for fulfilling the evolving business requirements. Hence, women with skill of localizing the emerging technologies are fit for competing with women for the employment opportunities in the tech-dependent SMEs (Antonio and Tuffley, 2014). This is an interesting observation which can be extrapolated to Saudi context, and help develop research question of whether the women in Saudi Arabia are given the knowledge and training in creation and adaptation of digital technologies.

Women in the advanced countries carry advantageous position compared to the women in developing countries to learn the skills of creating and adapting to the emerging digital tools, as they have more sophisticated infrastructure, social resources for obtaining high-level trainings for introducing and modification of the existing digital devices (Rosenthal, 2008). Similarly, in developed countries, women would have the opportunities to learn machine learning techniques

and usage of the intricate algorithms which are essential for creation of new technologies (Bandura, 2002).

Hafkin (2002) argue that inclusive policies for labour market cannot be successful unless the developing countries focus on providing education and training to women in adapting to the existing technologies and creation of new technologies. The digital skills relating to creation and adaptation of digital skills may vary for different sectors. For example, banking sector and the manufacturing industries will require different levels of education and experience in modifying the digital technology to suit to their business needs. The countries with dominant manufacturing sector require the skills in automation, developing and operating robotics technologies and knowledge of Internet of Things (Avgerou, 2008).

To sum up, most of the research cited in this section belong to the developed world, and based on the information presented, it can be argued that development of digital competencies is a key factor in increasing the impact of digital technologies on increasing the women's employment.

The perceptions of stakeholders about the digital competencies and potential employment opportunities created by digital technologies are most likely to reveal the degree of impact of digital technologies in improving the employment opportunities in tech-dependent organizations in Saudi Arabia. Therefore, it is critical to understand the roles of social institutions such as governments, business organizations, and academic institutions with regard to the enhancement of women's digital competencies.

Taken together, it can be concluded that digital competencies ranging from the adoption and basic use of digital devices and tools to the adaptation and creation of existing and new digital technologies are of utmost important for women to participate in the labour market. The

interaction of structures/stakeholder organizations with women will be determined through the level of digital competencies possessed by Saudi women. Therefore, designing questions about the perceptions of stakeholders about the relationship between women skills and employment opportunities were included in this current study.

However, it is not clear to which extent the digital competency is an important factor for widening the employment opportunities for women in Saudi context. The impact of digital technologies on increasing job opportunities for women cannot be assessed thoroughly, unless the knowledge about the education, skills programs, training opportunities for Saudi women aspiring to pursue career in the digital technologies is gained. The very knowledge and skills of digital technologies will enable Saudi women to find their ways into the labour market in Saudi Arabia.

After having discussed the different levels of digital competencies at various stages of career opportunities, it is important to determine which social players/stakeholders e.g. government, employers, and academic institutions in the case of my research) can help improve the digital skills of women through the provision of education and training opportunities.

The digital technologies are not all about offering the opportunities for women's employment. Despite the availability of employment opportunities and with right level of digital competencies possessed by Saudi women, they may not be in position to harness the employment opportunities for women globally in general and Saudi women in particular, unless and until there is acceptance of women's employment in digital technologies. There might be some obstacles in the successful participation of women at socio-psycho-cultural level. Therefore it is very important to have extensive discussion around different socio-psycho-cultural obstacles which might affect the participation of women in general and Saudi women in particular. The next section gives discussion around the obstacle to women's participation in the digital technologies-mediated labour market

2.6 Obstacles to Women's Participation in Technological Workplace

The globalisation of technology is having an impact on Saudi Arabia in ways that cannot be ignored, creating a tension in Saudi society between conservative members who promote the status quo and liberals who support women's issues (Nasseef, 2015). In terms of women and technology, most studies (e.g. Metcalfe, 2008; Elamin & Omair, 2010; Binsahl et al., 2015; Nasseef, 2015; Abalkhail & Allan, 2015) highlight women's issues from a global perspective, but those that focus on Saudi women mostly discuss employment and the work-place.

I may conclude here that there is an absence of research exploring the specific obstacles faced by Saudi women in the technology field and their related issues. Thus, I have intended the literature review to fill the gaps in the existing body of knowledge regarding issues of social perceptions or bias, male domination in the workplace, women's own desires and ambitions and the role and support of family.

Several studies have highlighted the fact that the use of the digital ICTs does not mean that it always empowers them. The access to the digital ICTs, as argued by Antonio and Tiffley (2014), that women's access to, training and the use of the digital ICTs must be examined in terms of the existing and potential opportunities in the labour market. According to Gil et al (2010), there are four key factors which serve as key social barriers to access the purposeful use of the digital technologies, which include "exclusion from technology education and design; limited free time; social norms favouring men; and financial and/or institutional constraints" (p. 678). Hafkin (2005, p.5) identified the 'collateral cultural factors' which are defined by "cultural attitudes based in gender bias, and not the immediate gendered identification of technology use".

For example, the girls at boarding schools were banned to attend the classes designed to train women for using digital ICTs in Uganda, similarly, men in Nigeria including politicians and policy-makers consider that women cannot benefit properly from the use of digital technologies, so it is the wastage of resources to train them. The social and cultural perceptions consider the men are at the higher advantageous position in terms of harnessing the digital resources effectively for career progression and social perceptions (Olatokun, 2009).

Olatokun (2009) also agreed to the views of Hafkin (2002) that exclusion of females from the access to the digital technologies is the collateral cultural barrier which need to be overcome through the awareness and empirical research showing the full-swing benefits of digital ICT' use and training for women and subsequent positive impact on the social and cultural fabrics. Although there is much debate on inclusion and exclusion of women from accessing the digital technologies from both developed and developing context as elaborated above, there is dearth of information from Saudi context, how leadership controlling and regulating employments in digital technologies in government, business and academic organizations think of women's upbringing, socialisation, education, and moreover about their ability to access to training…and to what extent these have implication on raising employment prospects in digital technologies for women in the Saudi context.

2.6.1 Perceptions of Society and Culture

I turn now to societal and cultural perceptions of women's education and employment, beginning with Prasad and Sreedevi (2007) observation that sociocultural norms still control women's access to IT and so discourage interaction between both genders owing to segregation in schools in the education system typical of Arabic countries. One of the foremost studies here is Hofstede's exploration of how the Gulf culture views gender through the cultural dimensions of masculinity and femininity. His cultural dimensions' theory provides a framework for cross-

cultural communication, describing the effects of a society's culture on the values of its members and how these values relate to behaviour (Hofstede, 1998).

Moreover, a critique of patriarchal structures, a more recent study shows that a gender-segregated culture is an important factor influencing Saudi women's use of technology (Binsahl et al., 2015). Alhareth et al (2013) recognise that there are two competing values in Saudi society: keeping up with the technology revolution while at the same time preserving religious beliefs and cultural values. In their study, Al Alhareth et al. (2013) give the example of e-learning as an important issue in Saudi Arabian culture, arguing that some members of the society may not accept new technologies.

Indeed, the customs and social-cultural trends that continue today can be shown to reduce the level of participation of Saudi women in the development of their country alongside men. In effect, a conservative interpretation of the state religion continues to be applied to justify women's life choices and determine their career options (Elamin & Omair, 2010). From this patriarchal socio-cultural framework follows the belief that when women are in contact with men, whether be it in the work environment or another place, such contact may damage a women's reputation (Metcalfe, 2008).

Cultural and social norms specific to any society can be discriminatory against women, whereby preventing the access of women to the use of digital ICTs. For example, cyber cafes in Muslim countries including Saudi Arabia are not considered safe for women to visit alone. The outdoor online activities and the use of digital technologies are deemed fit for women rather than men in the Middle Eastern countries.

Taken together, the socio-cultural belief still persists across the world today that there are clearly demarcated men's and women's occupations. Indeed, I might argue here that gender bias also encompasses education, where it is commonly held that STEM subjects are better suited to boys. Moreover, in the case of technology, there is the common perception that women play a far greater role as consumers rather than creators or producers. These social-cultural beliefs contribute to the low participation rates of women in technical education, technology-related employment and in the actual creation of new technologies (Goldin, 2006).

On a more practical level, Lee (2011) observes that the women and girls currently working with ICT are "anxious to adapt to the female image" (Sagebiel & Dahmen, 2006: 11). As Mahoney (2001:171) indicates, "The door may be open, but the world beyond it does not invite entry. Computing is a masculine world, in which women do not feel comfortable." Thus, Corneliussen (2014), Godfroy & Unwin (2005), Phipps (2007) and Adam et al. (2005) all conclude that women are still seeking to achieve a balance between femininity and technology in order to increase their participation in the domain of technology. Prasad and Sreedevi (2007) make a more focused recommendation that women should have a clear vision of their role in ICT development, particularly in terms of using ICT for economic and social empowerment, rather than remaining marginalised in across the domains of new technology.

Moreover, Gibbs (2014) reinforces the evidence of this absence, stating that for the past ten years, cultural norms have clearly functioned as barriers to women's entry and retention of positions in engineering, while female participation in technology has not developed to any significant degree.

2.6.2 Gender Stereotypes

I will turn now to one element of socio-cultural inequality and agree with Aljami (2001) that gender stereotyping in Saudi Arabia extends to gender segregation in schools and the labour force thereby controlling and restricting women's independent development. Within these male-dominant socio-cultural structures there is then a prevailing belief that the nature of the female body and mentality naturally favours their role as homemakers and carers of the family unit (Elamin & Omair, 2010). As Alajmi (2001) summarises, Saudi society has a gender-specific picture that "men are breadwinners and women are caregivers". I would state here in relation to the studies of Sorensen et al. (2011) and Goldin (2006) there are those who believe that femininity and technology are incompatible, suggesting that working with technology is exclusively for men.

Such widespread social use of gender-role stereotypes hinders women in attaining a high level of career opportunity (Metcalfe, 2008). Another corresponding perspective emanates from the cultural nature of the Saudi nation in regard to the division of labour where, for instance, men work to provide financial support, while women have to be good mothers in the role of caring for the children. In such circumstances, women's employment and career plans are not considered essential and are therefore deemed unnecessary (Tlaiss & Kauser, 2011).

Moreover, if a woman's understanding is that employment could damage her family, she may feel compelled to make personal concessions in order to maintain the family unit and fulfil her domestic duties (Nazzah, 2004). In such circumstances, Wajcman (2007:289) emphasises that in relation to professional work, "Women's reluctance 'to enter' is to do with the gender stereotyped association of technology as an activity appropriate for men".

Carlson (2013) conducted a survey in Afghanistan to find the reasons behind the low literacy of women in digital education, and it was found that women are discourage to participate in the digital training courses and workshops, as they are dependent upon men to take permission for schools and college level education. Intel (2013) performed surveys in India and Egypt to investigate the reasons behind exclusion of women from the use of internet and digital ICTs. The outcomes of survey showed that most women said that they were not able to access to use digital technologies, as friends and family members disapproved the use of digital ICTs, and women in Indian were of the view that the skills and competencies for using ICTs are appropriate for them due to the nature of their household work.

Carlson (2013) further reported that women are considered for carrying out the domestic work, and looking after children. Therefore, they do not have enough time to spend with digital technologies in order to learn and gain economic gains through the use of the digital ICTs. This means that allocation of household duties for women and outdoor responsibilities to earn bread and butter for families constitutes a substantial psychological barrier for women to use the digital ICTs for empowerment. These data reflect the gender-biasedness towards the digital education and exploitation of employment opportunities resulting from the proliferation of ICTs in everyday life.

Another gender-based barrier for women to gain access to the use of digital ICTs is the social preferences of families. The education of sons is preferred over that of the daughters by parents, which keep women illiterate and devoid of necessary digital competencies which are necessary for employment of women in the tech-dependent SMEs (Dlodlo, 2009; Hafkin and Huyer, 2007; Intel, 2013; Kumar et al., 2010; Carlson, 2013). Hilbert (2011) also showed in a survey carried out in 11 Latin American countries that gendered attitudes is another barrier in the use of digital technologies despite the knowledge and awareness of potential benefits of digital technologies

in online banking industry, e-business and e-governance. The results showed that women in Latin American countries are keenly interested to gain education enabling them to learn as to how to use ICTs, but they are less eager to exploit the employment opportunities arising from the use of digital ICTs.

Intel (2013) also pointed to the gender stereotypes in preventing the access of women to the use of internet and digital ICTs and the resulting opportunities in the socio-economic sectors. The men are regarded better fit for using internet, and are equipped with skills to exploit the opportunities from the use of digital ICTs. This puts women at the risk of becoming excluded from the labour market becoming richer with the tech-dependent SMEs. Suwana (2017) argued that gendering the digital technologies has become tool of exacerbating the pre-existing gender inequalities rather than narrowing it down. Antonio and Tuffley (2014, p. 676) also voiced this concern in the following way: "without careful planning, it is likely that ICTs will exacerbate differences between men and women as diffusion and use of ICTs and their benefits tend to follow existing contours of income and economic divides, with the poor being further marginalised or excluded".

Taken together, data presented in this section is relevant to my study, as data gathered from the representatives of government businesses and academia groups may unfold the extent to which male stereotypes is associated with the digital technologies-related employment opportunities. Inclusion of both male and female participants from business, government and academia groups in this study may enhance our understanding of male stereotypes as a barrier in the conservative society such as Saudi Arabia. If male stereotypes is detected in my study as was described by other studies cited in this studies in different socio-cultural setups, then it may leave negative effect on availability of employment opportunities in digital technologies for Saudi women. After having gained an insight into the gender stereotypes associated with digital technologies-

related careers, I will be able to compare and contrast the outcomes from my study with the literature cited in this section.

2.6.3 Societal ideologies of Women Seeking Employment in Digital Technologies

Various authors have highlighted the fact that women have become vulnerable to being controlled if they use and have access to the digital technologies (Tagny, 2013). The perception of women about being vulnerable to violence and control by men has constituted a barrier to exploit the digital ICTs-mediated employment opportunities. Jensen (2006) posited that if the digital ICTs are not designed to narrow the gap in the gender inequality, instead it becomes a tool for promoting private interests, then such technologies would deter women from participating in the use of the ICTs. The influence of private entities and interest on the use and access to then digital technologies is also more likely to widen the gap between rich and poor women. According to Newsom and Lengel (2012, p. 33), "The technology of the web carries a number of patriarchal and male connotations that function as gatekeeping barriers for information flow".

The role of private businesses in promoting the online sexual violence is viewed as a threat to the use of digital ICTs by women. Chami (2014, p. 38) argued that "control of the Internet by big business has also seen the normalisation of violent sexual imagery in online cultural products". Many authors have voiced for structuring laws and policies in order to prevent the violence and control against women using the digital ICTs, so that women can gain more confidence to take part in the employment opportunities offered by tech-dependent SMEs (Chami et al., 2014; Tagny, 2013).

Sarwari et al (2013) reported some case from Pakistan that women using ICTs are being harassed, monitored in order to be blackmailed by men, threatened and subjugated by male

partners and family members. The authors further highlighted the women using ICTs are at more risk of hour-killing, character assassination and prevention of access to the digital ICTs, which disallows them to gain empowerment through the use of ICTs. Moonlman (2013) highlighted similar dangers for women journalists and other professionals who try to obtain employment opportunities offered by social media tools. Women are reported to become victim of the hate and discriminatory campaigns on the social media, and one of victims of such hate campaign is Sarkeesian; Moolman commented on the case of Sarkeesian in this way: "the normalisation of violent behaviour and the culture that tolerates violence against women – such as that exercised against Sarkeesian – mimic trends offline" (p.39). Gendered social norms serve as an important factor in barring women from exploiting the online employment opportunities for women, and which was observed in the case of Sarkeesian.

UN Report also reported the discouragement of women occupying leadership positions, activists, and journalists and bloggers to encounter the online abuse and discrimination to avail the ICTs-related employment opportunities in tech-dependent SMEs. The abuse campaign against human rights activists nominated by UN was the fine example in which anonymous campaigner launched campaign against her, and called for gang raping her. Such incidents are discouraging for women to use and work with digital ICTs in order empower themselves (Moolman, 2013).

Taken together, violence and control seems to be a major discouraging factor in thwarting women to pursue their careers. However, there is no data regarding the extent of control and violence exerted by social forces on Saudi women. In the presence of social pressures at ideological levels, Saudi women might not be able to fully exploit the employment opportunities arising from digital technologies. Therefore, I speculated that control and violence exerted over women at societal ideological levels may belittle the impact of digital technologies on women's pursuance of digital technologies. The outcomes of this study are more likely to reveal the social

ideologies which may enhance or reduce the employment opportunities in digital technologies for Saudi women.

2.6.4 Male Domination and Traditional Family Relations

To continue with this theme of the patriarchal structure of Saudi Arabia, I would underline male domination in society as a well-documented phenomenon in Arab cultures and is an issue that is the subject of ongoing efforts to find a balance between male and female roles, responsibilities and opportunities. It is in the family then and the imbalance between male and female power within the traditional structures, that the nature of women's education – and specifically, their training in technology – becomes a significant issue before today's challenge of providing modern women with adequate opportunities to compete in the knowledge economy.

Educational opportunities are indeed the key here as Pechtelidis et al. (2015:169-170) argue that in regard to Arab women today, male domination in digital technology is not about gender but rather concerns computer knowledge, "At first glance they all seemed so familiar with digital Gender and Education technology that one might get the impression that technology is not related to issues of gender and power at all. Irrespective of gender, they stated that digital technology was very important to them"

Hence, for Pechtelidis et al. (2015:178), there is another contributing factor that reinforces male domination and affects women's educational opportunities – the tendency of women towards self-exclusion. They argue that "the reason for their [women's] self-exclusion lies in the fact that to assume a dominant position within the technological discourse (i.e. the subject position

of the 'connoisseur'), they need to renounce their socially accepted subject position as 'women'" (Pechtelidis et al.. 2015, p. 178). This point is particularly relevant to Saudi society and more so in the male-dominated technology sector where the notion of self-exclusion creates a challenging environment for women.

In the case of Arab countries, Metcalfe (2008) and Kellerman & Rhode (2007) highlight that there is a significant gap between the rights of women and men; hence, owing to the complexities of Arab/Islamic culture, women do not have equal opportunities to men in every field. Moreover, Sidani (2005:500) notes that women in some Arab countries such as Egypt, Lebanon and Iraq have a more relaxed environment with regard to rights and equality, but "Saudi Arabia retained strict control over women's economic and political participation".

I thus conclude that, in terms of modern employment opportunities, Saudi women are at a lower level of career development compared with those in other Arab countries. Although legislative changes have ensured that Saudi women have achieved some improvement in their situation over time, it is limited and still presents some challenges. Jahan et al. (2006) hence highlight the role of the government in improving the situation of Saudi women; for instance, through the policy to encourage improved education and training.

However, Yusuf et al. (2015) argue that male domination entails that females cannot take full advantage of these opportunities and, as a consequence, employment opportunities for educated females are limited. Elamin and Omair (2010) even go as far as to say that socio-cultural factors encourage male domination in most jobs and inhibit Saudi females from working, with the exception only of those sectors purported to be suitable for women, such as social work, healthcare and education.

I would also take into account here that men may also have a negative attitude toward women's work, particularly in the case of men who are married or have less education compared to those who are younger, have a high level of education and are less bound to tradition. The problem is compounded by the bias shown by men in the workplace, where they are placed in positions of seniority over women (Hamdan, 2005).

One consequence of male societal domination in Saudi Arabia is the negative effect it has on working women (Yusuf et al., 2015). In fact, one reason for male dominance is family roles and here Metcalfe (2008) stresses that the family structure has made men more dominant in the work-place. For Metcalfe (2008:90), women's situation in the Middle East is defined by the societal view that, "women's most important role, according to society, is a homemaker and mother, while the man's responsibility is to support and protect the wife and family". Therefore, according to customs and mores, women should prioritise their children and family ahead of their career path (Le Renard, 2008).

Abalkhail and Allan (2015) also stress that in terms of career advancement in Arab societies, women still needs some assistance from their family to reach senior positions. More specifically, Welsh et al. (2014) argue that male family members in Saudi Arabia (husbands, fathers or brothers) are supposed to offer some support to the females amongst them.

Indeed, one recent trend is for Saudi families to support their daughters in education, and to varying degrees in employment, although some encourage them to continue their education rather than look for a job. Nevertheless, some mothers still prefer to prepare their daughters for the future by encouraging them in traditional household tasks, rather than participation in personal and academic development (Nasseef, 2015).

One important addition here is an early study about the 'new' woman in Saudi Arabia (Bahry, 1982), revealing that as far back as thirty years ago Saudi women were starting to improve themselves by becoming aware of everything around them, such as identity and personality, Saudi Arabia's socio-cultural environment and their family circumstances. Hence, their desire for work has arisen from the need to fill leisure time, obtain social respect and to improve their family's standing.

Indeed, Welsh et al. (2014) argue that the image of Saudi women as passive, submissive and unambitious is wrong; on the contrary, they have motivation, ability and the power to change or participate in the economy. Thus, in view of these discursive and image-related obstacles to women's empowerment as tech workers, I will dedicate the next section to a theoretical survey of recent feminist thought regarding the relationship with women and technology.

2.7 Summary

As this study has seen, advances in digital technology have provoked changes in how each of these domains has approached the question of gender-balanced employment. The employment opportunities exist for women with application of digital technologies in education field, cloud computing technologies in the SMEs, artificial intelligence tools and gamification. In addition, social media tools and teleworking also provide employment opportunities for women. Despite the overwhelming role of digital technologies in employability of women, they have also risked the employment of women in manufacturing industries, for example, automation in manufacturing industry reduced the employment opportunities for women.

Currently, women are under-represented in the jobs requiring the digital skills, which is due to the lack of training opportunities, and socio-cultural barriers against participation of women in

the labour market. There is a need to put an emphasis on the training of women and transformations of socio-cultural values in the favour of women's employment, so that digital technologies-mediated opportunities in the labour market can be facilitated.

The next chapter will present the theoretical framework for overcoming the barriers in development of digital competencies for women, and for improving the women's participation in the labour marker created by the applications of digital technologies.

Chapter 3: A Theoretical Framework for Women 'Employment in digital Technologies.

3.1 Introduction

In the previous chapter, landscape of opportunities resulting from the digitalization of economies and societies is presented, along with discussion on the enablers for and barriers preventing the employment opportunities available for women is orchestrated. The previous literature showed that women's numbers in employment have increased in technology-dependent organizations in developed countries, but there is a lack of research showing the trend of employment created by digital technologies in the developing world, especially in the case of Saudi Arabia (Women Tech Network, 2019). The literature presented in the previous chapter showed the barriers which usually come from the social institutions within the society, which govern the norms of society, interact with women, and determine the size and scope of the career opportunities available for Saudi women in the digital technologies-supported labour market. This indicates that employment opportunities resulting from digitalization of Saudi society cannot be determined without placing the key actors or stakeholders in the limelight. This chapter is designed to present the theoretical perspectives on the elements/stakeholders responsible or involved in process of handling employment for women in technologies in the labour market. The theories discussed in this chapter will help determine relevant stakeholders which can play a critical role for increasing or squeezing the employment opportunities as discussed in the preceding chapter 2 for women, especially in Saudi market. Therefore, the development of theoretical framework is essential to guide the methodological choices at sampling and data collection levels for this study.

The first section gives overview and choice and justification of theoretical framework. The second section will highlight role of different social structures in supporting the women's

capability to harness the job opportunities produced by digitalization of society. The second section presents the literature in relation to digital education and training for Saudi women; the third section elaborates key concepts about the social structures supporting women's digital education and skills. The fourth section describes the current status of women's education and training in the Gulf region. The fifth section illustrates the research gap based on the literature reviewed in Chapter 2 and Chapter 3. The conclusion is presented in section six of this chapter.

3.2 Building Theoretical Framework

In this section, major theories suggesting the applications and construction of technological knowledge and skills for improving the prospects of women's employment in digital technologies are presented. Theories are critically analysed in relation to their relevance to my study, and finally justification for the choice of appropriate theory for my research work is presented in the subsequent subsections.

3.2.1 Social diffusion of technology innovation

There are different theories of adoption and use of technology for changing the economic outcomes at individual and organizational levels. The social diffusion of technology innovation theory stresses on the diffusion of technological innovations to individuals and businesses which have adopted them differently to order to fulfil different individualistic needs (e.g. leisure, fun, employment) in the case of individuals and the operational needs in the case of business-oriented organizations (Hazen and Byrd, 2012).

Meade and Islam (2006) described that diffusion of technologies and innovation to businesses pinpoints the differences in the level of adoption of technologies at different stages of the business lifecycles, and that of the career progression in the case of individuals. They proposed that business lifecycles and progression of careers can be explained through adoption of

technologies suiting to the business and individual needs through social diffusion of technology innovation theory. The adoption of digital technologies does not denote the improvements in the economic status of the individuals and organizations (Hazen and Byrd, 2012), as it requires the technical know-how, learning culture and social system for developing individuals to use the technologies based on the environmental needs (West and Bogers, 2014).

The basic assumption of social diffusion of technology innovation theory revolves around the adoption of technologies by businesses and individuals to fulfil their needs, and most of studies conducted in media and technologies-related domain employed this theory to describe the adoption patterns rather than engagement patterns of individuals with technologies to gain digital skills for career progression (Meade and Islam, 2006). Bolick et al (2007) applied social diffusion of technology innovation to assess the adoption of technologies by educators in the higher education sector. They argued that social diffusion of technology innovation theory is fit to describe the patterns of adoption of technologies at different stages of careers of individuals. Moreover, the social diffusion of technology innovation theory does not take into account functional roles of government, academic institutions and businesses in promoting diffusion of innovative technologies at social level (Kaminski, 2011), which makes it non-idealistic to be applied in the context of this research which aims to explore the employment opportunities for Saudi women resulting from the digital technologies from the selected organizational leaderships' perspectives.

The critics of technology diffusion theory highlighted the fact that it does not stress on the continuous learning and acquisition of new knowledge, shaping and reshaping of technological application to fit into business needs (Meade and Islam, 2006; Pande and Weide, 2012). Kaminski (2011) posited that social diffusion of technology innovation assume that innovative technologies are adopted by the users, but it does not necessarily inform that adopted technologies would be used by adopters to increase the economic prosperity, so its application in the context of economic benefits of adopters may be questioned. As this study investigates

into increasing employment opportunities by training women in the use of digital technologies for improving their economic empowerment. This means that the good understanding of digital technological gadgets and applications, and gaining knowledge about their productive use may ensure the better employment prospects for women in the job market. Moreover, the social diffusion of technology ignores the deep-understanding of digital technologies in terms of their impact on the individuals' motives to achieve the career goals, rather than it addresses the motives of technological diffusion through different strata of society. Therefore, the social diffusion theory seems to be unfit to support the questions raised by this study. Further justification for not using this this theory will be provided in section 3.2.3.

3.2.2 Social construction of technology and theory of technology domestication

The social construction of technology (SCOT) theory described that technology can be shaped and reshaped based on the social contexts in order to serve the individual motives of businesses or individuals (Bijker et al., 1987). Therefore, Harwood (2011) argue that SCOT describes the relationship between the social development and technological innovations, suggesting the role of society and technology in shaping each other. For example, meanings of gender are defined by technology, and gender is involved in shaping the landscape of digital technologies (Harwood, 2011). For instance, the use of computer was advertised to be associated to men, however, this concept was changed when women also started to use computers. Hence, Dixon et al (2014) argued that the gender gap observed in 1990s in the context of using the technological gadgets was significantly reduced in the late 2000s.

SCOT introduces the social group as an important player to decide about the potential design and development of technologies (Jackson et al., 2002). Social groups constitute the members of society who share the similar understandings about the meanings and utilities of particular form of technology. The SCOT assumes that all social groups taking part in meaning and interpretation of technologies under development are equal; and meanings given artefacts are

purely attributed based on the social groups may be employers, employees, customers, designers and so on (Klein and Kleinman, 2002; Djordjevic et al., 2016; Fulk and Connie Yuan, 2017). The social groups have "shared assumptions, knowledge and expectations or underlying belief in relation to the technology", they continued that social groups 'articulate different definitions, identifications, etc. of technology, their meanings in effect giving rise to different artefacts and systems" (Djordjevic et al., 2016, p. 179-180). These propositions highlight that beliefs and perceptions of social groups about the utilities of digital technologies have implications for end-use and productivity of the systems (Pinch et al., 1989). Thorough justification of not using this theory in this research work will be provided in the section 3.2.3.

Theory of technology domestication is another theory which is used by researchers in context of technologies and its adoption by the users (Serensen, 2006, Berker, 2005). The domestication of technology theory describes that users have permanent role in moulding the technologies for their own benefits in their daily lives; and that technologies can be reframed or tamed to fit into interests of the users (Pantzar, 1997). The Theory of Domestication of Technology splits the use of technologies into four phases: 1) appropriation which deals with ownership of technological devices and applications, 2) objectification which is related to capturing the objective value of digital technologies within a social system, 3) incorporation which deals with finding ways to use the digital technologies productively within home or business environment, and conversion which is related to interpretation of digital technologies from the users' perspectives (Serensen, 2006).

In the first phase, owners set up the devices by downloading applications and settings them to fulfil their needs. This phase is mostly related to buying the right technological devices and application to serve the business needs of organizations or personal needs of individuals. The objectification, incorporation and conversion phases are experienced by users during their learning of digital technologies. Without capturing the objective value and real meanings and understandings about the digital technologies and their roles in increasing the economic

empowerment, women cannot be motivated to be trained in digital technologies (Berker, 2005). In addition, specialized knowledge and training are required for women in order for gaining the understanding about the values and utilities associated to the digital technologies (Serensen, 2005). Also, incorporation of digital technologies is not possible without gaining the digital skills and specialized knowledge about the usage of digital technologies for economic gains (Smits, 2006). Berker (2006) contended that theory of domestication of technologies is mostly employed by researchers investigating the acceptance of technologies, the use of technologies or the rejection of technologies in a particular social settings. As this study deals with neither of afore-said themes, that is why it is not adopted for this research work. The though justification of not adopting the theory of domestication technology for the current study will be described in the subsequent section 3.2.1.

3.2.3 Evaluating suitability of SCOT and theory of technology domestication

The critic of SCOT argues that it lacks of any systematic approach for gaining knowledge about the ways and methods which can be helpful in increasing employment opportunities (Klein and Kleinman, 2002; Winner, 1993).

Though social construction theory provides an insight into the construction of knowledge of digital technologies on behalf of users through having belief in benefits and utilities of technologies, but references to the usage of digital technologies for a variety of purposes such as employments and developing careers by working through technologies are not clearly provided. Moreover, interaction between different social groups are not described by SCOT, which can enable researchers for drawing inferences about the equipment of skills and knowledge to users for enhancing their career opportunities.

Speaking about whether SCOT and domestication are suitable to address the research questions in this study, I can argue based on foregoing discussions that though both theories describe the gain of knowledge and skills from the user's perspectives, but not from the social organizations'

perspectives. Organizations might be users as well, and can benefit from the technology theory, nevertheless, it does not fit into research question framed in my study. Moreover, the role of organizations responsible for organizing the knowledge and skills-related exercises seems to be unclear in the assumptions promulgated by these theories. This very emphasis of SCOT and domestication theories on the user's beliefs rather than the organizational beliefs about the digital technologies as a vehicle for improving women's economic empowerment make both theories unsuitable to fully address the research issue being explored in my study.

Another drawback of constructive and demonetisation approaches is that they do not consider the political and organizational environments in which the learning and digital competencies can be gained, and which also affect the perceptions and set of beliefs/values of individuals about utility of technologies for career development (Rajahonka and Vilman, 2019). The interactions of users (women in our case) with social institutions and factors leading to uneven power distribution between women and institutions remain invisible in both approaches (Klein and Kleinman, 2002). However, impact of digital technologies on women in the context of present study cannot be explored fully unless the roles of social structures influencing the women's employment in digital era are explored (Orlikowski and Barley, 2001).

The more emphasis of SCOT and domestication theory of technology domestication is on the construction of knowledge of technologies, using technologies for a variety of purposes, while they are yet to elaborate on the key social mechanisms or social structures which engage individuals with digital technologies or motivates individuals to develop the deep knowledge and skills for developing careers in technologies to a higher level (Klein and Kleinman, 2002). The knowledge and skills constructed or possessed by individuals may not have any value, unless they are appreciated by the relevant stakeholders in the labour market (Winner, 1993). The relationship between the individuals with digital skills or knowledge or aspire to pursue careers in digital technologies within a society and social structures is adequately addressed and elaborated by social structuration theory as presented in section 3.2.4.

The technology domestication theory is mostly employed by researchers to understand the process of gaining and using technological skills from the users' perspectives and adoption of technologies by users (Lim, 2008; Hynes and Richardson, 2009; Liste and Sorensen, 2015). For example, the Norwegian governmental organization apply the technology domestication theory to increase the usage of e-government services. However, interaction between the users and forces in the labour market is not predicted by the technology domestication theory, which renders it unfit to address the research question raised in my study.

In the contexts of research questions formed in this study, the employment opportunities offered by digital technologies in Saudi Arabia as emerging and developing digital economy is assumed to be determined by the social structures responsible for digitalizing the economy and society; this assumption draws its vigour from the structuration theory, which will be explained in the subsequent section.

3.2.4 Structuration theory

Structuration theory was presented by Giddens (1984), which articulated the relationship between the social members and structural environment. Giddens's argument was that individuals within a social system have agency, however, the social structures put restrains on their powers. The structuration theory basically opposed the ideology promoted by structuralism and functionalism which emphasised on the lack of individuals' powers in the face of social structures. Giddens argued that "one of my principal ambitions in the formulation of structuration theory is to put an end to each of these empire-building endeavours" (p. 2). He further posits "the basic domain of study of the social sciences, according to the theory of structuration, is neither the experience of the individual actor, nor the existence of any form of societal activity, but social practices ordered across space and time" (p. 2).

Structuration theory has wider applications in the field of digital and information systems promulgated by the organizations for facilitating the organizational performances (Kort and Gharbi, 2013). In reality, structuration theory is the most suitable approach, as argued by several

researchers, for conceptualization of digital technologies in the dynamic way, and puts forward the concepts describing the true relationship between the users and digital technologies (Kort and Gharbi, 2013; Pozzenbon and Pinsonneault, 2005; Boudreau and Robey, 2005). Many theorists (Boudreau and Robey, 2005; Kort and Gharbi, 2013) have supported the application of structuration theory as a suitable theoretical approach for understanding the connections between the users and opportunities conferred upon users through the skilful use and applications of digital technologies with focus on enhancing employability potential of users (women in Saudi Arabia). They have used the qualitative approach from the perspectives of the social structures/stakeholders to understand the position of agents (women) in the web of opportunities offered by technologies within particular economic and social settings. However, none of the researchers have tried to investigate the position of women in landscape of employment opportunities created by digital technologies in Middle East including Saudi Arabia.

As this study considers the employment opportunities offered by the proliferation of digital technologies in Saudi Arabia for Saudi women, which is less likely to be realized unless and until the relationship between the human agents (women in my case) and the organizations responsible for increasing the digital competencies and thereby enhancing the employability potential of women in the Saudi society is viewed through lens of perspectives of major social structures as envisioned by structuration theory. These relationships between the agents and the digital technologies are captured effectively by the structuration theory, as argued by Boudreau and Robey (2005), as it explicitly surfaces any potential relationships between the agents and organizations in the presence of digital technologies. The authors seem to suggest that digital skills and competencies acts as connecting between the agents and the organizations. The desire of economic empowerment serves as stimulus for women to act and gain digital knowledge and skills, while the need to utilize the digital technologies for functional efficiency lays the

foundation for connectivity between the social structures/organizations and the agents (women in my research work) (Boudreau and Robey, 2005).

Also, it is pertinent to acknowledge that structuration theory is not the only theory which offers the relationship between agent and structure. Some other theorists have put forward frameworks and theories expanding on the same issue. For example, Theory of Practice suggested by Bourdieu (1977), the constitutions of society theory proposed by Beger and Luckam (1966), morphogenic theory suggested by Archer (1995), the critical theory of technology (1991-2002). However, these theories only presented with much focus on either agents or structures (social organizations), therefore, could not appeal to the researchers which are interested to map the characteristics of agents, organizations, and digital technologies in the dynamic way.

Though each of the afore-mentioned theories has its own historical footing and singularities based on the issues falling in the contemporary social settings. The flexibility of the concepts (e.g. social structures, agents, interplay between the social structures and agents for streamlining, shaping and reshaping of social structures) as envisioned by structuration theory and their extrapolation to evolving nature of technologies are valuable in determining the scope of the career opportunities which is made available by social structures to the agents (e.g. Saudi women in my case) (Jones, 1999; Jones and Karsten, 2008). Jack (2017) argued that "Structuration theory is particularly suited to qualitative empirical research in management accounting…….it encourages and reminds researchers to use up to date scholarship from other disciplines in their research…… it refocuses research on agency and the intended and unintended effects that individual people have on structures……it encourages research design that have the intention of building new theoretical insights" (Jack, 2017, p. 211).

Agreeing to the views of Jack (2017), I found the structuration theory appealing to my research due to three reasons: it promotes the in-depth insights into the views of individuals who are part

of structures about the interactions resulting from a particular event (e.g. digital proliferation in Saudi labour market) between the structures and agents; it serves as theoretical framework supporting qualitative research design with the aim of offering theoretical insights into the research problem under investigation; and it puts emphasis on exploring the intended and unintended consequences of digital technologies on shaping the interactions between the structures (e.g. government, businesses and academic institutions in context of my research) and agents (e.g. Saudi women). Hence, this puts forward the argument for considering the structuration theory as a major theoretical framework for analysing the data from this study.

Compared to other theorists, Giddens's concepts relating to agents and structures are independent of the political situations in which theory, for instance, Giddens started his political commentaries and writings in 1995, while the discourse of the agents versus structures has started in 1970, which suggests that Giddens's theory of structuration is independent of the his political thoughts while conceptualizing the agent-structure relationships. This makes the structuration theory by Gidden a most suitable approach for identifying the relationship between the workers and the structures in the presence of digital technologies (Kort and Gharbi, 2013), which satisfies the lines of inquiries raised by my study in relation to the women's career pursuance in digital technologies.

Like Giddens, Bourdieu (1977) also gave the dual interpretation of social systems, and advanced the habitus concept which was related to individuals' features and characteristics in relation to surrounding social structures rather than considering the focus on the social systems. The main argument promulgated by Bourdieu was that knowledge is constructed instead of being learnt passively. The critics of habitus concept argues that individuals cannot learn unless the social systems are supportive of the learning processes, which is addressed Giddens who argued that agents turn into active learners in the presence of the social systems' support. Moreover, Bourdieu did not consider or interpret the evolutions brought about by the technological

developments, which are independent from the agents, within the social systems. However, Giddens's structuration theory is flexible and uses several concepts such as variations in attitudes and behaviours of social systems (organizations) and agents in response to external changes. This flexibility makes the structuration theory compared to Bourdieu's habitus concept a good fit to interpret the changes caused by technological proliferation in Saudi society in context of women's opportunities. Poole and DeSanctis (2002) argued that Giddens's view of structuring of social systems in presence of technological advances, and instantiation of new practices and sub-structures within an existing structures/systems in in line with new opportunities created by technological advances for the agents either in the form of employment opportunities for agents in relation to the interaction of social systems with technologies or refinement of systems in their own right. Of note, Giddens states that structures are external to agents (individuals), and are formed in collaboration with each other. Hence, structures and social systems revolutionized by the digital technologies are more likely to change the stances and positions of agents to the social systems.

From the forgoing debates on Giddens's theory, it is clear that the relationship between 'agency and 'structure' is prominently elaborated in the structuration theory. Giddens's definition of agency articulate that agency is not "the intentions people have in doing things but to their capability of doing things in the first place" (p. 9). Agency is related to the possibility that an individual can take actions based on the capabilities, which, in our case, reflects that women with greater level of digital competencies and skills have more probability to participate in the job employment created by the digital technological applications.

As far as structures are concerned in the structuration theory, Giddens believed in duality of structures in the social system, as they have enabling and restraining powers over individuals; they can stimulate an action from an individual or discourage the occurrence of an event planned

by an individual. He expounded that "the structural properties of social systems are both medium and outcome of the practices they recursively organize" (p. 25). He theorized that individuals and structures are intertwined, and writes "analysing the structuration of social systems means studying the modes in which such systems, grounded in the knowledgeable activities of situated actors who draw upon rules and resources in the diversity of action contexts, are produced and reproduced in interaction" (p. 25). Hence, the repetitive or recursive actions of individuals produce the social structures.

The focus of the structuration theory on the 'social practices' and 'social structures' justifies the investigation into the structures surrounding the individuals. In my case, women are individuals in Saudi Arabian society, who are surrounded by various social structures including the family members, educational institutions, and governmental and non-governmental institutions which dictate the degree of impact of digital technologies on the women's employment. Based on the proposition of structuration theory, women have potential to learn and compete with men, nevertheless, they are restrained by the institutions which are authorized to provide the education, training, and necessary skills in digital technologies which can warrant their participation in the job market. I argue that mere acquisition of digital competencies and skills are no suffice for participation of women in the labour market, the attitudes and perceptions of employers towards the women are also important for enabling participation of women with digital skills in the labour market. According to structuration theory, businesses or profit-oriented organizations constitute a critical part of the social structures.

It is also important to show the link of Giddens's structuration theory with gender issues, because this study deals with women's employment. The next section will show the connection between Giddens's structuration theories with gender issues to further justify the selection of Giddens's structuration theory as a theoretical framework for this study.

3.2.4.1. Giddens's Structuration Theory and Gender Issues

I came across Giddens's Structuration theory which proposed the relationship between the social structures - institutions responsible for laying out policies, rules and practices leading to the employment opportunities for women within these very institutions – and power dynamic working at the centres of these institutions which may enable or disable the working opportunities for Saudi women in the labour market created by digitalization of the economy and society (Giddens, 2001).

In contrast to traditional feminist perspectives and theorizations, Giddens's structuration theory, where it supports the oppressive nature of the social systems/institutions, also espouses their 'enabling character' which highlights the power of the social systems in formulating the relevant rules and practices to accommodate women within the social structures, thereby changing the social relations, restricting the opportunities for a particular gender (oppressive side), or expanding the opportunities in relation to building capabilities, seeking knowledge, progressing to the higher steps of the ladder or exploiting the employment options for women (enabling side) (Felski, 1989; Kahlert, 2012). Hence, Giddens's structuration theory presents the duality of structures, and according to Giddens, structures are 'rules and practices' governing the very existence of social systems/structures which are also called institutions (Giddens, 2001). The rules and practices are aligned along with the perceived differences between women and men, which the former and latter interwoven in a social fabric. Hence, structures are gender sensitive, and actions resulting from the implementation of these structures (rules, practices) leads to favour either men or women or both simultaneously depending on socio-cultural settings (Wolffensperger, 1991).

Giddens's concept of 'duality of structures' was understood by Kahlert (2012) and many other writers as a concept of 'duality of gender' from the feminine perspective. They based their arguments on the production and reproduction of structures by integrating the gender as a

structural category. The actions resulting from the structures (rules, practices) are socially intertwined with the social processes which accentuates the differentiation of gender at the social level, which is repeatedly produced and reproduced. Hence, the gender differentiation or gender identity is a part of social construction which lends to the gender position, differences within a social systems/structures/institution in their daily practices.

From this angle, structuration theory conceptualizes the social construction of gender in the daily practices of social systems/institutions which may stall or trigger the change in the conceptualization of gender within institutional boundaries, and how gender is understood as a result of social changes happening within and without institutional boundaries (Kahlert et al, 2012). This concept is pertinent to the research questions raised in my study. My study deals with digitalization of Saudi economy which is triggering change in the social systems/institutions, and as a consequence of this change, what is the understanding of institutions about the employment opportunities resulting from this change.

Of note, my study does not deal with women experiences with the use of technologies at workplaces, instead it deals with institutional thinking about the women's place and position in response to the change relating to the digitalization of the society and economy. How far do the institutions trigger the change towards equipping women with skills and training in digital technologies for allowing women to work in digital technologies? As this study concentrates on employment opportunities, which means it has futuristic/prospective perspective rather than retrospective perspective, which is why no emphasis is placed on the 'women's experiences with digital technologies, which was still emerging phenomenon at institutional level in Saudi Arabia at the time when these data were collected for this study. According to Kahlert et al (2012, p. 63),

"Giddens agrees to the ethno methodological approach to gender that doing gender consists of the production and reproduction of gender as a social routine. That means that people use practical knowledge of rules during the daily production and reproduction of gender in an

experienced manner. In daily practices, gender is not challenged and it is unquestionably reproduced. Experience produced and reproduction form a firm (gender) order".

He continues to argue that actors interpret gender in different ways based on their socio-cultural settings, which results in either undo the process of production and reproduction of gender, which indicates that institutions hold the authority to change the mainstream perceptions about the any gender-related event such as employment opportunities arising from the digital technologies for Saudi women. This is what called 'transformative power of action to change the social practices of doing gender" (Kahlert et al., 2012, p. 63), which was very key and guiding point which led me to emphasize on the organizational/institutional/social systems related perspectives in exploring the employment opportunities in digital technologies for Saudi women.

The participants in my study are representative of institutional standpoints in terms of perceiving women's employment opportunities in digital technologies. This is reason why women and men are both included in my study to reflect the overall perceptions of social systems/structures to conclude whether employment opportunities in digital technologies are materializable for Saudi women. The perceptions of women in my study sample should not be taken as tantamount to the 'experiences of women in the use of or working with digital technologies, rather than their perceptions are mere reflections of structures - rules/practices routinely used by social structures (institutions), which combines both their powers, positions, knowledge and experiences relating to their work in digital technologies. Therefore, by dubbing their perceptions as mere experiences in digital technologies will not do justice to the data, and it was not meant or intended in the research questions either within my study.

Moreover, if my study will be focussing only on experiences of women in digital technologies, and based on that development of conclusions in relations in relations to employment opportunities would be restricted and weak, as women occupying low-level positions and working through digital technologies might not be having in-depth knowledge of what is being

done at the institutional level to increase the employment opportunities for women in digital technologies. In addition, I will be missing a key data regarding men with transformative power within institutional settings, which could enable or disable the participation of Saudi women in digital technologies either through withdrawing from the 'production and reproduction' of gender-related practices. Therefore, it was necessary to take collective view of people representing the active force responsible for making changes to increase the participation of Saudi women in the labour market created by digital technologies.

Positing on the relationship of Giddens's structuration theory, Wolffensperger (1991, p. 93) argued that structuration theory presents the "engendered structure' which represents the rules and resources governing the co-production of gender relationships and social structures/institutions., as the latter can be developed without taking the social differences between men and women which are linchpin of social practices. These data show that both gender relations and social structures are inseparable in structuration theory, and their productions and reproductions as envisioned by Giddens's structuration theory.

Giddens envisages the structures as enabling, and therefore, the rules/resources developed by social structures are productive in terms of enabling changes which is very critical for research questions raised in this study, which demands data about the changes planned or implemented at the social structures/institutional level for bringing the change forward (Giddens, 2001). The change in the context of my study is about increasing the employment opportunities in digital technologies for Saudi women in the consequence of the proliferation of digital technologies. The knowledge and capability of actors, the key concepts in Giddens's structuration theory, within institutional boundaries are driving forces in allowing Saudi women to exploit the employment opportunities or can serve as barrier in the way of participation of employment opportunities created by digital technologies (Kahlert, 2012).

Taken together, discussion in the foregoing paragraphs reflect the link of Giddens's structuration theory with feminine theoretical perspectives, and warrants its use in the studies

reflecting over the gender relations. The studies exploring the gender issues either use Marxist-promoted feminine theories which only look at the suppressive feminine outlooks practiced by the capitalist organizations and more focussed on highlighting gender inequalities, or use the Giddens's structuration theory which offers the opportunity to researchers to explore both the enabling and suppressive characters of actors within social structures.

As this study aims to discover the enabling and suppressive characters of actors with knowledge and capability within the social structures in relation to increasing the Saudi women's participation in the labour market created by digital technologies. Walby (2009) favours the application of Giddens's structuration theory with a view to develop more complex structuration theory fitting into various gender issues.

Kahlert (2012) also proposes the use of Giddens's structuration theory to explore more complex issues surrounding the females in the world of change and stability. The foregoing arguments and discussion justify the application of Giddens's structuration in my study with the aim to explore complex issue of women's employment opportunities from the institutional perspective rather than taking women as a general category. The women were situated at the heart of social structures which produce and reproduce the gender in their daily routines, and prospective data about the employment opportunities in digital technologies cannot tell the whole story unless.

After debating around the relationship between Giddens's structuration theory and gender issues, and role of social structures as enablers or disablers, this seems pertinent to discuss the social structures' importance in enabling the women's employment opportunities through supporting the women's digital competencies. The next section discusses the social structures in supporting the women's digital competencies.

3.2.4.2 Social structures in supporting women's digital competencies

According to structuration theory as explained in preceding section, social structures including government institutions, academia and businesses constitute key mechanisms for regulating the interaction of agents (both insiders – organizational employees and outsiders – potential job applicants) with technologies and subsequently attainment of the digital competencies either to find jobs, self-employ or to progress up the ladder of digital career. In addition, expanding on the structuration theory, Gurung (2018) defined the social structures in the context of women's employment as the social institutions including the educational system, governmental bodies dealing with educational institutions, business organizations involved in training the employees and students in collaboration with academic institutions for economic empowerment through the skills development programs.

The education system, businesses, and government policies might act as enabler or disabler of raising awareness among women about the opportunities offered by digital technologies and providing them with necessary skills to compete with men for ICT-related jobs in tech-dependent SMEs. The debates on the role of education system, businesses, and government roles in equipping women with digital competencies are presented in the subsequent subsections. The discussion presented in this section would lead me to compare and contrast the findings from my study with the existing data in order to determine and predict the scope of job opportunities available for women in the context digitalization of Saudi society.

3.2.4.3 Criticism on structuration theory

Nevertheless, the fame and success earned by structuration theory proposed by Giddens's, it was criticized by several scholars as well. Rose (1998) and Layder (2006) criticized that structures as

viewed by Giddens are conflated, and conflation renders the ignorance towards the analytical perspectives of certain concepts such as social system and interaction and agents. Layder (2006) continues that, through concepts of interaction, social systems and agents are presented logically in the structuration, but without proper underpinning from the empirical evidence, the existence of interaction between structures and agents cannot extrapolated to every society, as the technological developments affect unevenly the social systems in every society. In line with criticism from Layder (2006), I agree to lend the empirical support to the concepts such as interaction of digital technologies with social structures and resulting employment opportunities for women in Saudi Arabia. Without assessing the views and opinions of organizations interacting with digital technologies and social actors (agents) within and outside the organizations, it is not possible to gain insight into how far the social systems can be supportive towards the inside and outside agents in terms of provisions and utilization of the employment opportunities created by the digital technologies.

Another criticism against structuration theory is that it focuses on the practical knowledge rather than discursive knowledge, which comes from overemphasis of Giddens on the power of agents and reflexivity of agents (Loyal, 2003). Giddens's views agents with powers, and omits the cultural dimension which may restrain or enhances the agent's power to interact with social systems. Hence, the emphasis on the practical consciousness and stress of the element of power in the structuration theory contradict each other, which is mainly due to the lack of cultural references to postulates of the structuration theory (Loyal, 2003, Craib, 1992). Though Loyal (2003) admits that the lack of cultural references also makes the structuration theory as a foundation ground for researchers for investigating the possible outcomes resulting from the interactions between the agents and social systems under the influences of external stimulus such as digital technologies in different cultures.

Criticising the methodological guidelines and assumptions of the structuration theory, many critics argued that theory lacked of the clear guidelines and laws specifying its empirical

applications in the social world, which renders it limited and controversial for the positivist researchers – ones who investigate the associations between social factors quantitatively (Barnes, 2001). Joseph (2006) also criticized the inability of structuration for determination of causal relationships due to recursive nature of relationships presented in the theory; and suggest that application of structuration theory might be suited for the qualitative researchers who are interested in portrayal of broader perspectives and in-depth analysis of relationships. As my study is qualitative one, which makes the application of structuration theory suitable to qualitative research work. In addition, Giddens himself emphasized that researchers investigating the relationship between institutions and agents should be aware of the complex skills of agents in the institutional context, which makes it more important to consider the characteristics of agents (outside and inside in institutions) for achieving certain outcomes such as pursuing careers in technologies. Shotter and Lannamann (2002) criticized that the complexity of agents' skills and institutional behaviours vary with time and space due to evolving nature of societies as envisioned by Giddens, which is difficult to be captured without gathering in-depth analysis of agents' characteristics within and without the institutions. Gregon (1989) directed his criticism against the structuration theory that it is abstract, second order theory which is far to be proved by the quantitative means.

Taken together, despite all criticism against the structuration theory, it is widely acknowledged theory in the literature considering knowledge-ability of agent-institution paradigm in the social phenomenon. It provides strong conceptual basis to interpret the relationships through the qualitative research tools, and offers guidelines for identify the methodological consideration and highlights the agents within and without institutions which can yield a meaningful data for determining the impact of digital technologies on the employment opportunities for women in Saudi Arabia.

In addition to that, structuration theory of Giddens offers an opportunity to understand the relationship between the employment opportunities created by the digitalization of Saudi society and the social structures which can either enable or restrain the change. Simultaneously, the possibility of women's power, skills and competencies in the digital applications for exploiting the job opportunities can also be understood through the lens of Giddens's theory. Most importantly, accentuation of Giddens's theories on the 'possibility of individuals to enact change' as marked by Dixon et al (2014) strengthen the proposition in my study that women with digital skills can exploit the employment opportunities arising from digital technologies application through the repetitive display of the necessary skills for participation into job market.

Taken together, discussion on the Giddens's structuration theory predicts the interaction between the social structures and Saudi women at the labour market level, which can be meaningful if there is connecting force between Saudi women and social structures. Based on my understanding of the Giddens' structuration theory when interpreted in the context of my research work seems to put forward the digital knowledge, skills and competencies gained by Saudi women as a major force which connects Saudi women with the labour market. In other words, the digital education and training seems to be an important factor which needs to be taken into account for settling the debate whether there are employment opportunities. Assuming the criticality of digital education and training, women with better digital education and training would be in better position to avail the employment opportunities in digital technologies due employers' favourable attitude towards them.

Therefore, a thorough discussion about the digital education and training for women's employment is necessary for understanding the role of digital skills and competencies in enabling the women to grab the employment opportunities in digital technologies. The role of education and training for women's employment is presented in next section.

As this research work intends to explore the impact of digital technological on women employment in Saudi Arabia, mechanisms (measures, policies, corporate and government beliefs about women's entry into job market) or stakeholders involved in competency-building process and subsequently increasing the women's potential to enter in the employment market generated by digital technologies need to be identified for two key reasons: finding the stakeholders to be investigated in relation to women's employment as a consequence of digitalization of Saudi society for clarification and choices made in methodological Chapter 4. Therefore, the next section will highlight the evidence-based role of social structures in improving the women's digital competencies.

3.2.5 Institutional and Policy Support for Building Digital Competencies

As derived from the Giddens's structuration theory, governmental bodies, institutions and policy-level support is important for allowing interaction between social structures and Saudi women. In this section, literature has been reviewed to show the extent to which the institutional and policy support was found to be useful in building digital competencies for women. The building of digital competencies of women is usually facilitated through the active involvement of the government and related institutional and policy with the educational and business organizations at the national level (Heeley and Damodaran, 2009). However, this is not clear to which extent the governmental as stakeholders become engaged with educational institutions and businesses to prepare the women for pursuing career in technologies (Sifuna, 2006).

Moreover, though it is true that national policies and governments play an important in setting the grounds for delivering the desired skills and competencies, but the willingness of women and raising the awareness among women about the connection between digital market and skills are important. The deployment of infrastructure for training and education of the women, especially in the gender-sensitive developing countries, can play a fundamental role in creating

and promoting the digital competencies framework for supporting the women employment in the job market (Davaki, 2018). For example, Saudi Arabia is gender sensitive country where it is not possible for women to obtain training and education in the same academic and vocational institutions which train men. In such cases, the proliferation for the women-dedicated centres, vocational training institutes and university-level support structures can provide the adequate level of training to female students in the digital technologies (Al-Rajhi et al., 2012).

In addition, governments from the UK and the USA were reported to be involved in sponsoring the academic institutions and private vocational training institutions to deliver the knowledge and training in the ICTs-related tools and software for female students in Saudi Arabia. The incentives provided by governments were given in the form of the scholarships, training for staff in digital education, reducing taxes on the academic institutions sponsoring digital educations for female students (Helsper and Van Deursen, 2015; Courtright and Robbin, 2002). Furthermore, European Union also motivated industries in Europe to recruit female workers with digital competencies, and deliver the training to women workforce (Martinez-Cantos, 2017). In addition, Signatories in the Women in Digital Declaration have pledged to provide incentives to broadcasters for promoting the positive public image of women in Tech-dependent SMEs, apart from celebrating the European Girls and Women in ICT day (Digibyte, 2019)

Yordanova (2015) argued that incentive structure established by government in Bulgaria financed the industry and academic institutions for encouraging and facilitating the female labour participation in the digital economy. Bulgaria government developed ‘Digital Bulgaria 2020’ program which places emphasis on women training in order for enhancing the digital skills, reduced the digital divide and decrease the workforce shortage in the high-technology sector (Pashova and Bandova, 2017). This program was effective not only motivating the industries and educational institutions to provide the skills and knowledge to female workers,

but it also prompted women to participate in the process of national digitalization (Yoshinova et al., 2016).

Canada introduced 'Innovation and Skills Plan' which promoted the theme of digital competencies for women in order to establish a knowledge-based economy. The objective of the program is to develop the ICT competency framework involving the participation from both men and women for driving the industrial innovations. The Canadian Innovation and Skills Plan was considered to inclusive in nature, promoting the female participation in the job market in the high-technology sector (Metcalfe and Fenwick, 2009; Cheung et al., 2012). Another study conducted by Medichie and Kemp (2013) identified the role of government in the UAE context in increasing the access of women to education, paving the way for 'societal acceptance of educated women' in the labour market, thereby supporting the assumption of structuration theory on government as a main stakeholder in paving the grounds for increased participation of women in the labour market.

Portugal's National ICT Master plan promoted the concept of inclusive workforce, reduced the gender divide, stimulated women' employability in tech-dependent SMEs, increasing the training and education for women in digital technologies and emphasized on the strong participation of women in the tech-dependent SMEs for production of digital knowledge and ensuring the participation of women in the research and development of digital economy (ANACOM, 2013). Similarly, 'Revised National Broadband Policy and Broadband Strategy' was launched by South African government aiming to make digital technologies accessible for all citizens (Hanna and Knight, 2011). The government backed Digital Skills and Inclusion Policy in the UK puts emphasis on the inclusion of women in the labour force in order for creating digital economy (Helsper and Van Deusen, 2015).

There are still many gaps in the governmental policies which are causing the inequalities in the Saudi labour market. The important one is the lack of coherent policies for preventing the

harassment and abuse to women on the social media and online channels. The online communities are organized and utilized by the big businesses for their own financial gains, and which influence the government decision-making in controlling the hate group and discrimination against women (Morganti et al., 2014). Governmental policies are criticized for promoting the corporate world by not controlling the Facebook and other social media platforms which are used by hate groups (Herbert, 2017). The women devoid of security and privacy cannot grab the employment opportunities offered by digital technologies unless government take action to address the gender-based biasedness and harassments (Herbert, 2017).

Another criticism on the government sponsored ICT projects aiming to promote inclusive practices at workplaces came from UNSECAP (2016) which highlighted that most of ICT projects were unable to integrate the gender analysis effectively, which resulted in failure of addressing the women's employment in ICT-related jobs in industries. Broadband Commission (2017) stressed on the need of e-governmental policies for collecting, analysing and tracking the data on women's employment, so that effective policies can be structured for increasing the women' competencies in digital technologies at national levels.

Taken together, from the above examples, it was clear that goals of digital competencies for women, participation in the digital economy for women were achieved through the active support from the governments in the developed countries in the Europe and the USA, which is in line with the assumptions supported by Giddens's structuration theory. The incentive structure for both industries and academic and training institutions were shown to be important factors for enabling women to fully participate in the job market created by the digital technologies. Broadcasting of women's positive public image in digital comes under the aegis of governments, which can overcome the stereotypical attitude of society which only attaches men to the digital transformation of society. There is a dearth of literature showing the initiatives and

efforts directed by the government, employers and academic institutions for women in Saudi Arabia for enabling them to pursue careers in the digital technologies.

Saudi Arabia has also launched the plans for digital transformation of country via the Vision 2030 Program by encouraging participation of all citizens in creating and sustaining digital economy, nevertheless, policies and practices for preparing women to exploit the employment opportunities resulting from the digitalization of Saudi society are clearly documented in the literature, which warrants a research to investigate into perceptions of policy-makers and government as stakeholders to know whether the digitalization of society offers opportunities for women along with men, and what measures are being taken in order to ensure the women's participation in Saudi labour market (INISGHT, 2016).

Moreover, there is a lack of data as to which extent the government in collaboration with employees and academic institutions under Vision 2030 Plan is helpful in ensuring the participation of women in the establishment of digital economy. The literature presented in section 2.5.2 showed that digital skills and competencies are very important for allowing women to enter into the job market, nevertheless, it is not clear whether Saudi government have implemented any policies as part of Vision 2030 Plan for training and educating women to be part of the digital transformations within the country. As this study deals with exploring the employment opportunities arising from the digital technologies, therefore, Saudi government along with employers and academic institutions are considered as important stakeholders in the process of enabling women to harness employment opportunities resulting from the digital transformation of Saudi Arabia.

The governments' practices and policies for building skills and competencies for citizens including women to build economy run in parallel with the practices developed and followed at academic institutions. Governments make policies in order to provide the businesses with workforce with required skills and competencies, while academic institutions implement

government policies for delivering the right skills and competencies to students in order to fulfil the requirements of job market.

Therefore, it is important to review the evidence in literature regarding the role of academic institutions as an enabler or disabler for increasing the women' job opportunities through the delivery of digital skills to women. The next section discusses the link between the education system and building of digital competencies.

3.2.6 Education system and digital competencies for women

Several feminist theorists have emphasized on the role of education system in increasing the employment opportunities for women by proving them with digital competencies (Chetty et al., 2018; Van Deursen and Van Dijk, 2011; West et al., 2019). West et al (2019) highlighted the central role of education system in preparing the societies and workers to work to take advantage from thee exponential technologies. Van Deursen and Van Dijk (2011) have recognized the importance of digital competencies of women of workforce in leveraging the ICTs for creating sustainable economic development and innovations. Chetty et al (2017) espoused the assumptions of Giddens's structuration theory, and posited that education system espoused by the government in educational institutions has transformed since the evolution of digital technologies, and for economic growth of countries, it has become essential to incorporate the education policies aiming at increasing the digital competencies for girls into the education policies. Anugwom (2009) showed that two of social structures: academic institutions and governmental bodies dedicated for upskilling citizens were found to play an important role in education of employment, which resulted in increasing the participation of Nigerian women in the labour market. Another study conducted by Kemp (2013) identified the role of government in the UAE context in increasing the access of women to education, paving the way for 'societal acceptance of educated women' in the labour market, thereby supporting the

emphasis of structuration theory on government as a main stakeholder in paving the grounds for increased participation of women in the labour market.

Steeves and Kwami (2017) suggested that it is not only necessary to make the digital skills and training as part of the education programs, but it is also important to revise the curricula for digital training depending on the advances in the digital technologies. This indicates that modifications in the types and digital competencies will enable the students, especially women students, to benefit from the existing and emerging ICTs. The education system places stress on development of curricula for increasing the digital skills for women for the future job opportunities in the tech-dependent SMEs, which established grounds for women's participation in the labour market (Chetty et al., 2018). In addition, the training and education process can be promoted at different levels of education system ranging from primary, through secondary to the tertiary levels along with upscaling of digital competencies for the female workers and development of infrastructure for vocational training such as establishment of vocational training institutes (Van Deursen and Van Dijk, 2011). The flexibility of the training and education programs is the key element which can ensure the equipment of the state-of-the-art skills serving the needs of the tech-dependent SMEs, which allows the tailoring of curricula and training events according to emerging digital technological advances (Huyer and Sikoska, 2003).

The education and training can be arranged for girls at the primary education level starting from the operations of the desktop use, text processing techniques, and delivery of knowledge about fundamental computing languages, and promotion of logical and problem-solving thinking through the use of mobile applications (Cooper and Weaver, 2003). The basic use of the computing tools has proved to be successful in increasing digital competency of girls in African schools under the auspicious of UN-sponsored educational programs (Van Deursen et al., 2011).

The education at the secondary level aimed at equipping the students with skills of using mobile phones in productive manner are shown to increase the digital skills of students (*Ibid*). The authors showed that students learning the better ways of using mobile phones for seeking the useful information and seeking jobs were more successful in finding the jobs easily compared to the ones who only used mobile devices for leisure activities and contacting with friends.

The research has showed the relationship between the development of digital skills including intermediate and advanced levels and the participation of girls in the digital technologies-oriented educational programs (Fountain, 2000; Matzat and Sadowski, 2012). The girls encouraged to participate in the training and education of digital technologies showed better prospects of joining the tech-dependent SMEs, which indicated that learning aptitude and the awareness of digital competencies in securing economic empowerment were key factors in building the digital competencies and subsequent participation in the labour market for women (Matzat and Sadowski, 2012).

The lower participation of girls in the educational programs aiming at increasing the digital competencies was recorded in both developed and developing countries, which is mostly related to securities and privacy concerns perceived by parents due to the girls 'use of digital technologies without parental mediation (Dodel and Mesch, 2018). According to report of UNO, women constitute 35% of the total student population studying ICTs-related education and training programs in science, technology, engineering and mathematical disciplines, while less than 30% aspire to join ICTs-related career. At the tertiary education level, women only form the 3% of ICT graduates globally, indicating acute level of underrepresentation of women in university level education (Economic and Social Council of United Nations, 2018). The report further highlighted that gender gap in ICTs-related jobs can be fulfilled unless women are encouraged to participate in the educational program, receive trainings in the emerging

technologies, and become competent to be employed in tech-dependent SMEs along with their male counterparts.

The educational system in developing countries including Middle Eastern and Asian countries are failed in reaching and retaining female students, especially at the secondary education level, which resulted in increasing the gender gap in the labour market (Antonio and Tuffley, 2014). World Bank report indicated that girls' employment can be improved through skills development program by encouraging girls' participation in the secondary and tertiary level education, which influences positively on decision-making process leading to join the employment opportunities in tech-dependent SMEs (Economic and Social Council of United Nations, 2018). For example, digital technology-oriented educational and training program called the Citizens Foundation improved the participation of women in job market by building the digital competencies of women in using mobile applications for earning income in Pakistan (UNESCO Report, 2017). Similarly, the government sponsored digital competency program for women in Kenya led to improvement of women's share in the job market. (United Nations Commission Report, 2017).

There are some case studies showing the positive impact of digital education and competency offered by vocational training institutions on increasing women' employment share in the job market. For example, Ada National College for Digital Skills in the UK and Northern Ireland focussed on increasing the digital competencies of women with lower-income backgrounds. The women were provided with skills in analysing data, coding, and e-commerce especially doing business using online and social media channels (Blakeley, 2017). Another successful example was seen in the form of Industry 4.0 Projects launched in Turkey, which aimed at increasing the digital competencies of women at the local vocational institutions, so that they can be employed along with men in the tech-dependent SMEs (Coskun et al., 2019). Ustundag and Cevikcan

(2017) demonstrated the positive role of collaboration between the academic institutions and industry in order to deliver the knowledge and skills required by relevant industries. This point will further be elaborated in the next section.

3.2.7 HRM Practices and Leadership in Building Digital Competencies

HRM is an important component of business which constitute the third social structure which has been emphasized in the course of discussion on structuration theory, which may interact with other two stakeholders, and with the Saudi women as well. In this section literature presented and discussed in this section are related to different social cultural contexts have been discussed with the purpose of highlighting the potential role of Saudi employers which may play a critical role in equipping the Saudi women with digital competencies. As the HR in a business is responsible for recruiting and training the employees to perform certain tasks effectively and efficiently, therefore, the discussion in this section revolves around what scholars and researchers have found or perceived about the HRM practices in building digital competencies of employees including women. Subsequently the literature presented in this section will help me interpret the responses gathered from the businesses groups participating in this study.

Goransson and Rolfstam (2013) revealed that building the digital competencies of the existing and potential workforce through the HRM-initiated training programs and commitment of organizational leadership was proved to be an important factor in employability of women in the tech-dependent SMEs in many countries such as China, Poland and Sweden. Pichler et al (2008) conducted quantitative research on organizations supporting the female employees' involvement in the lower-level managerial positions, and found that HRM emphasis on women training significantly reduced the gender gap in the organizations.

Fuhl (2018) conducted interviews with consultant working closely with HRM leadership of organizations, and reported the HR leaders within SMEs can introduce the diversity and

inclusion at the following policy levels: recruitment, interviews, internal mobility and succession planning, and training/learning. These measures are proved to be predictor of women's inclusion at workplaces and performance of the organizations. Yanadori and Kato (2009) argue that digital technologies are certainly ready to transform the workplaces, and are major driver in enforcing inclusion and diversity at workplaces, however, it is clear that HRM leaders' attitudes and policies will determine stricture, processes and strategies leading to the skilling of the potential women workers and upskilling of existing women workers. HR consultant Jessica Pallot-Cook emphasized on the development of digital competencies of women as contributor to the HRM-sponsored inclusion policies in this way:

"We need to ensure all employees have equal access to training; we need to focus more on people management as a skill rather than an assured ability and drive inclusion throughout these messages" (Fuhl, 2018). These data indicated that HRM policies towards training employees regardless of gender can drive inclusion and diversity at workplaces.

Despite the overwhelming role of HRM leaders in promoting the women' employment requiring the digital skills, many studies have pointed to the presence of discriminatory HRM policies against the women's employment and career development, for example, Shen et al (2009) reviewed HRM diversity management practices in organizations. They found that HRM practices in most of organizations are failed to comply with equality employment opportunity legislation in the European countries. This resulted in poor development of digital skills in female employees, and lower retention rate of female workers in the managerial level jobs.

Similar evidence was recorded by Metcalfe (2007) in organizations based in the Middle East, and demonstrated link between women's employability and HRM training programs. The organizations which emphasized more on training employees to gain digital competencies were able to attract female workers. Nevertheless, they criticized the absence of training and

development opportunities for female workers in HRM organization policies, which can negatively impact the digital skills development for female workers, whereby reducing the women's participation in the Middle East. They further argued that HRM policies is a fundamental factor in training and equipping the females with digital skills in order to promote the inclusion and diversity at workplaces in the Middle East.

Alnaqbi (2011) criticized the HRM approaches of businesses in the United Arab Emirates at the selection and recruitment levels that they are not well-defined and are not applied to the male and female workers equally. For example, they showed that women's pay scale was lower than male workers in the high-technology companies, which is a demotivating factor for female workers to join the tech-dependent SMEs in both developed and developing countries. This might be the case with Saudi women who are interested to pursue career in digital technologies. The lower salaries and issues at the stage of recruitment and selection levels might serve as demotivating factors, and can reduce the impact of digitalization of society on provision of job opportunities for Saudi women.

Basit et al (2015) reported that training provided by businesses to the existing and potential employees in collaboration with the academic institutions resulted in increasing the digital competencies of the women. The women with greater level of digital competencies were also found to be highly motivated to become entrepreneurs or to participate in the job market (Plewa et al., 2015; Wilson, 2012). The involvement of leadership and HRM departments of companies in training women as to how to promote their products via online channels, up-skilling of digital competencies, techniques for targeting audience and customers through social media channels (Hunt et al., 2013; Annunziata and Bourgeois, 2018).

Shadbolt review revealed that major cause of under-employment of the computer graduates, especially female graduates is the lack of collaboration between the industries and the educational institutions (HM Treasury, 2014). The graduates are not equipped with set of skills and competencies required by industries due to poor knowledge of industrial digital applications and innovations, which results in reducing potential of females to fit into the digital roles at the organizations. This indicate that HRM departments and leadership of organizations can play a vital role in updating the current curricula for skills and development course of students in computer science (*Ibid*).

Wakeham Review called for the proactive role of employers in ensuring the delivery of skills and competencies to internal employees through the internal training system and to the potential employees (students) through forging collaborations with the educational institutions (Wakeham, 2016). Government Office for Science (2017) argued that upskilling and quick adaptation to the highly evolving digital labour market are main factors in warranting the future employability of women, and HRM practices need to be developed to cater to needs of female employees, such as online assessment system of employees for identification of training needs, strengthening the equal job opportunities for men and women, and providing the flexibility to working hours for women to allow them for maintaining the family-work balance.

In addition, the tech-dependent organizations such as educational institutions using the educational technology has set the model for equipping staff and students with digital skills which are considered vital for female students to seek the employment in the labour market. For example, University of Wolverhampton trained male and female staff in delivering the lessons in anatomy and dissection using 3-D visualization system. Bolton College implemented Ada – virtual assistant for delivering on-line information and guidance to students. The staff were trained to use the system via Amazon Alexa (Department of Education, 2019). Similar

arrangements can be extrapolated to the Universities and other professional training institutions for training the Saudi women aspiring to pursue careers in digital technologies.

The training and education courses for arranged for staff by HMR departments based at Bolton College and the University of Wolverhampton, which not only promoted the participation of female staff in the obtaining training, but it also helped them to enhance their career progression in areas where digital skills relating to educating students through the educational technology was required (Department of Education, 2019; Government Office for Science, 2017). In addition, technology industry played active role in shaping the educational technologies required by the education providers through collaboration with education-providers in the UK (DfE, 2019). These models can be replicated by educational institutions in Saudi Arabia for training their female staff and students, which can improve the inclusive practices in the education sector dependent on educational technologies.

Moreover, educational technology industry can extend their role in fulfilling the training needs for female staff for the emerging digital technologies used for delivering teaching and courses in developing countries such as Saudi Arabia (Barua and Barua, 2012). These measures are likely to increase the capability of women to exploit the job opportunities arising from the digital technologies-related applications in tech-dependent SMEs.

Taken together, the evidence presented in this section were derived from various socio-cultural contexts, and indicated the significance and importance of the HRM policies in terms of motivating women to pursue the careers in digital technologies. The policies relating to upskilling, motivation strategies such as an increased pay-scale, opportunities for promotion, fair treatment at selection stage are discovered to be important factors for enabling women to pursue careers, and thereby enabling them to exploit the job opportunities created by digital market.

An insight into the current developments of education and training in digital technologies for women can enable me to see the future prospects of women after digitalization of societies in

Gulf countries. This will provide a comparative context of Saudi women in context of preparedness of women to exploit the potential job opportunities based on training and educational initiatives in digital technologies for women in Saudi Arabia.

The next section will show the situation of education and training opportunities for women in the Gulf region including Saudi Arab.

3.3 The Current Development of Women's Technological Education and Training in the Gulf Region

Having considered both empirical research and theoretical perspectives for advancing the Saudi women's employment in digital technologies in the domain of new technology, I will now make the discussion more specific to the Gulf region in the name of presenting some primary issues later to be considered for the case of Saudi Arabia.

Nonetheless, one should be equally aware that technological potential will not be fully exploited today, nor in the foreseeable future, due to the lack of education and training in the required technology (Li & Herd, 2017). Such pessimistic predictions are supported by evidence provided by West (2015), who argues that between 2010-2020 the rate of the employment growth in digital technology in the STEM subjects of sciences, technology, engineering and Maths will become a severe problem of a lack of labour supply if the young have not been trained sufficiently in the STEM domains.

Brynjolfsson & McAfee (2011) and Rotman (2013) do not deny that digital technology has positive effects on the workplace; information technology clearly enhances the efficiency of both production and marketing to ensure that societies become wealthier. In addition, digital

processes have become safer and easier for organisations and the human resources that engage with them.

Moreover, Balch (2013) identifies a direct link between digital technology and employment, concluding that women must acquire the knowledge and skills to deal with it. Hence, the employment opportunities for those young women who are digitally literate will be improved and the future of women's employment will come to depend on greater learning of a range and level of digital skills. These skills go far beyond just a consumer interest in e-commerce and the internet of things, ranging from simple computer application courses to advanced strategic digital e-skills, including cyber-security, big data, mobile data (Balch, 2013).

All the points that I have discussed above are a means of introducing the current literature dealing with the impact of digital technology in the workplace in GCC context. In their full scope, they cover the implementation of processes, organisational data access, training and the effect on employment opportunities and the unemployment rate. In addition, they raise the question of how organisations connect digital technologies to human resource management (HRM) processes with the objective of improving management of the organisation's data and training to improve the work environment and the quality of work of its employees.

Hence, I can question whether new HR processes centred on information technology (IT) can start providing women with digital skills which are prerequisite for women entering the modern work-place in Saudi Arabia. Here, Alhudhaif and Nalband (2012) would agree with this proposition in their claim that digital technology has had a very clear day-to-day impact within Saudi organisations, which is putting pressures on the Saudi SMEs to recruit skilled women or train the existing female employees for executing the key responsibilities involving the use of digital technologies. When Saudi women work directly or indirectly with IT they do so in

compliance with the cultural and legal context of the workplace; for example, in customer service, their work may be restricted to dealing with female customers.

Nonetheless, what is clear is that Saudi society is beginning to recognise the presence of women in the modern work-place; indeed, Sundström et al. (2017) claim that the Saudi government's goal for women is to bring more Saudi women into the workforce. Moreover, Basaffar et al. (2016) note that the Saudi government has supported women by establishing multiple programmes to provide more career opportunities in areas spanning business and education.
In terms of my thesis, it would be feasible to follow Ismail et al. (2016) in recognising that the Saudi government organisations now accept that Saudi women can adopt multiple roles across the family and the workplace. This approach would place a significant official emphasis on the evolution of women's employment, and development as workers, as the path to sizable economic and social achievements in the future.

There are no proper infrastructure and social mechanisms in place for guiding and motivating females to join the digital technologies-related careers in Saudi Arabia, such as the absence of career counselling for women, the lack of family support, and the limited involvement of employers in reducing the gender divide at the organizational levels. Mathew (2010) emphasized that due to these structural problems few Middle East women join the digital technology sector is both a lack of career guidance and insufficient awareness of the opportunities available to them. At school, for instance, girls do not realise that the ICT sector can provide them with future careers that are independent of the traditional jobs available to females.

According to the Arab News (2016), the Saudi government's long-term aim to improve the national educational environment to prepare Saudi females for the labour force in two ways:

through organisations and via the community. Firstly, the government has acted to encourage more intervention from firms to help women access the appropriate preparatory training for a professional career. Secondly, the government is raising social awareness of the contribution that women make as workers.

Nonetheless, other studies have concluded that it is human resource management that actually contributes the most to creating opportunities for women and breaking structural barriers through training and skills development program for women working or with promise to work with key positions in SMEs using digital technologies to support the business operations.

Here, Bahget (1999) notes that all the Arab Gulf States (Saudi Arabia, Iraq, Kuwait, Bahrain, Qatar, the United Arab Emirates and Oman) have displayed signs of significant achievements in technological education. Unfortunately, women have traditionally lacked the specific skills required in the labour market, especially in the technological sector, because their performance level and opportunities are unequal to those of men.

Elnaggar (2007) takes the example of Oman and states that Omani girls have a lack of access to technology, in either education or the workplace because of male dominance, insufficiency of English competencies and difficulty learning digital knowledge available in English language, and the lack of political awareness of social benefits of digital technologies.

These impediments apply equally across the Gulf region. Elnaggar (2007) points to the many disadvantages facing women, such as the gender digital gap, social-cultural norms and other ICT obstacles. Meanwhile, Buarki et al. (2011) argue that although males and females are equal, the socio-cultural norms of the region may need to change to open up equal opportunities for women.

Education policy is a key element and future planning starts with changes to existing curricula in Saudi Arabia. With widely observed gender differences in the approach to STEM education, gender skills in information technology (IT), I would conclude here that communication technology (CT) and digital technology (DT) need to be developed that are responsive to the

needs of the labour market. In this way, the development of professional skills in technology will remove barriers to women's full participation in technology-based employment.

For many researchers, it is clear that digital technology can expand women's leadership prospects in the workplace, especially marketing and advertising firms can be set up by women with the help of ICTs (Matthew & Kavitha, 2010; Furst and Reeves, 2008). For instance, many professional Kuwaiti women over thirty years of age do not know how to use computers and instead use administrative staff to arrange the office work. Nonetheless, such a trend may change dramatically with younger women who are now using technology with ease and expertise (Wheeler, 2008). These women are not only mothers caring for children; they are also becoming better educated, competent and innovative in the technology sector. Yet these women remain a small minority and Matthew and Kavitha (2010) recall that women in the Gulf States still face many obstacles preventing them from developing the technology skills they need.

Hence, it cannot be denied that in terms of culture, family, gender, social roles, politics, sociology, the nature of the labour force and the lack of English language proficiency are serious and continuing issues faced by the women of the Gulf today. In the case of Saudi Arabia, Saudi traditional culture has been changed by the new technology because it may provide Saudi women with immediate access to the labour market (Elmusa, 1997).

There are hence abundant studies underlining cultural traditions may be the key factor obstructing women in their development in the tech domain, and that traditional community attitudes and roles have a negative influence on their education. Al-Alwani (2005) too argues that there are a number of factors hindering the improvement of women's career evolution, such as policies, support and staff development.

However, the status of women's employment needs to be robust to meet the challenge of reaping the benefits of the digital revolution. It is thus important that women prepare themselves for the digital workplace with the skills essential to using the technology efficiently.

One starting point is to upgrade the education system, starting at the primary level and continuing through secondary and vocational education, and overcoming cultural and social barriers by running awareness campaigns. Future employment will require that women are not only able to utilise ICT, but also to develop the technology themselves (Booz et al., 2015).

It might then be ironic to note that the integration of digital technology and ICT in the education system has helped develop more diverse modes of training to enable women to become teachers. The consequence is that seventy per cent of women in KSA are now employed as teachers in the public sector, which is arguably the most traditional occupation for Saudi women. Indeed, it is a double irony that other studies indicate that the education system has inevitably failed to prepare students, especially women, by teaching them high-level technological skills (Al-Sulaimani, 2010).

Here, I remark that Saudi women appear to be caught between an unbalanced education system and access in too large numbers to overly typical or traditional professions. Indeed, Baki (2004) stresses that Saudi women's access to the labour market in the technology sector is very limited, resulting in a foreign employee workforce. As Al-Ahmadi (2011) notes, women have had success in senior administrative and decision-making positions but this level of participation is limited in terms of numbers.

Taken together, the thrust of much of the existing research then appears to be on the obstacles to women's evolution in the work-place of today. However, the overlook may not be so negative. Looking specifically at the tech domain, Al-Gahtani (2004) acknowledges that traditional Saudi culture imposes itself on society and restricts women from practicing advanced technology in the workplace yet is also able to emphasis Saudi women themselves are tech-savvy and commonly communicate through such services as WhatsApp, Twitter, Facebook and Instagram.

In the education domain too, it has been said that women university graduates now have the ability to utilise academic Web resources effectively, even if they lack technical engineering and

maintenance skills (Al-Gahtani, 2004). Perhaps then, in line with the previous Saudi seven-year development plan (2000-2007), today's private sector may solve the issue for women in technology through technical and vocational training, where as a result, they may find career opportunities in technical and vocational occupations (Calvert & Al-Shetaiwi, 2002).

In this respect, Al Mulhim (2014) reports widespread acknowledgment that the education sector needs to incorporate technology education in the curriculum at all levels. Changes to the curriculum have been made and computer science has improved for both boys and girls, but more needs to be done and further in-depth education is needed. Nonetheless, it is now the case that girls need to learn not only how to use computers, but how these devices and software programming work. In other words, female students need to be instructed in how to become creators and not only consumers of technology products and services. Researchers have also claimed that teachers lack the knowledge and skills to use and work with advanced technology; these deficiencies can be remedied through training courses and access to technical support staff.

In the interests of acquiring an overall picture then, the following table shows female graduate degrees by department in Saudi Arabia for the year 2004-05.

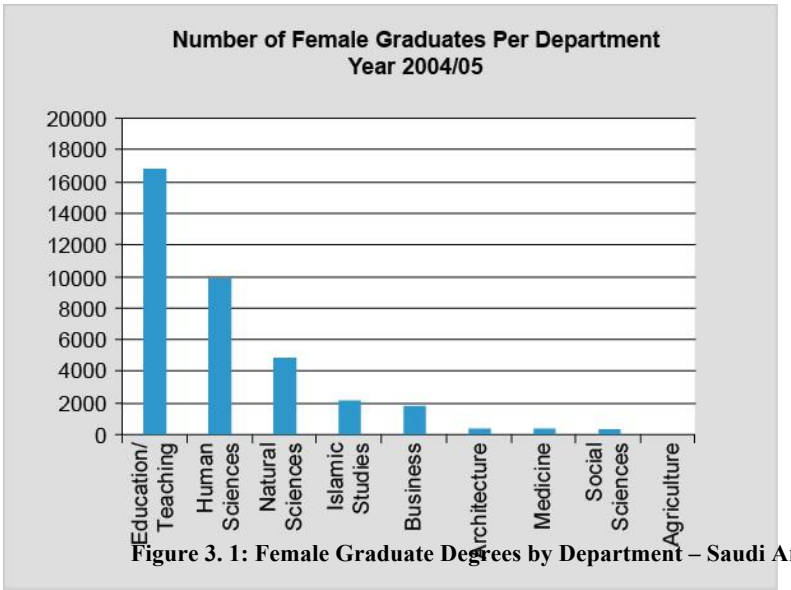


Figure 3. 1: Female Graduate Degrees by Department – Saudi Arabia

Source: Al Hamed, M., Ziadeh, M., Al Oteibi, B., and Mutawalli, N., Al Taalim fi AlMamlaka al Arabiya AlSaudia: Rouyat al Hader wa Istishraf al Mustakbal*, 4th ed., Al Rushd Library, Beirut, Lebanon, 1428/2007*

If I were to connect education policy to female student up-take in STEM subjects (Besselaar, 2007), then I would conclude that although government of KSA has made extensive efforts to promote the employment of women through digital technology, these measure would appear to have been largely ineffective due to concomitant changes in the social structures as described by structuration theory for making the smooth interaction of Saudi women with relevant leadership to secure employment in digital technologies. Nevertheless, recent trends in the employment of women in KSA are encouraging; indeed since 1992, women's participation rate in the Saudi national labour force has increased from 5.4 per cent to 14.4 per cent.

By 2012, for instance, Alhudhaif and Nalband (2012) were happy to highlight that the government supports women's work, although they still face several issues, such as a lack of technical training, the requirement of segregated environment and others. Many Saudi women have entered the private and the public sectors after the resolution of the Council of Ministers, which aims to develop Saudi women and give them the opportunity to adopt a role to improve society.

However, women's employment in the digital technology domain is declining (Amuda, 2020). It has been suggested that Saudi women are affected by a 'Knowledge Gap'. As previously noted, the education of women is a relatively new phenomenon, with the result that they have yet to acquire technical skills beyond the simple consumption of technology. In other words, women are still to acquire advanced information, putting them at a disadvantage compared to their male counterparts.

A lack of communication skills, access to stored information and only selective exposure and obstructive social norms are amongst the reasons why this knowledge gap continues to exist (Tichenor et al., 1970). In summary then, I would conclude that although the ongoing gender

gap presents a challenge, both government and academia acknowledge this issue and efforts are being made to remedy the problem, including e-learning and vocational training.

3.4 Gaps in the Literature

The gap in the literature is synthesized based on the evidence reviewed in chapter 2 and chapter 3. Several studies have indicated that there is plethora of job opportunities resulting from digitalization of society and industries for women, and many studies have indicated the economic empowerment of women in OECD countries. However, there is a lack of evidence regarding the impact of digitalization of Saudi industries and society on women's employment; and this has led the current researcher to investigates the impact of information and communication technologies on women's employment in tech-dependent SMEs in Saudi Arabia.

Furthermore, numerous theorists reviewed in section 3.2 and 3.3 have emphasized the urgency of digital skills and competencies for enabling women to harness the job opportunities due to deployment of digital technologies, but they have not provided the mechanisms and ways to achieve the increased competencies and subsequently increased participation level in the labor markets in general, and in the labour market of Saudi Arabia in particular. The theories relating to digital skills and women's employment are tested in the European countries, showing the positive link between women' digital competencies and employment. Nonetheless, none of research work is conducted, to the best of my knowledge, to assess what is being done to increase women's employment opportunities in digital technologies due to digitalization of Saudi economy. Moreover, the outcomes of studies reported for western countries cannot be extrapolated to the Saudi context due to differences in socio-cultural dynamics.

The social structures regulating the women's education and training such as government institutions, education institutions and the business organizations operate differently in Western

and Saudi contexts. I assume that measures and initiatives run by government, employers in Saudi market and educational institutions, either standalone or in collaboration with each other, can help women to gain digital skills which will enable Saudi women to exploit employment opportunities arising from proliferation of digital technologies.

Another assumption driving this research work forward is that knowledge of the perceptions/viewpoints and experiences of participants in relation to digital technologies and women's suitability for digital employments in Saudi contexts is critically important of revealing interesting themes about women's employment in digital technologies. There is a lack of empirical evidence in Saudi Arabia as to how social structures view digital competencies for women for purpose of gaining economic empowerment, and what is being done to increase the digital competencies and skills for Saudi women. The data from this study will more likely provide an insight into perceptions of participants about the initiatives and measures being taken to increase the digital competencies of Saudi women, which will in turn enable me to assess the employment opportunities for Saudi women in digital technologies.

There is a dearth of empirical evidence in Middle East, especially in Saudi Arabia, which can portray the perceptions of government, academic institutions and HRM policies for encouraging women to participate in the labour market as a result of digitalization of Saudi society. This study intends to fulfil this research gap by including the organizational leadership from government, businesses and academic institutions and exploring their views about the impact of digitalization of businesses and opportunities arising therefrom for women aspiring to pursue careers in digital technologies. It is expected that data from the business groups will reveal as to what HRM policies are underway due to digitalization of businesses for supporting and promoting women's aspirations to develop careers in digital technologies.

In order to bridge up this gap in the research, this study intends to assess the perceptions of stakeholders: government, academic institutions and HRM leadership about the women' digital competencies and its possible impact on increasing women's employment. The resulting data

from this study can be useful to realistically analyse the impact of digital technologies on women's employment in Saudi Arabia.

3.5 Summary

I have intended, in this chapter, to conduct survey of the theoretical background to women's employment in technology today. I have hence discussed several theories presenting the factors that are necessary for increasing women's employment opportunities resulting from proliferation of digital technologies in Saudi Arabia. The social construction of Technology theory, technology domestication approach, and the structuration theory offered insight into the major stakeholders involved in improving the impact of digital technologies on the women's employment.

Based on the literature surveyed in this chapter, I have found agreement from most of the researchers that women need to empower themselves within the technology field and remove the digital gender divide. Education and training for increasing digital competencies of women along with the roles of institutional policies (business-oriented organizations, public sector organizations) are main drivers in enabling women to exploit the work opportunities created by the digital technologies for achieving economic empowerment. Hence, perceptions of women, and attitude of social structures including government officials, organizational leaderships and academia can provide a useful insight into the strategies, processes and structures being employed for training women in digital technologies, consequently, the level of digital competencies can further illuminate the capability of women to harness the job opportunities resulting from the digital technologies.

The next chapter will discuss the methodological approaches adopted to address the research issue relating to the impact of digital technologies on the women's employment in Saudi Arabia.

PART III: RESEARCH METHODOLOGY

Chapter 4: Research Design and Approach

4.1 Introduction

While the previous chapter discussed the theoretical framework based on structuration theory, and the gap in research in women's employment in digital technology in KSA, I will define in this chapter, the most appropriate method and methodology for this research work. This chapter is mainly concerned about the presentation of epistemological stances, choice of epistemological viewpoints for this study, research strategy, and research method. This chapter has been divided into ten main sections. Section one describes the research epistemology; the research approach is illustrated in section two. The section three provides the research strategy, while sampling strategy is elaborated in section four. The method of data collection and data collection process are described in section five and six, respectively. Trustworthiness and validity were discussed in section seven. The data analysis and ethical considerations are illustrated in sections eight and nine, respectively. The summary of the chapter is provided in the section twelve.

4.2 Research Epistemology

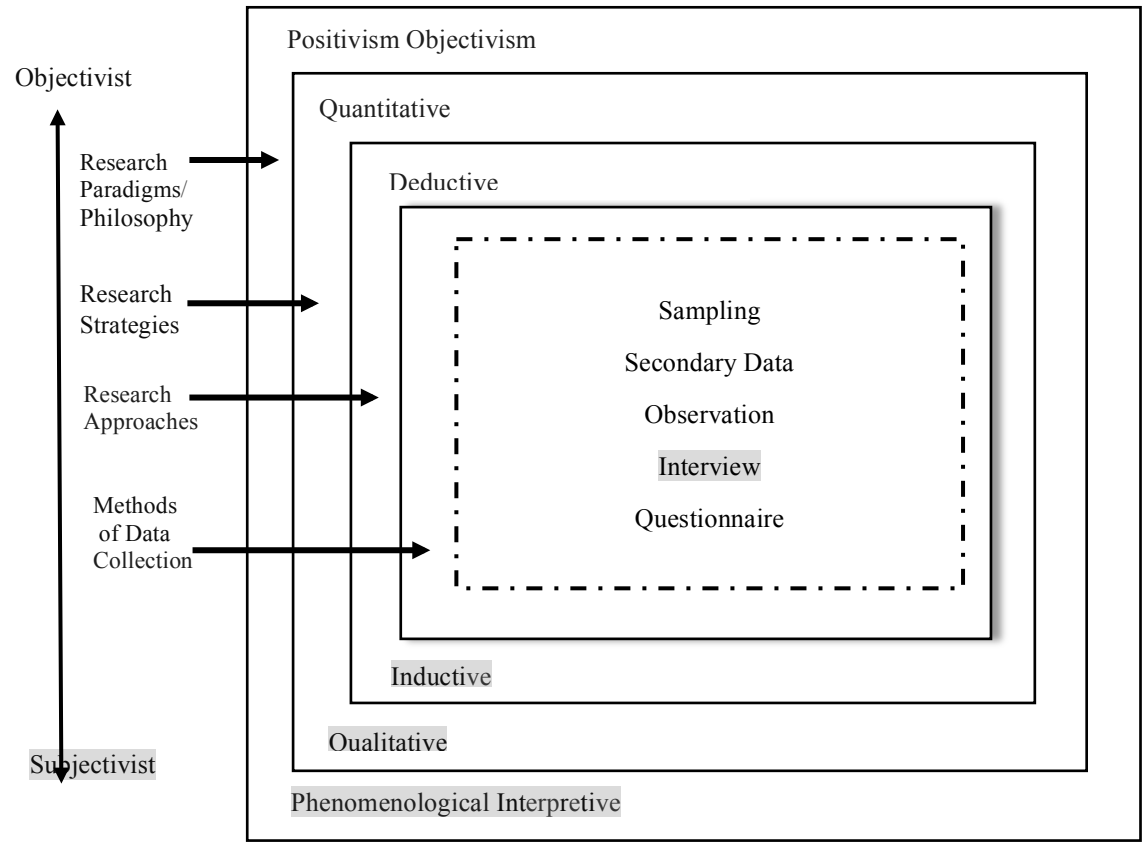


Figure 4. 1: Research Epistemology Flow chart Sources: Bryman & Bell (2007); Burrell & Morgan (1979); Collis & Hussey (2003); Easterby-Smith et al.(2012) and Saunders (2012).

As illustrated in figure 4.1, there are a range of possible approaches, out of which interpretivist approach has been chosen from the epistemological point of view. According to Schwandt (2001), epistemology refers to "the study of nature of knowledge and justification (p. 71). and deals with "issues about an adequate theory of knowledge or justificatory strategy" as posited by Harding (1987, p. 2). Three epistemology approaches, also called paradigms, are employed by researchers in the field of women and digital technologies, which are positivism (prediction), interpretivism (understanding) and critical (change) (Orlikowski and Baroudi, 1991; Braa and Vidgen, 2001). The employment of the foregoing three paradigms to explain the relationship between gender and technologies is illustrated by Trauth and Howcroft (2006) using positivist epistemology, interpretivistic epistemology and critical epistemology. When the relationship between gender and technologies is viewed by positivists, they aim to uncover whether and where technologies affect the lives of women. However, positive epistemology does not intend to explain the ways or theorize why relationship between the women and technologies has arisen and continue to exist (Trauth and Howcroft, 2006, p. 273).

Interpretivistic epistemology focuses on understanding how the relationship between women and technologies has arisen, and what opportunities are available for women as a result of proliferation of technologies in the modern societies. This approach is more fit for research questions aiming to explore in depth the influences of technologies on women in terms of emancipation, empowerment, liberties and employment opportunities offered by technologies to women in the developing and modernizing societies (Howcroft and Trauth, 2004; Trauth and Howcroft, 2003). As this research deals with the relationship between women and technologies in the context of employment opportunities, therefore, interpretivistic epistemology seems to be more suitable to address the research questions posed in this study.

Critical studies on gender and digital technologies address the question as to why gender inequalities and opportunities for women from the technological proliferation exist using different theories such as critical social theory and post-modernism. The motivation is to understand the power relationships exerted by stakeholders to control the employment opportunities or empowerment offered by technologies to women (Kvansy and Trauth, 2002). In the chapter 3 Sections 3.2.5-3.2.7, three important stakeholders including government, businesses and academic institutions are in position to control the availability of employment opportunities for women.

Many researchers have pointed to the compatibility of the choice of epistemology and research questions in a research work (Carter and Little, 2007; Young and Skrla, 2012). This study draws on mainly two epistemologies including interpretivistic epistemology and critical epistemology, and this is in accordance with the research questions raised in this study. Interpretivistic epistemology is chosen due to main focus of research questions on understanding the employment opportunities for and challenges to be faced by Saudi women in digital technologies-mediated labour market as perceived by participants handling the digitalization of selected social structures in Saudi Arabia. Guba and Lincoln (1994) view the interpretivistic epistemology useful in interpreting the social constructed realities, which is also supported by Giddens's structuration theory used as a theoretical framework for this study (see chapter 3 for detailed discussion). Structuration theory points to the perceptions of social structures and agents (women) as a basis for constructing social relationships between the social structures (academic, government, businesses in my case) and agents (Saudi women in my case). Additionally, interpretivistic epistemology resonates with structuration theory, as both put emphasis on the construction of social realities/relationships through human actions and interactions in a particular social setting (Orlikowski and Baroudi, 1991). Orlikowski and Baroudi (1991, p. 14) continues that interpretivistic epistemology is related to gaining 'understanding of social reality' which further allows researchers to understand 'how practices

and meanings are formed and informed by language and tacit norms shared by human working towards some shared goal". I assume that 'meanings' are beliefs and experiences of participants in relation to women's employment opportunities in digital technologies, and the tacit and norms are the 'practices' exercised by selected participants in their respective organizations, and 'shared goal' is whether Saudi women can gain access to the digital technologies-assisted labour market in Saudi Arabia. Based on these assumptions, interpretivistic epistemology seems to be logical choice for addressing the research questions in this study, and is supported by the structuration theory as a theoretical framework used in my research work.

Walsham (1993, p. 5) envisions the relevance of interpretivistic epistemology with "the approaches to the understanding of reality and asserting that all such knowledge is necessarily a social construction and thus subjective". Hence, the choice of interpretivistic epistemology can enable me to gain in-depth insight into interpretations provided by participants about digital technologies as a vehicle for creating women's employment opportunities, their views about the entry of Saudi women in the digital technologies-assisted labour market, and perceptions in relation to education and training of women's employment opportunities. Schwandt (1994) asserted that interpretivistic epistemology is concerned with elaboration of 'complex world of lived experience from the point of view of those live it'. As this study intends to explore the 'live experiences' of participants while selecting, recruiting and training employees in digital technologies in their respective organizations/social structures to address the research question relating to whether digital technologies do offer the opportunities for Saudi women to participate in the labour market for economic empowerment.

As this study also intend to identify potential barriers in the way of participation of Saudi women in the digital technologies-mediated labour market in Saudi Arabia. The interpretivistic epistemology only focuses on 'understanding the social influences, not questioning them. Hence, the critical epistemology is employed as complementary to the interpretivistic epistemology to address the research questions raised in my research work. Critical

epistemology is based on the assumptions that contextual factors around humans play a critical role in changing the prevalent conditions to meet out certain human objectives (Trauth et al., 2009; Myers, 2003). In similar vein, critical epistemology, according to Myers (2013), recognizes the human ability to act and change their social circumstances, but simultaneously it incorporates the notion that 'their ability to do so is constrained by various forms of social, cultural and political dimensions.

Contextualizing the above-stated arguments in the context of my study, if data reveal that employment opportunities in digital technologies are available for Saudi women in the labour market, the question is whether they would be able exploit these opportunities in the light of prevalent socio-politico-cultural conditions. These issues can be addressed by taking into account assumptions supported by critical epistemology. In other words, critical epistemology enables me to explore the repressive factors in the wider system which may involve obstacles of structural and socio-cultural nature working within the social structures, and that may lead to prevention of Saudi women in the participation of digital technologies-assisted labour market (Trauth, 2011). The critical researchers in the field of women and digital technologies try to explore as to how perceptions and socio-cultural within the social structures view the women's participation in digital technologies-created labour market (Howcroft and Trauth, 2008).

Taken together, I consider both interpretivistic and critical epistemologies fit to investigate the employment opportunities in digital technologies and potential barriers for participation in the digital technology-assisted labour market in Saudi Arabia. The outcomes of critical research identified and evaluates the measures and interventions at the level of social structures for improving employment opportunities while reducing the potential barriers relating to successful participation of Saudi women in the labour market.

4. 3 Research Approach: Inductive

The two main research approaches are deductive and inductive (see Figure 4.1), which reflect differences in the research logic; that is, the relationship between the research and theory. This study takes an inductive approach, which starts with a question, and proceeds through making observations, forming hypotheses, testing, analysing and drawing conclusions (Roberts, 2013). Here, Bernard is quoted as saying, "It involves the search for patterns from observation and the development of explanations – theories – for those patterns through a series of hypotheses" (Bernard, 2011:7). Similar stance was presented by Hair et al (2015), who argued that inductive approach does not demand the theory prior to collecting and analysing data, instead it generates theory and hypotheses. This stands in contrast to deductive approach which requires theory before data collection and deals with testing of hypotheses (Haddow et al., 2007).

In turn, Collis and Hussey (2009:8) state that "Inductive research is a study in which theory is developed from the observation of empirical reality; thus, general inferences are induced from particular instances." The role of the researcher is hence to understand thoroughly the feelings and views of participants and then to interpret the results (Creswell, 2007). In this study, an inductive approach was used in order to understand and explore the impact of digital technology on Saudi women's employment in KSA.

This study finds inductive research approach useful in terms of addressing the main research question as to what are perceptions of participants in this study about the employment opportunities in digital technologies for women due to digitalization of Saudi economy. In addition, the inductive approach will enable me to explore and investigate in-depth the perceptions and experiences of participants in relation to employment opportunities in digital technologies in the context of my study. Thus, the structuration theory, and literature reviewed in chapter 2 and chapter 3 on women's employment opportunities in digital technologies and barriers will be used to interpret the experiences and opinions of participants collected at the data collection and data analysis phases.

4.4 The Research Strategy: Qualitative Approach

There are two main research strategies: qualitative and quantitative research (Collis & Hussey, 2003). Each strategy justifies itself as a targeted research approach. According to Creswell (2013), a quantitative approach is favoured in the positivist paradigm to test statistics and make deductions. On the other hand, a qualitative approach is linked with the interpretive paradigm and is inductive, with the aim of understanding humans and their experiences.

Creswell (1998:15) defines a qualitative approach as "an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The research builds complex, holistic pictures, analyses words; reports detailed views of informants, and conducted the study in natural setting". Alvesson and Deetz (2000:1) describe the qualitative approach as follows,

> Qualitative research or what might more appropriately be called 'interpretive 'research aims at understanding the micro-practices of everyday life. Qualitative research is typically oriented towards understanding socially constructed reality. It focuses on meaning, ideas and practice, taking the native's point seriously without questioning either the wider context of it or the process forming it.

Since interpretive research aims to understand social phenomena and explores the opinions, feelings, beliefs, attitudes and experiences of people, a qualitative approach is appropriate. In this study, the qualitative strategy investigates and provides complex and rich detail about the participants' interpretations of the challenges and opportunities experienced by Saudi women in terms of the impact of technology on their employment prospects, and their personal stories, through which they can deeply express their beliefs, attitudes and feelings (Saunders, 2012).

My goal is hence to research the effects of digital technology on women's employment, and how the roles of government, academia and business assist or hinder those effects. I will do so

by examining the consequence or repercussions of the explicit opportunities and challenges that are relevant to the particular context of Saudi female workers and students.

4.5 Sampling Strategy

Smith et al. (2009: 48) stress that, "Sampling must be theoretically consistent with the qualitative paradigm in general, and with interpretative analysis particular". The purpose of sampling is to obtain deeper insights and better understanding of some cases and events (Neuman, 2006) and, for this reason, purposive sampling was the strategy adopted in this study where, as Neuman (2006:222) indicates, "Purposive sampling occurs when a researcher wants to identify particular types of cases for in-depth investigation to gain a deeper understanding of types".

Sampling strategy is informed by structuration theory, which describes that social structures interacting with women (agents) for their selection, recruitment, and training in digital technologies As this study intends to explore the perceptions of participants who are directly involved in the employment, provision of knowledge and training to women in Saudi Arabia, therefore, purposive sampling technique is found to be the most suitable to select the participants. Moreover, the purposive sample technique is used for recruitment of samples from the relevant organizations in this study, which enabled me to target the participants which met the following criteria:

- The participants representative of academic, government and business groups must hold decision-making positions within organizations, such as recruitment of employees, and digitalization of operations
- Participating social structures should be involved in making regulations and national policies regarding equal education, training and employment opportunities, and

digitalization of society and economy. This criterion only applies to selection of participants from the government group.

- The participating organizations which have already started to implement the digitalization of their organizational functions before the data collection phase of this study.
- The participants from social structures with documented training programs for employees in digital technologies within last two years.
- The business start-ups purely established and run by women through working with digital technologies.
- Participants representing the academic, business and government groups should have 5 years experiences in planning and implementing the digital technologies in the business operations of their respective organizations during their careers.

The participants fulfilling the afore-mentioned criteria were recruited from the participating organizations. I gave special consideration to the sample size, as it plays an important role to credibility of qualitative outcomes of my study. The sample size in qualitative research depends on the needs of the study which means that it is guided by the principle of saturation, which Lewis & Ritchie (2003:83) define as "the point of diminishing return where increasing the sample size no longer contributes to new evidence". Qualitative researchers suggest that researchers should cease data collection when they reach saturation in terms of information or a level of theoretical saturation (Creswell, 2007; Lewis & Ritchie, 2003).

Selection of the appropriate number of interviewees is hence subjective. Perry (2000) suggests that 30-35 are required for conducting a qualitative research at the doctorate level, whereas Bauer and Gaskell (2000) suggest between 10-15 participants, arguing that the main concern is the quality of the information rather than the number of the respondents. Patton (2002:244), meanwhile, asserts that the sample size in qualitative research does not rely on a specific

number of interviews, but on several factors which are "what you want to know, the purpose of the inquiry, what's at stake, what will be useful, what will have credibility, and what can be done with available resources".

Based on the foregoing arguments, the participants in this study were comprised of forty people who were selected to reflect different experiences. The participants were divided into three main groups based on their affiliations with the respective organizations: government, academia and business whose roles and responsibilities affect women's relationship with technology (see table 4.1). Some details about each group are provided below:

- **Government**: Based on the selection criteria, participants representing their ministries and agencies responsible for policy and programmes to empower women to work with technology (also see section 4.7.1). They were expected to provide an insight into the government programs and training opportunities in digital technologies for women in the wake of digitalization of society and economy.
- **Academia**: This is the sector responsible for the curriculum and education to provide women with the knowledge and skills to be successful in the technology sector (also see section 4.7.1). It contained participants from the top leadership (male and female students engaged in acquiring knowledge and skills in the science and technology-related disciplines. Participants from academic organization organizations can give opinions and show experiences about fulfilling the knowledge gap for female, and paving ways for Saudi women to harvest employment opportunities in digital technologies.
- **Business**: National and multi-national business organizations fulfilling the selection criteria are selected. This group contained women entrepreneurs with established start-ups, men and women occupying top leadership positions in the HR departments of the included organizations (also see section 4.7.1). The views and opinions of participants from businesses can reveal the patterns of employment or any changes towards employment opportunities in digital technologies for Saudi women due to digitalized operations of businesses.

Table 4. 1: Participants in semi-structured interviews in Saudi Arabia

Stakeholder	Female	Male	Total
Government	6	4	10
Academia	13	2	15
Business	9	6	15
Total	28 (70%)	12 (30%)	40

Most successful societies are based on a partnership between government, academia and business to cater to the needs of the communities they serve. The objective is to derive insights from representatives of the afore-mentioned groups who all have an important role to play in the selection and training of women in the digital technologies in their respective sectors in the KSA.

4.5.1 Sample Structure

The first group was the government employees (see Table 4.2). The participants were ten members from the main government organisations that make decisions affecting women's employment. I received consent from four men and seven women for a meeting. For a man to allow a private interview with women is not normal in the Saudi cultural context, but in practice I had no difficulty in arranging these meetings.

One of the men agreed to do an interview in his office, with the door left open and the security guard outside; in fact, he was very interested in research and about the research topic. He was educated and respected me, as a woman who was studying and doing a PhD degree. The

questions raised with this group were about the policies affecting the situation of women working with digital technology (see appendix 2).

Table 4. 2: Participants in the Government Group

Stakeholder	Female	Male	Total
Ministry of Civil Service **MCS**	0	1	1
Ministry of Labour **ML**	1	0	1
Ministry of Education **ME**	1	1	2
Ministry of Health **MH**	1	0	1
Ministry of Commerce **MC**	1	0	1
Ministry of Social Affairs **MSA**	0	1	1
Communications and Information Technology Commission **CITC**	0	1	1
King Abdul-Aziz City for Science and Technology **KACST**	1	0	1
Public Training Office **PTO**	1	0	1
Total	6	4	10

The second group was academics (see Table 4.3). The participants were 15 people involved in various positions in the academic sector, including secondary schools, women's training organisations and universities, and 5 students studying science and technology-related subjects in the academic sector. The sample included both women and men. However, the sample contained predominantly women, as it included 8 women occupying management positions in the HR department and 5 students aspiring to be gain digital competencies to become either entrepreneur or join a digital technology-dependent companies. The 2 male participants in the academia group sample were included from the HR departments, as they played an important in decision making process regarding the recruitment and training of female candidates for the advertised positions in their relevant organizations.

In addition, the perceptions of HR managers and female students in science and technology disciplines could identify the level of education and training given to female students, and to

which extent the existing provisions for education and training were important for enabling female students to exploit the employment opportunities in the digital technologies-generated labour market. The presence of the students in the academic sample provided me with valuable data for assessing the employment opportunities in the labour market along with the level of training and education available at the educational institutions for development of the female students' digital competencies. Moreover, the students' perceptions about the governmental policies and employment prospects at the firms can constitute an important data for unfolding the employment opportunities created by digital technologies.

Within this group, an important source was the Saudi Electronic University (SEU) because all the processes of the university are done by means of digital technology, with a focus on distance learning and e-learning. The questions raised with this group were about policy and the situation of training in the education sector, including the curriculum and the approach to teaching new technologies (see appendix 2).

Table 4. 3: Participants in the Academic Group

Stakeholder	Female	Male	Total
Saudi Electronic University **SEU**	1 (Management)	1 (Management)	2
Princess Norah Bint Abdulrahman University **PNAU**	2 (1 management + 1 student)	0	2
King Saud University for Health Science **KSU-HS**	2 (students)	1 (Management)	3
Taif University **TU**	2 (1 management +1 student)	0	2
Effat University (Private) **EU**	1 (Management	0	1
Technical College **TC**	1 (Management)	0	1
Public Training **PT**	1	0	1
Institute of Computer Training **ICT**	2 (1 management + 1 student)	0	2
Secondary School **SS**	1	0	1
Total	13	2	15

The third group was business people (see Table 4.4). The participants were from ten private companies, including women and men. The Human Resources Development Fund (HRDF) under the Ministry of Labour was an important stakeholder in terms of establishing the policy and conditions of employment in the private sector. Another source, Glowork Company, is a major employer of women. It employs women in call centres, working from home. The questions raised with this group were about HRM policy, and the situation for women in terms of training, professional and technological opportunities (see appendix 2).

Table 4. 4: Participants of the Business Group

Stakeholder	Female	Male	Total
Human Resources Development Fund **HRDF**	1	1	2
Glowork Company	0	1	1
Badir Office_ Badir Program for Technology Incubators **BPTI**	1	0	1
Chocolate Factory	1	0	1
Consulting and Feasibility Study Firm	1	0	1
Investment Firm	0	1	1
Electronic Firm	0	1	1
Telecommunication Company	1	1	2
Regional Administration Ahli Bank	0	1	1
Entrepreneurs women	4	0	4
Total	9	6	15

Table 4.5 documents the distribution of participants by age group. The age of the participants is important owing to generational socio-economic and cultural differences in education, experience, perceptions and expectations. The dominant age range across both genders was 35-45, represented by eighteen participants, of which eleven were female and seven were male. This age group was mature, experienced and yet still capable of further career/employment adjustment and advancement.

Table 4. 5: Age groups of interviewees

Age	Government		Academia		Business		Total
	F	M	F	M	F	M	
25-30			5		2		7
25-35	1		2		4		7
35-45	3	2	5		3	5	18
45-55	2	1	1			1	5
55-65		1		2			3
Total	6	4	13	2	9	6	40

It can be noticed that male participants, which constituted 30% of the total sample population (see table 4.1), are present in all three participants groups. This is because of the fact that they occupy central positions in the decision-making process within the respective organizations for making policies or providing resources for education and training of females (workers/students) for development of female digital competencies. In academia group, all the academic institutions except one were dealing with female educating institutions. I was compelled to select two male members from mixed gender educational institutions, as they were directly involved in decision making process relating to the selection and training of female staff with digital competencies. There were 6 males in the business group, which was relatively high number compared to other stakeholders' groups in this study. This is due to the fact business world in both developing and developed countries is male dominated, and many reports have highlighted the relatively very low representation of women in the leadership positions in the business organizations in digital technologies-dependent organizations (see section 2.6.3). Hence, the recruitment of male participants from the businesses participating in this study was essential to gain insight into the employment opportunities available for women or any HR policies designed to increase the digital competencies of the female staff for improving the retention of the women workers at positions requiring the digital competencies.

Similarly, the public institutions are mostly male dominated, though women also occupy the positions in the public institutions due to the recent government emphasis on inclusion of women in public sector institutions, but the top layer of the government organizations are mostly occupied by males. This means that as far as the decisions/policies regarding the education and training of females in digital technologies are concerned, mostly male leadership is responsible for structuring or restructuring such decisions or policies. This situation led to the presence of relatively 4 men and 6 women participants in the government group, which is slightly lower than business groups, but higher than the academia group.

Without gathering the perceptions of male participants at the decision-making positions within their organizations, it would not be possible to gain an in-depth insight into the digital technologies-mediated employment opportunities available for women in the organizations with male leaders, as men even in the female-reserved social structures (such as female educational institutions) are involved in selection, recruitment, and training of employees in digital technologies in their respective HR departments in Saudi Arabia. In addition, it should be acknowledged that the context of my research is female employment opportunities created by digital technologies in the Saudi labour market which is mostly male dominated, and perceptions of males are most likely to reveal the male attitude towards the women's employment and challenges which may be faced by Saudi women in exploiting employment opportunities in digital technologies. Male perspectives on women employment in the digital-technologies-dependent organizations can provide an insight into the extent to which women would be able to exploit the employment opportunities in the organizations where men are involved in decision making process for selection, recruitment and training of female staff. Therefore, it is very vital to include the male participants from all of three groups: academia, government and businesses. In academia, more women were included, as the education

institutions are segregated for female education, only two males were included because of their involvement in the HR decision-making processes in the respective academic institutions.

4.6 Method of Data Collection

The semi-structured interviews were used as data collection tool, which fits well into the qualitative research approach adopted by this study. The choice and justification of semi-structured interview as a data collection tool is presented in the subsequent subsection

4.6.1 Semi-structured Interviews

According to Smith (2007), the interview method is an appropriate data collection technique for use with an interpretive paradigm. Interviews help researchers to understand the feelings and thoughts of people expressed through speech and body language, enabling them to answer the questions in a natural way (Hussey & Hussey, 1997). Collis and Hussey (2009), Creswell (2007) and Patton (2002) also emphasise that interviews are a strong tool to understand human experience.

Furthermore, Kvale (1996:1) indicates that the qualitative research interview is used "to understand the world from the subjects' points of view, to unfold the meaning of people's experiences, to uncover their lived world". As Denscombe (2007:173) indicates, "Interviews are actually something more than just a conversation. Interviews involve a set of assumptions and understandings about the situation which are not normally associated with a casual conversation".

Moreover, interviews help researchers to obtain more and deeper viewpoints from respondents (Robson, 2002). Thus, for the purposes of this study, the interview method was selected as an effective way to gather data, first and foremost because the interviewees can be specifically targeted to ensure that they are knowledgeable about their roles in the areas to be explored.

Hence, I would conclude that interviews give researchers the freedom to explore opinions in greater depth and detail. In addition, it can be used to explore sensitive issues such as cultural constructions of gender, women's rights and gender segregation, which may be important to the present study. Therefore, the benefits of the interview are, as Patton (1990:196) explains:

> We interview people to find out from them those things we cannot directly observe… we cannot observe everything. We cannot observe feelings, thoughts and intentions. We cannot observe behaviours that took place at some previous point in time. We cannot observe situations that preclude the presence of an observer. We cannot observe how people have organized the world and the meanings they attach to what goes on in the world. We have to ask people questions about those things".

Researchers have traditionally categorised qualitative interviews into three types: unstructured, semi-structured and structured (Creswell, 2007; Robson, 2002; Punch, 2005; Saunders et al., 2012). Using closed questions, the structured interview places the same questions in the same order, within a short time duration with a large sample. Moreover, structured interviews avoid the creation of new questions during the interview (Denscombe, 2007).

However, the structured interview was not suitable for this study because it is based on an objective ontology and positivist epistemology (Cunliffe, 2010). In contrast, unstructured interviews ask questions that are general and help in the understanding of a situation. Hesse-Biber and Leavy (2006) indicate that unstructured interviews are an informal conversation between the researcher and the interviewee.

The unstructured interview approach did not fit with the study aims because my research required more focus on the specific area of the relationship between employment and technology in Saudi Arabia. In doing so, it needed to generate the rich data best placed to make a strong contribution to knowledge, and here the semi-structured interview proved the best approach.

Semi-structured interviews are commonly used in qualitative research (Collis & Hussey, 2003; Saunders et al., 2012). The semi-structured interview subsequently uses open-ended and probing

questions to allow the respondents to express their experiences in depth, while providing enough guidance and structure to ensure that the discussion remains focused on the researcher's topic of interest.

Hence, the benefit of the semi-structured interview is to understand the world through the interviewee's perspective (Patton, 2002). Similarly, Alston and Bowles (2003:118) indicate that a semi-structured interview is a strong tool, to "see the world from the eyes of the respondents as much as possible, to explore with them their thoughts and feelings and to thoroughly understand their point of view". Finally, Cunliffe (2010:13) highlights that semi-structured interview is used to "explore different meanings, perceptions, and interpretations of organisational members".

During the interview, the researcher can ask flexible questions to encourage the participants to reveal their experiences by expressing their feelings and beliefs. Therefore, a wealth of relevant information and different experiences from each group's perspective could be obtained to contribute to the study. In this study, the use of semi-structured interviews has enabled me to understand the participants' views, feelings and experiences regarding the relationship between Saudi women and digital technology.

4.7 Data Collection Process

The process of data collection includes the preparation of the interviews, the pilot study, the design of the final interview protocol, field access, and then the conduct of the actual interviews.

4.7.1 Designing Data Collection Instrument

At this stage of the process, it is important to take into consideration the nature of the topic. In other words, the interview questions must relate to the literature on women, in the context of the impact of digital technology on the employment opportunities for women in digital technologies

and potential challenges in exploiting these opportunities. I used literature on the Saudi cultural context, employment opportunities in digital technologies, skills and training required for employment opportunities, and barriers for women to participate in the job market created by digital technologies to formulate the main interview questions. Additionally, prompt questions were used to clarify responses or extract more information in response to the points requiring more explanation from participants.

The structure of interview consists of four main sections (see Appendix 2):

Section 1: participants profile with aim to collect data about age, position and responsibilities in the work, experience.

Section 2: Government Group with purpose to extract data regarding the employment opportunities, training and skills programs and barriers for women's participation in the labour market created by digital technologies. There are 11 open-ended questions in this section.

Section 3: Academic Group with purpose to extract data regarding the employment opportunities, training and skills programs and barriers for women's participation in the labour market created by digital technologies. This section consists of 7 open-ended questions.

Section 4: Business Group with purpose to extract data regarding the employment opportunities, training and skills programs and barriers for women's participation in the labour market created by digital technologies. This section contained 8 open-ended questions.

4.7.2 Pilot Study

A pilot study is an important step prior to the actual data collection process (Kent, 2007). Gillham (2000:55) highlights that a pilot is a "dress rehearsal", while Bazeley (2013:55) advises, "Put all your proposed research procedure, including strategies for analysis, through a 'dry run' with the kind of setting or people who will eventually become your research focus".

Saunders et al. (2009) and Yin (2003) indicate that a pilot study helps the researcher to improve and reformulate difficult, unclear interview questions or improve the interview schedule. In the pilot study stage, the researcher begins to understand him/herself, and how long the analytical process will take (Marshall & Rossman, 2014).

In this study, a pilot study was undertaken two weeks ahead of the fieldwork. There were two stages of the pilot interviews. In the first stage, I selected three Saudi women in order to benefit from their experience. Two of them were PhD researchers at Hull University. I asked them to read the proposed interview questions and provide detailed feedback and then I adjusted some of the questions.

The first woman was in the final stage of writing up and had experience of working in the Ministry of Labour in KSA. The second pilot interview was with a female student who was studying in the Business School and was in the stage of analysing data. She provided useful comments about the type and the order of the questions, which helped in formulating understandable questions and developing a clear interview schedule.

The second stage of piloting was conducted with a female student who was studying in KSA at Jeddah University. This was done four days before the main interviews. The interview took around one hour, without any comments about the questions. Moreover, it was a flexible interview, and the interviewee allowed me to record the meeting.

In terms of rewording some questions and checking the time for each interview, these first interviews constituted an important and beneficial stage before starting the actual interviews. Overall, the pilot study helped me to test and judge the quality of the interview questions, resulting in the rewording of some questions, to include ‘Why’ and ‘How’ in order to produce deeper and more meaningful input.

After incorporations of the feedback and input derived from participants, the final interview was distributed to the participants from government, business and academia, as described in section 4.5.1.

4.7.3 Field Access

The interviews were conducted in Saudi Arabia during a period of three months from 26th August 2015 to 26th November 2015. There were forty participants comprising 12 Saudi men and 28 Saudi women (see table 4.1). I arranged the appointments for the interviews in several ways; for instance, social media (Twitter), the telephone and the mail were used to arrange appointments. In many cases, the interviews were held at the workplace of the participants.

In the gender-segregated society of the Saudi workplace, this approach created some difficulties. In those cases where I had not been able to pre-arrange an appointment, but where the individual or the organisation was valuable to the research, an innovative approach was required. I discovered that the most effective technique was to present myself at the reception of the organisation, request an appointment, and explain the nature of the interview. This proved to be an effective way to start to the process.

In the Saudi context it was difficult for a female researcher to be able to interview a male representative in an all-male environment. Nevertheless, I was successful in interviewing appropriate senior management representatives of four government departments, as well as their equivalents in academia and from four companies.

These logistical challenges led me to use a creative and demanding strategy to access qualified representatives of the four stakeholder groups. I found that it was essential to present a professional approach - for example, having a business card and a summary of the research project - which could be presented at the organisation's reception. In addition, I found that knowledge of the vocabulary of government, academia and business was beneficial.

In the case of the academia group, a conference in my home city (Taif) was opportune and contact was made at the conference venue, where appointments could be arranged. In some

cases, participants were agreeable to immediate interviews. Others were available prior to departing to their homes. All of the above were interviews with men.

In contrast, the experience with women participants was straightforward. Here, I found arranging appointments by telephone was possible.

4.7.4 The Actual Interviews

Deep conversation between the interviewer and the interviewees provides details and thought about the phenomena under investigation (Smith et al., 2009). Wilkinson and Young (2004) suggest that an effective way to prepare for the interview is through logistical planning, arrangement of a list of interview status and ideal organising.

Logistical planning takes into account such issues as identifying and knowing the location, or the distance between the interview place and the organisation, the specific times of the meeting and the availability of transportation. Here an interview agenda that takes account of essential logistical considerations is advisable, including names of participants, time and place of interview, required equipment and supplies, such as recording facilities and business cards. Indeed, Smith et al. (2009) emphasise that it is important to ask the participants about the place and the time of the interview in order to ensure that they are comfortable with the arrangements.

I decided that better results would be obtained by conducting the interviews in the interviewee's first language, so they would be able to express their thoughts and ideas clearly. In this regard, Bryman and Bell (2007: 496) stress that:

> If you are interviewing people whose primary language is not English but another language in which you, the interviewer are fluent, you may decide to interview respondents in their primary language, so that their ability to communicate effectively is not impaired by having to speak in a language with which they are less familiar (p. 496).

I respected the participants by keeping to the agreed timetable and confirmed to each participant, that their information was confidential and secure. The duration of the interviews was between forty and seventy minutes.

Some respondents were unable or unwilling to give lengthy interviews because of the pressure of their work schedules, while others had difficulty giving long answers because of limited knowledge or personal reluctance. Nevertheless, I tried to obtain as much detail as possible without making respondents uncomfortable or unduly disrupting them.

After the data collection process, it was apparent that this systematic, progressive approach was important for revealing insights into the employment opportunities for Saudi women in digital technologies. Moreover, it offered an opportunity to contribute to the literature on this important topic, on which there is currently limited knowledge. In doing so, a better understanding of the employment opportunities in digital technologies and challenges could be developed in order to assist Saudi women to participate in the digital technologies-assisted labour market in Saudi Arabia.

4.8 Trustworthiness and validity

The validity is commonly applied to the qualitative research, while the reliability is used frequently by the quantitative research (Golafshani, 2003, Creswell and Miller, 2000). Lincoln and Guba (1985) coined another term ‘trustworthiness’ to determine the reliability of the qualitative findings. Strauss and Corbin (1990) also emphasized on the use of ‘trustworthiness’ equivalent to reliability in the quantitative study. The trustworthiness indicates the degree to which the outcomes of the study are believable for the audience in the field of study (Seale, 1999).

In order to ensure the trustworthiness and reliability of the data, I carried out the ‘inquiry audit’ approach involving the description of data collection process with as much details as possible to

ensure transparency and consistency of qualitative data (Golafshani, 2003). The raw data were carefully compiled, stored, translated with high degree of precision as explained in the data analysis section 4.7.4.

Moreover, the data analysis steps were recorded and described in full details, steps involved in reducing and summarizing using thematic analysis such as the process of making codes and subcodes, themes and sub-themes, maintenance of data notes within the dedicated notebook throughout the data analysis phase, and the exhaustive comparison of codes and themes with each other and with raw data at codes- and themes-formation stages of data analysis were performed. These measures increased the consistency and transparency of data from this study, as Campbell (1996) contended that maintenance of notes, referring codes and themes to the raw data, and description of data reduction steps increase the qualitative data's verifiability and consistency which enhance trustworthiness and reliability of the qualitative data.

Yardley (2000) describes that coherence is another measure which is used to increase trustworthiness of qualitative data. To achieve this, I took care in selecting the interviewees, scheduling every step in the data collection and the analysis process. In addition, I sought to connect the research themes together logically and to present a coherent argument, in order to convince the reader of the trustworthiness of the results (Yardley, 2000; Guba & Lincoln, 1994), to convey an understanding of how digital technology affects Saudi women's employment in terms of new career opportunities and challenges.

4.8.1 Construct validity

Validity is considered to be an important criterion to increase accuracy and truthfulness of the qualitative data, which is used to verify the accuracy of information derived from the qualitative data collection instrument (Creswell and Clark, 2010). As this research work elicits the experiences and opinions about the digital technologies-created labour market and potential

employment opportunities for women, which means that data derived from participants reflect the subjective realities expressed by interviews. The subjective realities can be verified only through the participants who expressed them during data collection, which warrants the use of internal validity for ensuring the accuracy of data and interpretation of data by the researchers by asking participants about whether outcomes presented in the study are reflection of their experiences. I adopted the member-check approach for confirming of whether outcomes of this study are in line with what they have reported during interviews. Yin (1994) viewed the member-check tactic as a useful strategy to minimize biasedness arising from the humans dealing with data collection and data analysis in the qualitative research process. I prepared the summarized version of findings, and forwarded to the participants for their feedback. All participants expressed their satisfaction with the summary of outcomes, and none of them raised any objection against any part of the findings. Additionally, the discussion was outcomes of this study was conducted based on the existing literature, which further reduced indeliberate biasedness and increased credibility of data.

Secomb and Smith (2011) posited that pilot study also enhances the validity of the study, as it reveals the flaws of the data collection instrument. If the data collection instrument measures what it intends to do is called valid data collection tool. The pre-assessment of the data collection instrument before the actual study allows researchers to discover and correct flaws, so that misunderstandings of meanings of and confusions in the data can be avoided. Therefore, I have conducted pilot study prior to actual study to ensure that questions in interviews extract the information required by me to address the research question. The detail of pilot study can be found in section 4.7.2. The outcomes from pilot study helped me to refine and modify the research questions based on feedbacks from the interviewees involved in pilot study. This help increase the validity of data collected by qualitative interviews.

Wilson (2014) stressed on importance of face validation for increasing the validity of the qualitative data collection tools. Face validation is the correction of language usage and clarity

of questions through the feedbacks from experts in the field in which research work is being conducted. Face validation was done by my supervisors and other experts such as my second supervisor.

4.9 Data Analysis

Data analysis phase comprised of two steps: preparation of data for analysis and implementation of data analysis tool. These steps are elaborated in the subsequent subsections.

4.9.1 Preparation for Data Analysis

Preparation for the data analysis requires several steps: recording, transcription, translation and validation of the recording, transcription and translation. These steps are explained below.

4.9.1.1 Recording, Transcriptions and Translation

Recording is the first step in preparing the interview data for analysis. Smith and Osborn (2008) highlight that in qualitative research it is better to rely on recording than using notes. In this study, I had originally intended to use a voice recorder for the interviews, but only nine female participants and five males agreed to this, with the others preferring not to be recorded for their own reasons.

In those cases where participants did not agree to recording, I had to rely on notes carefully written during the interviews to document the conversation as accurately as possible. Table 4.6 illustrates the distribution of voice recorded and researcher note records of female and male participants of each stakeholder group.

Table 4. 6: Interview Record – Voice Recording or Researcher Notes

Group		Female			Male	
–	Voice	Notes	Total	Voice	Notes	Total
Government	2	4	6	2	2	4
Academia	4	9	8	2	0	2
Business	3	6	4	1	5	6
Total	9	19	28	5	7	12

In this study, all forty participants were interviewed in their native language, Arabic (see appendix 2). By conducting the interviews in our shared main language, I was able to follow their reactions and symbolic words. I spent a long time on the transcripts, preparing them for the next stage.

The third step was to translate the transcripts from Arabic into the English language. Bryman and Bell (2007) suggests that the researcher must translate the data into English, in order to utilise it in analysis and the final writing.

Translation was required because all of the interviews were conducted in Arabic and as this PhD thesis is in the English language. This was a major challenge, as I had to translate all of the data from the forty participants into the English language. A professional translator was hired to translate all interview transcripts from Arabic to English language. Back-translation is too recommended by several scholars to reduce the language errors and improve accuracy of meanings in both languages.

Hence, to ensure quality and accuracy, the English translated version of the documented "interviews" was then given to a professional translating agency, who back-translated them into Arabic. In this way, the Arabic back translation could then be compared with the original Arabic

transcripts. Of note, only a sample of 12 transcripts were back-translated to ensure the quality and accuracy of the translation due to the cost factor.

The validation of the interview translation is a very important process ensuring that the translation of the data does not change the meaning during the translation. Interview transcripts can be validated in two ways - member validation and peer validation (Creswell, 2007; Lincoln et al., 2011); peer validation was used in this study, as described below.

After the interview process, I translated the dialogue into English, while to ensure the accuracy of the translation the translation, I asked two linguists familiar with professional language translation techniques to check my translation; therefore, providing peer validation (Creswell, 2007). These linguists were two teachers teaching in English schools whose main language is Arabic.

If these linguistic reviewers found any mistakes in my translation, or if there was any discrepancy between the suggestions of the two reviewers, then the three of us sat down together and discussed the issues. My aim here was to agree upon a translation that best captured the nuances of the original Arabic, while being understandable to an English reader. Such discussions focused on issues of semantics in relation meaning equivalence, being that some cultural allusions, idioms and figurative language cannot be translated literally from Arabic to English.

4.9.2 Implementation of data analysis tool

Thematic analysis was used for analysing the qualitative data obtained from the participants in this study; and is considered to be a useful tool for analysing the textual data or interview transcripts (Braun & Clarke, 2006). Braun and Clark (2006:79) define thematic analysis as "a method for identifying, analysing, and reporting patterns (themes) within data". Creswell (2007), McMillan and Schumacher (2010) and Ryan and Bernard (2003) all highlight that

thematic analysis is a common type of analysis method in qualitative research. Patton (1990) points out that through the thematic analysis of data, "the patterns, themes, and categories of analysis emerge out of the data rather than being imposed on them prior to data collection and analysis" (p. 390). Hence, selection of the main themes and the sub-themes is an important stage in the analysis process.

Thematic analysis carries several advantages. First, it is a flexible, and straightforward technique that can be modified for different qualitative studies depending on the research questions and accounts of participants which "Provides a rich and detailed, yet complex account of data" (Braun and Clarke, 2006, p. 78). Second, a research is not required to have a prior technological expertise or theoretical knowledge of other qualitative methods for performing the thematic analysis on the textual data successfully. Therefore, thematic analysis is a suitable and accessible data analysis tool for researchers in their early research career (Braun and Clarke, 2006). As thematic analysis is a well-structured approach involving the defined procedures and easily implementable steps, therefore, a researcher with limited knowledge of different qualitative research methods can quickly learn the procedures/prescriptions. King (2004) maintained that thematic analysis is a useful qualitative data analysis instrument for obtaining the different perspectives embedded in the textual data, finding the similarities and differences across the responses from different participants and highlighting unexpected insights into the data.

However, there are some drawbacks of thematic analysis, which should be mentioned. The very flexibility of the thematic analysis may be the cause of incoherence and inconsistency at the stage of the development of themes from the qualitative data (Creswell and Poth, 2016: Ajagbe et al., 2015), which can be overcome through the use of the reliable data analysis software such as Nvivo and stating the epistemological position explicitly for supporting the empirical claims (Leech and Onwuegbuzie, 2011: Welsh, 2002).

Due to afore-mentioned advantages, the thematic analysis was used for analysing the interview transcripts in this study. NVivo is a computer software program, which I used in this research because it is up-to-date and easily available qualitative data analysis software. NVivo has many advantages. First, it supports the automatic the coding and analysis process, the ease of managing the data, the ease of moving between documents and the variety of reports it is possible to generate from the data (Bazeley, 2013). It has some disadvantages which include the difficulty of using it, technological know-how in using the software for data analysis. Moreover, many steps are required before importing the data into NVivo, such as writing all the interviews in a Microsoft Word file, which takes a lot of time (McLafferty, 2006).

Based on instructions of McLafferty (2006), I followed several stages in the analysis process to reach the final themes and sub-themes according to the research questions.

4.9.2.1 Reading, Thinking and Annotating, Marking and Linking

In this stage, I was involved in reading, re-reading and making comments on interpreting the text. The words were then summarised in tables before importing the document into NVivo (Bazeley, 2013). This approach proved an effective way to clarify the structure and the responses. Moreover, it was easier to link between the quotations of participants in each group.

4.9.2.2 Importing data into NVivo

Importing the data (all the interviews) into NVivo was the next step of the analysis. I was then able to import all the forty responses in order to prepare them for the next step (see Appendix 3).

4.9.2.3 Coding and Sorting Codes in Nodes

After familiarizing myself with data, I have generated the codes. According to Braun and Clarke (2006), qualitative coding process involves the researcher to rethink and reflect on and interact with data with the pursuit to find the answers to the research questions. By following the advice of Boyatzis (1998, p. 1), “the good code is the one that captures the qualitative richness of the phenomenon”, the codes were developed which clearly reflected the perceptions of participants

on the digital technology and women employment. During the coding process, relevant sections of texts were highlighted with coloured labels, so that patterns of ideas can be detected across various responses. Such labels were also useful for relating the codes to a theme/category at the later stages of data analysis. The important themes emerged in literature reviewed in chapter 2 and 3 and matching with research questions raised in this study helped me to decide upon codes and sub-codes from the transcripts of interviews.

I have developed the Codebook in order to facilitate the coding and organizing codes derived from data; definitions and examples of each code was written, which was particularly useful in revisiting data, modifying the codes and tracking the similarities and differences in patterns of codes as they emerged. Nvivo software program was used for sorting and organizing large dataset. The full attention was given to each item in the data, and individual data extracts were coded into as many themes as were possible and/relevant.

4.9.2.4 Searching for themes

Braun and Clarke (2006) posited that all codes developed from data to be sorted into broader categories by grouping the potentially relevant codes into themes. According to DeSantis and Ugarriza (2000, p. 362), "a theme is an abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations. As such, a theme captures and unifies the nature or basis of the experience into a meaningful whole". Hence, theme is a manifestation of experiences which are structured through collecting various fragments of ideas/components which are meaningless if they are viewed alone. Braun and Clarke argue that theme need not to be necessarily a quantifiable measure, but should capture something contributing to the overall research question.

After coding and collating all data, a list of codes was obtained; codes were compared with each other. Similar codes were grouped into a single theme. For example, the codes relating to different ways available for women to earn their income were grouped into a broader theme

called ‘employment opportunity for women’. King (2004) speculates that main themes should be compared, and based on similarities they should be categorized into broader themes. Thus, the themes and subthemes were developed resulting from the arrangement of codes created in the coding phase of the data. All themes and subthemes were represented as parent nodes and child nodes in the Nvivo software program. Some of codes were directly related to research question, so they were used as a main theme as represented by parent node in the Nvivo program. All themes and subthemes were preserved in the codebook in order to establish links with the transcripts of interview data.

The codes and themes developed using the above-mentioned steps are presented in Table form in the Appendix 4.

4.9.2.5 Interpretation

The nature of interpretation is to move from the particular to the holistic point-by-point (Smith et al., 2009). In this process, the researcher reads, re-reads and summarises complex information in order to weave the themes into descriptive accounts (Willig, 2008; Smith, 2009).

Smith and Osborn (2008:76) emphasise that "the division between analysis and writing up is, to a certain extent, a false one, in that the analysis will be expanded during the writing phase". The interpretation of the feelings and ideas of the participants therefore gave me an opportunity to enter inside their world, particularly the women, and to discuss some issues that faced them in daily life, linked with the research questions 2 and 3 (see chapters 5 and 6). Moreover, descriptive interpretation enriches the study with more knowledge and information from the sample.

The trail of participants expressions while answering the interview questions was also preserved, which allowed me to illuminate the contextual nature of the interview question and potential interpretation of responses in terms of agreement, disagreement, belief or rejection

about the idea of women's employment in the era of digital technologies (Creswell and Poth, 2016). For example, many participants were laughed, amused, frowned, or showed expressionless face while answering the research questions. According to King (2004), it is important that interviewer should pay heed to the behavioural and facial expressions of interviews during qualitative interviews in order to unravel the strength of agreement and disagreement in the lengthy responses from participants about the certain phenomenon. Therefore, I have made observations of the expressions (behavioural and facial) of participants, and supported findings using their gestures and expressions in the chapter 5.

4.9.2.6 Writing the Report

In the last stage, I have used the themes and codes to write the results in this study. The broader themes were used as main headings, while the sub-themes were used as subheadings, and the codes were used to support relevant themes and subthemes.

4.10 Reflection on my Role in the Field

As mentioned before, my task was to obtain the different opinions, experiences and feelings from the participants (government, academics and business) and interpret them. I was therefore conscious of my role in the fieldwork, especially during the data collection process.

One problem encountered was prospective participants excusing themselves from the interviews without any convincing reason. In this sense, the interviewees did not realise the importance of the timetable of the meeting and how delaying the interview affected my time.

Most of the participants and public/private organisations were located in the capital city of KSA (Riyadh) and I live in another city. Some interviewees postponed meetings when I was struggling to book plane tickets or had already reached Riyadh. Moreover, transportation inside

the city was very difficult and expensive because I used ‘Kareem’, denoting a kind of taxi, since Saudi law prohibits women from driving.

Using the recorder was another issue that I had faced during the interviews, while some participants refused to allow recording (see Table 4.6). Being that the idea of qualitative research is not common in the society of Saudi Arabia, it seemed to me that the participants were afraid about disclosing some information affecting the organisation for which they worked or even their position in the workplace. Naturally, I respected their views and took notes.

I had difficulty in the meetings with some participants, while they were responding to the questions. Some men who had negative opinions and views about women’s work, especially with technology, made discussion difficult during the interview. They thought that working with technology pushes women to work in the same place as men, which is against Saudi culture, based on its strict interpretation of the Islamic religion.

Other participants criticised the research topic according to their belief that women contribute to and participate in the growth of the economy by playing their main role in the home (raising children) (see the findings chapter). I took care, however, to ensure that they had the opportunity to explain their opinions without influence from myself.

Moreover, during the meetings, efforts were made to make a balance between the interviewer and the interviewee. According to Oakley, “A balance must then be struck between the warmth required to generate ‘rapport’ and the detachment necessary to see the interview as an object under surveillance” (Oakley, 2005:218).

In addition, communication skills, such as eye contact, good listening and control of body language were very important to keep the participants comfortable, in order to encourage them to answer in full (Arksey & Knight, 1999). These efforts have contributed to a healthy

relationship between the interviewees and I, which involved a lot of mutual affection and respect.

Nonetheless, I had difficulty entering some of the Saudi government organisations because most of the decision makers are men, and security personnel were very worried when they saw a woman approaching. Nevertheless, I conducted the interviews inside the government organisations politely and courteously.

Another common question facing me was why I did not make appointments before coming. I have some evidence that I sent emails but no one replied to give permission, whereas they allowed the meeting when approached directly. Finally, I proposed that the qualitative research could be useful, particularly in a Saudi context, in order to obtain better understanding of different issues and listening to women's voice, as Ritchie and Lewis claim (2003: 267):

> ..the particular value of qualitative research lies in its ability to explore issues in depth and from the perspectives of different participants, with concepts, meaning and explanation developed inductively from the data ... the degree to which the data from a study support existing theories can be assessed, by comparing how well different cases 'fit' within an established theory and how far it is able to explain behaviours in individual cases.

4.11 Ethical Considerations

Many authors emphasise the importance of ethical principles when conducting research (Creswell, 2007; Patton, 2002; Schneider et al., 2003) and it is widely accepted that a variety of ethical and legal issues must be considered before commencing research that includes human subjects (Schneider et al., 2003).

Research ethics refers "to questions about how we formulate and clarify our research topic, design our research and gain access, collect data, process and store our data, analyse data and write-up our research findings in a moral and responsible way" (Saunders et al., 2009: 184). The ethical issues involved in data collection, methodology and research design should hence be

considered at the beginning of the research process (Collis & Hussey, 2003; Oliver, 2012). Moreover, they must also be respected during and after the research process.

Most academic institutions have implemented their own code of conduct with regard to ethical standards. For example, the University of Hull states in its code on Ethics in Research (University of Hull website, 2014):

> As an academic community, The University of Hull has a responsibility to encourage the highest possible standards of care, consideration and integrity within all research. Research integrity extends to accountability for the ethical basis of all aspects of research; for the protection of both the participants and the researchers; for the probity of the financial management of the project; for the reliability of results; and for making every best effort to provide value for public or private funds invested in research projects

A key objective of any research is to protect the participants from the risk of harm (Bryman, 2006). This can be achieved through obtaining informed consent from the participants, protecting the anonymity and confidentiality of participants, while providing a right to withdraw.

First, informed consent should be obtained before an interview (MacKay, 2007). McNamee and McNamee (2002:25) underline that "informed consent is a standard principle in a variety of professional practices as well as social research: it is the formulation of a widely recognised moral obligation to respect others and take into account their interests" (p. 25). Simply put, informed consent means that participants should understand what they are doing and what the research requires of them, while such information may include the aim and the purpose of the study.

Secondly, Neuman (2006) highlights the key ethical issues of privacy and confidentiality. The confidentiality of the participants means not disclosing their personal data, information or social status. Indeed, Oliver (2012) insists that the researcher should retain only the information required for the purposes of the study.

Finally, participants have a right to withdraw. According to Gravetter and Forzano (2011: 126), "ethical research requires informing participants that they have the right to withdraw from the study at any time without penalty".

In order to ensure compliance with all ethical guidelines, from the outset of this study I obtained a consent form and permission for the data collection from Hull University Business School, the Ethics Committee, my own university (Taif University - see appendix 1), and the Saudi Arabian Cultural Bureau in London. I then explained to the participants the idea of the topic and the aim of the study and adhered to ethical practice during the research steps in terms of privacy and confidentiality.

Moreover, I protected the respondents' names by giving each one a pseudonym and withheld sensitive information. Some of the participants refused permission to record the interview, which I dutifully respected.

Finally, I documented the whole process of the fieldwork including each participant's gender, age, the organisation, the time and date. I have been transparent about my role in the research and the challenges that I faced during the data collection process, so endeavouring to provide a fair and trustworthy interpretation of the information collected.

4.12 Summary

The aim of my study was to explore the impact of digital technology on women's employment in Saudi Arabia. An interpretive research paradigm was adopted as being most appropriate to the research topic since it enables an in-depth view and rich findings resulting in a deeper understanding about women and technology, particularly in a Saudi context. Furthermore, the research strategy selected was a qualitative, inductive approach in order to understand human experiences using interviews as the main data collection method.

Finally, forty participants, divided into three "stakeholder" groups - namely, government, academia and business - participated in face-to-face semi-structured interviews, which provided rich data and information about women and technology. In regard to this research approach, several criteria were presented to evaluate the quality of the qualitative research.

Data collection phase included the development of the interviews, the pilot study, the design of the final interview guide, the field access involved and how the actual interviews were conducted. Following on from these initial stages, my preparation for the qualitative data analysis was explained to the participants. The discussion then moved on to the process of data analysis, interpretation, writing a report and reflections on my role as a researcher in the field and the ethics of the research.

Having outlined my research methodology, Part IV encompasses two chapters in which the findings will be presented, and I will conduct a discussion offering analysis and interpretation of the data. My presentation of the findings and analysis will then lead to a conclusion chapter.

PART IV: FINDING AND ANALYSIS, DISCUSSION AND CONCLUSION

Chapter 5: Findings and Analysis

5.1 Introduction

This chapter will present and analyse the findings obtained from the semi-structured interviews conducted for this research project. First of all, I will confirm that the research participants were comprised of forty people in total, both female and male, from three stakeholder groups; namely, *government*, *academia* and *business*. The rationale for the choice of both stakeholder groups and participants was explained in the methodology chapter.

The objective here was to obtain individual insights, opinions and perspectives within each group to determine what, if any, differences exist between the various positions and viewpoints of these three sets of stakeholders in relation to the employment opportunities available for Saudi women arising from digitalization of economy.

I asked participants whether the education curriculum and training programs within and without organizations (e.g. education, business and governmental organizations) are designed to provide the necessary skills as a first step to allow Saudi women for pursuing careers in digital technologies successfully. In addition, questions are asked in relation to the level and scope of employment opportunities available for Saudi women aspiring to pursue careers in digital technologies.

This chapter focuses on the description of results, while critical commentary on results in the light of existing literature and context of the study is provided in the subsequent discussion chapter.

5.2 Career Opportunities for Women

A career can be defined as an occupation for which one is trained and progresses through a working and professional life; on the other hand, the most common conception of employment is having a job for which one is paid (Malhotra, 2015). In the interviews, these two terms were mentioned by participants without a clear distinction, but I believe that their intent here was to refer to the creation of 'jobs'.

In the world, or the global economy today, multiple potential career and employment paths are open to both men and women (Fountain, 2000). However, the extent to which access to such opportunities is facilitated is determined by the degree of appropriate training available, and most notably in the case of technology-related employment and careers (Kirkup, 2002).

5.2.1 Technology-Related Careers – Realty not a dream for Saudi women

Here, some of the respondents acknowledged that technology-related careers are opportunities for women, being that they are suitable for either men or women. At the same time, the interviewees appeared socially regressive in outlining what they considered appropriate areas of employment for men or women only. For example, Thamer/B said:

> "Both genders can have the same job, such as work on the technical, professional, and technological side. These jobs are subject to a suitable work environment for women."

As a businessman, Thamer/B was of the opinion that employment is accessible to both men and women but, in the case of women, opportunities are dependent upon a suitable work environment (i.e. whether or not positions involved a gender-segregated workplace). However, this viewpoint is only partially valid because Thamer/B and Olfat/B attested (and they are managers), they conduct meetings with members of their companies via teleconference.

Olfat/B had a range of experience in the private sector. She was the manager of a women's branch in another city separate to the company headquarters. Hence, she is continuing to look

for a better job suited to her experience and qualifications because she had worked hard to reach her current position and had attended numerous training courses and seminars related to technology.

She is thus an example of a woman who is not just waiting for a great opportunity to come to her but is proactive in creating her own career path. Other women could follow her example and may, indeed, be starting to do so. For instance, Salah/B is the senior director of a factory and allowed me to visit a factory in Riyadh city where I found Saudi women working with professional and technological devices (e.g. stock management software, ordering software for ordering raw materials).

Other participants identified numerous different types of jobs, which they perceived as suitable for women. For example, participant Olfat/B between 35-45 years of age and is a manager. The meeting took place without interruption, during which I observed her body language and saw that her level of eye contact was very strong, and her hands stayed still and calm on top of her desk.

Olfat/B argued that Saudi women find employment opportunities in various fields requiring them to work through the digital technologies:

> "Career opportunities are available in the call centre, web design and programming, coding, data processing, marketing through websites, social media programs, IT, solar energy technology, and nanotechnology. Today women have started working in the production lines of electrical tools and assembling devices."

Indeed, the consensus amongst Saudis today is that work in the future will involve artificial intelligence, robotics and big data.

Sara/A had her own accounting consultancy business and delivered accounting classes online using the relevant software. She was hired because of her knowledge and her ability to help others. Like Shatha/B with robots, Sara/W had a clear picture of her future career plans.

> "Artificial intelligence and the use of robotics, tools and apps are the area of future cutting-edge career opportunities. There will be job opportunities in the field of in the field of robotics, especially in research, development and

> usability areas, if I get opportunity to work in field of robotics, I will go for that."

Olfat/B suggests that there are various types of jobs available to Saudi women. She herself is an actual example of a career woman. She had begun working in a bank and ended up in a company for women's employment "Taqat", with required a high level of digital technological skills such as using social media and communication tools to interact with potential customers if they are already running a business, or employers if they are looking for employments in some organizations.

Her response to women's employment opportunities in digital technologies was based on more than ten years' experience, after which she believed that women have the potential to succeed in every field. I agree with her because I also believe that with equal opportunities in education and training, different career choices will now begin to open up for women and more diverse occupations will welcome their applications.

Hind/B stressed that the digitalization of Saudi economy and society offers employment opportunities for Saudi women in film graphics, hardware manufacturing and incubator projects in digital technologies.

> "Many like to use software in the design of graphic films. Now manufacturing technology relies on technology. In addition, manufacturing the hardware is a smart innovation. Business incubators support projects and smart innovations."

I would be skeptical of above-mentioned assertions, which stems from the existing literature reporting limited and small proportion of women in manufacturing technologies and graphic designs (Huntemann, 2013). The critical discussion on this issues will be done in the discussion Chapter.

Aliya/B then pointed out that various skills could be transformed into a career by using technology, such as digital manufacturing, with an integrated, computer-based system and various collaboration tools to create a product and manufacturing process.

> "Drawing, embroidery, the line has become a leading Digital Manufacturing area. Here is a direction for the majority of women who enjoy a great passion for this area."

Fahad/B added a very important point about employment opportunities in tech-dependent companies:

> "Opportunities are available in IBM, Microsoft, Cisco and Apple only in the field of accounting and sales, but not much in IT. There are some girls who work on building applications, but a very small percentage."

Fahad make references to some tech-companies such as IBM, Cisco and Apple which have entered into Saudi labour market due to efforts of government to proliferate the digital technologies in Saudi Arabia. This resulted in career opportunities for Saudi women in application development. Simultaneously, there is note about the little representation of women in this area, which mainly springs from his experience in business organizations.

5.2.2 E-marketing and Online Businesses

The government of Saudi Arabia plans to diversify the economy away from its dependence on energy resources and develop more advanced economic sectors, including information and communications technology. The technology provides a large number of services, up-to-date knowledge and fast performance, as well as an efficient means to facilitate business processes and other organisational procedures.

The participating interviewees thus raised a range of pertinent points with regard to impact of digitalisation of Saudi society and its impact on the employment opportunities or women and subsequent economic development of the country. Most of the participants from the government group remarked that digital technologies have enabled the process of buying and selling online which accelerates the volume and speed of business transactions, which offers employment opportunities to women. For example, Mariam/G said:

> "The digital economies are presenting a range of innovative practices to businesses involving the online selling and buying to customers. Reaching out to customers via online channels holds opportunities for unemployed skilled women to do the work for the businesses".

The above comments indicate that employers need the skilled workforce for managing the online resources in order to have effective interactions with customers, and skilled but unemployed women at homes can perform the job of targeting customers for increasing the sales revenues for companies.

Participants also reported that an increase in production is achieved through the use of computer-aided design, robotic production and facilitation of material or product logistics; and to operate the technological tools, the skilled workforce holds critical value for companies. The female's workers with appropriate training and experience in handling the digital technological tools can be the best fit for the tech-dependent organizations in Saudi Arabia. For example, according to Mariam/G, digital technology asserted the need of skilled labour in digital technologies in tech-dependent companies in modern Saudi Arabia. She stated:

> "The desire and need for higher production are making companies dependent on the use of digital technologies. They are in need of workforce trained in working with the digital technologies in order to meet the needs of labour market."

Afrah /B supported the arguments of Mariam/G, and said:

> "The businesses in the technologically driven economies are always in the need of skilled and trained workforce, and we would welcome inclusion of skilled workforce in our organization regardless gender."

It is clear from comments from government and business groups that trained and skilled women have opportunity to participate in the labour market. The stress of participants on the training and skills vindicate the importance of digital skills in empowering the women. E-marketing has emerged as a new phenomenon in a decade, and women can only increase their employment

share in the e-marketing through the knowledge of utility and training in the use of the digital technologies.

In addition, Laila/G and Ali/G mentioned that technology is used in e-marketing to increase sales, which can be capitalized on by women to start selling their own products online by setting their own online shops while sitting at homes as per requirements of Saudi social traditions. In her work-place in particular, Laila/G mentioned her use of advanced technologies for selling her products online while studying in the U.S.A. Indeed, having conducted the interview at her Saudi workplace, I observed that it was a small office with inadequate IT services illustrating the amount of progress still required in the Kingdom. Nonetheless, Laila/G attested that e-marketing is available in Saudi Arabia and most businesswomen use it in their companies:

> "Technology diversifies the economy in many (ways), such as e-marketing, increased production, increased intellectual progress."

In the above comment recorded by Laila/G seems, the 'role of technologies' can be interpreted in terms of aiding diversification of the economy in different ways. Diversification is the process of moving the economies to more diverse lines such as creation of new business opportunities such as online business, e-marking, digital enterprises. The increased intellectual progress in the above quote, from my point of view, means that women in particular and citizens in general in Saudi Arabia can work through technologies, participate in the economic diversification process aided by digital technologies, and can fulfil their ambitions of pursuing careers in digital technologies. Taken together, diversification of Saudi economy aided by the digitalization process impacted in creation of digital technologically supported businesses which are opening employment avenues for women aspiring to pursue careers in digital technologies.

Participant Aliya/B supported this point as a businesswoman now serving as the owner of a chocolate factory, but also as a former employee in a bank and a financial analyst. She had extensive knowledge of the labour market and has used a variety of marketing and

communications applications to obtain customers in the name of selling her products profitably and using the most suitable delivery method. Her experience provided a real example of how e-marketing can help empowering women in the modern Saudi economy. She commented on the role of digital economies in empowering women in this way:

> "The trained and skilled women who knows how to use the information and communication technologies can do a lot via online channels, such as internet use, social media use for e-marketing of home-made items or products made by national and international companies can really help women to have economic empowerment."

In the above comment, the emphasis of the participant was on the technical know-how and digital skills in using the digital technologies for productive purpose such as applying the communication supported by digital technologies to the online advertising and e-marketing. The women with digital expertise and experience can achieve the economic empowerment easily and can find in a variety of business settings, which is evident from the perceptions of Manal/G:

> "Economics has become digital, and I think the present generation copes with technology. If women convince themselves that they are not the consumers only, and they can learn to work through digital technologies productively, which can be more helpful for making them do many things online such as increasing income through selling products online."

This statement was supported by Asma/A, who is a Senior IT and training specialist. When I met her, she highlighted how technology has had an impact on the computer skills of young girls in high school, notably demonstrated by their student inventions in the field of robotics. Asma/A said:

> "Women whether they are studying or in work are in better position to become economically empowered nowadays thanks to the development of the digital technological tools, and there are many opportunities out there in the market, important one is selling and advertising products online which suits to female students, and women who are restricted to their homes."

From the above quote, Asma/A's experiences with working through digital technologies reached to the conclusion that women after having wider exposure to career opportunities in digital technologies can get the economic empowerment like the way she feels.

Ahmad/A added that women with online advertising are also suitable candidate to advertise the online educational programs, and was of view that it is now possible to employ women from home:

> "We employed two girls in the call centre from (home) and to activate the remote education program. I mean, I could provide them with an effective training to make them capable of dealing with advanced technology."

The point of focus made by Ahamed/A based on his academic experiences and dealing with teaching of digital technologies is that training can be an effective solution for women in order to pursue careers in digital technologies successfully.

Fahad/B gave the real example of the Mobily Telecommunications Company, which has employed Saudi women from home and thereby giving them an additional employment opportunity. However, to be efficient workers, these women will require state-of-the-art training and best practice to be successful. The issue of skills training is discussed in more depth in section 5.9.

5.2.3 Entrepreneurships and Training Arrangements for Women

Most of the interviewees from government bodies, business groups and academia had emphasized on the concept of self-employment and entrepreneurship in digital technologies for women in Saudi Arabia. Furthermore, they perceived that digital technologies provide strong and positive models of work and economic participation for woman and their children, who gain experience of self-sufficiency, economic autonomy and the ability to work together for a shared advantage. Laila/G claimed that women are more involved in entrepreneurship and successfully so,

> "Look, women have a significant role that is greater than yesterday, and they engage in entrepreneurship. Women now have large projects in the country…. Imagine that, every day about 30 to 40 businesswomen visit us [Ministry of Labour and Employment], and each one has 4 to 5 projects, whether small or large."

Thus, women have now established a growing number of enterprise projects in KSA thanks to the support and encouragement of the Ministry of Labour and Social Development. Indeed, the emerging role of women in productive family enterprises established with the help of digital technological tools is a positive step, serving as a practical and constructive way to reduce unemployment in the female population. In Saudi Arabia, home-based enterprises showed great success in the past, such as handicrafts, fashion accessories and jewellery, which used to be marketed through the traditional marketing channels such as shops or personal contacts. Mona/B responded argued:

> "The digital technology created a new concept of family owned business, in fact, it supplemented the marketing of the home produce manifold. It brought women in contact with hundreds of thousands of contacts, which increased the sale and productivity of family owned business, and increased the interest of unemployed women to start the family owned online businesses."

From the above comment, it is clear that the advent of digital technologies in Saudi Arabia provided different avenues for marketing the home-based products such as internet and social media tools, which increased sale revenues manifold for home-based enterprises manifold. Hence, it can be argued that digital technological tools made the women's involvement and participation in the home-based self-managed enterprises.

Participants Lama/A highlighted the importance of the training opportunities for women entrepreneurs, which can improve the ability of women to avail the employment opportunities offered by digital technologies. For example, one of participants was of the view:

> "The information and communication tools are useful in increasing the family economy through the participation of women in the labour market, either in the form of employment in organizations or in the form of online businesses run by women at home. The government and educational institutions are thinking seriously to provide training to women to help them to start a home-based family business."

The training is an important component for women entrepreneurship, as they are not bold and confident in the male dominated society. There are different digital technological platforms, infrastructure and software which are useful for connecting users with other users, customers and stakeholders in the wider community. The above comments show that academic institutions are government are still planning phase to devise the curricula for training women in digital technologies so that they can start their career as women entrepreneur. This holds a great promise for women in future in terms of receiving training and knowledge to become involved in the applications of digital technologies for initiating their own businesses.

Participants Mariam/G, most favoured the idea of giving training to women so that they can set up their own businesses, use the online channels for selling the home produce.

> "The digital technologies are helpful in increasing the economic development. The women can contribute to the national economy by making the homes independent of the benefits given by state to the low-income people in Saudi Arabia. The encouragement of women to get training and start their own family businesses with the help of information and communication tools."

The view of Mariam/G reflects the change in government policy towards pushing women into the labour market to increase the home and national incomes. The women with the support of governmental policies would be in better position to increase their career as a women entrepreneur. The training may encourage women to participate in the labour market, and help them to become independent earner and contributing member in the homes to increase the family income.

Many other participants agreed to comments of Mariam/G, and argued that education and training for female students and workers can enable them to use their capabilities in digital technologies for earning and finding the suitable employment or training female workers to reach their potential in their workplaces. For instance, Manal G, who works in a government organisation, believes that Saudi women have the ability to contribute significantly to the economy though their participation in the labour market generated by digital technologies:

> "Now women have entered the world of production and have developed simple enterprises as a businesswoman with the application of digital technological tools. Today, Ministry of Social Affairs tries to support the digital technology-based work of women through providing support services, workshops and training courses to help develop competitiveness."

Manal/G's testimony is illustrative of the vital role of affirmative action. In turn, the government now recognises the important role of support services, workshops and training courses in order to help develop competitiveness of women. Such support initiatives on behalf of government can be helpful in increasing the women's participation in the labour market created by digital technologies. The promise is that such state support can be useful in changing the repertoire of women's skills in digital technologies, which in return can increase the employers' motivation to accept women for positions involving the digital competencies and women's suitability for starting their own business based on the applications of digital technologies.

Participant Shatha/B also supported the claim of Salam/G, and referred to the digital technology as a source for employment while being restricted to home;

> "Though we are supposed to stay at home as part of our culture, but now with the help of information and communication technologies, we can do sell our home-made product to customers. This is still good change to start our own business while staying at home."

The women's support to the perceptions of Salman/G is also reflection of certain women's submission to the men's control over their lives. Even though they are ambitious to work, they are willing to go outside and find the jobs, they are ready to implement their ambitions with the help of technologies while still respecting the family values in the Saudi society. Of note, the stance taken by Shatha/B coincide with responses gathered from most of the women's participants, which suggested that it should be accepted with caution, and it is most likely that skilled and qualified women are still forced to work within boundaries of the house, which is a form of tacit violence against women in Saudi society.

Women-led ventures can offer hope for the ambitious female students/workers living in conservative families to fulfil their ambitions of working or starting their own ventures in collaboration with experienced women entrepreneurs. Jana/B reinforced Aliya/B comments, and views women's participation in digital technologies-assisted businesses as a good examples for other women to follow:

> "If more women are in the business, and run their own business, it means that they can consider training and helping other women to set up their businesses using the digital technologies, however, sadly, there are not too many women in business world in Saudi Arabia. Technologies and media are motivating more women to have their start-ups."

From the above remarks, it seems that skilled and qualified business women, in Saudi male dominated and conservative society, will be in better position to set their own business by taking guidance from the women-run organizations. This is partly due to the allowance given by men to women to work but only in the female dominated workplaces. This may be reminiscent of the control of men over women in terms of deciding where and when they should work. With the change of position of women as active contributor to the family income, women might be empowered to make their own choices within the Saudi conservative families. Women can

achieve quicker economic empowerment through using their skills and experience in the information and communication technologies. Unfortunately, women who are lacking in the skills and training in using the digital technologies productively would not be able to achieve the economic empowerment promised by the digitalization of Saudi society and economy. This refers to the importance of imparting the awareness, education and training to the female students/workers in using the digital technologies for increasing their income.

Moreover, the greater women's participation in the political process can also be helpful in solving the issues for ambitious women aspiring to start ventures in digital technologies by putting forward a strong case for provision of funds and training in order to support women's work within and without homes. Aliya/B had personal experience of this progression when she applied in municipal elections to be one of the candidates and was not accepted. However, she persevered and eventually reached her goal. She was of the view that

> "It is hard for women to work without the active role of government in preparing the society to accept changes regarding women's employment in the society. The women's presence in the government bodies responsible for decision-making about the women's future in the work can start the process of structuring inclusive work-related policies for both public and private sectors, and supporting the funds to women looking for start-ups. I have plan to push such initiative in my own municipality."

From the above comments, it can be gathered that women are not able to take up employment opportunities created by digital technologies in the labour market or launch their own start-ups without the support from governmental bodies, Aliya/B's ambition to become a leading political figure and with the work experience can help her to identify the challenges for women at work, and the possible solutions which can be suggested or planned at the government level in order to facilitate the entry of women in the digital technologies-mediated labour market.

Distance working became possible for Sara/A, who was prevented from attending university for some time. Another woman who benefitted from technology was Afrah/B, who ran a small

business buying and selling through Instagram application. She was studying and working using online applications to earn money.

> "I find social media a helpful tool for advertising my home-made products, attracting so many customers through my contacts in Instagram. I am sure that other students can study and work at the same time using the social media."

Given that there are cultural restrictions for women free-movement, Sara/A's experience is that by using social she could outreach wider customer base. Being an academic, she urges other students to do as she does.

Another participant Aliya/B who was running chocolate factory was also working through Instagram for selling the chocolate via the online channels.

> "Being women entrepreneur, social media is a powerful tool for finding the customers in different regions of Saudi Arabia, where it is not possible to travel due to high cost of travelling involved. I have increased the customer base for my products through the use of some other social media such as Snapchat, Instagram and Facebook."

It can be argued based on the comments of Aliya/B, social media can help give the best start to the women entrepreneur. The way digital technologies have assisted Aliya/B to widen its customers, and increase the revenue for her company, presents a viable example for other women to follow, and can be seen as a viable example of teleworking through the social mean channels for increasing the customers' base instead of travelling and advertising the products in different cities using traditional advertising means such as holding meetings and displaying banners in different cities. . Similarly, it helped female students to work online while they were studying as was obvious from the online buying and selling experience of Afrah/B.

Most of women participants from the academic and businesses argued that social media holds a great potential increasing the income of women if they use it with proper training and guidance. The women remarked on the social media. Jana/B stated that,

> "The social media is a source of providing additional avenue for raising the family income for women in Saudi Arabia, if they know the real benefits of social media. The issue is that women take the social media for granted, and consider it only to communicate with their friends. The training and awareness can provide some know-how as to how to increase their employment potential."

Shatha/B and Lama/A agreed to the comments given by Jana/B. Furthermore, Aliya/B posited on the potential of social media in this way:

> "I would be happy to offer employment opportunity to girls who show their experience in using social media to advertise their products."

This reflects the importance of training and experience in using the social media for commercial purposes rather than just the application for personal communication with friends and family members. Taken together, social media can be a useful way of increasing the women's employment if the women are trained and given experience in using the social media tools productively for commercial activities.

5.3 Human Resources Practices and Women's Employment

Saudi Arabia has prepared a long-term plan for the transformation of its economy through diversification. One major initiative announced recently is to diversify the national economy by pursuing new legislation and direct intervention in Human Resource Management (HRM). This plan will impact the female population because HRM applies to most, if not all, areas of employment and its role, responsibilities and impact is influential.

It is hence important to consider how human resource assumptions apply to women and so come to terms with issues of training, experience, qualification and opportunities affecting women in different work sectors. This study hence assumes that HRM policies are to be integrated with strategic business planning, including such factors as employment policy being derived from

government directives and business objectives, consideration of the state of the labour market at any given time, making adjustments to reflect changing economic or market conditions and responding to competitive markets and services pressures.

In reality, everyone has their own opinion about HRM and its assumptions, with many points of view were represented in this study. According to Mariam/G, for instance, government involvement has changed the system of wages in the private sector, suggesting that state HRM is of significant importance in Saudi Arabia.

Moreover, our participants attested that the main HR office of in the city of Riyadh has implemented a specific programme, the Human Resources Development Fund (HRDAF), taking the form of a government agency responsible for qualifying and employing the national workforce in the private sector. As other researchers have shown, this agency also controls the salary system (Parveen, 2014). Moreover, as Mariam/G stated, this intervention on the part of the state is very significant because it has sought to improve the conditions of employment in the private sector.

> "The HR assumption is to support jobs and encourage employers in the private and public sector. For example, HRM has modified the wages of the private sector. The employee takes a salary from the company of about 2500 and from HR 2500, making a total of 5,000 Riyals... They created the HRDAF programme to monitor and control this process."

It is evident that HRM practices were strengthened and supported by government's contribution towards salary for female workers, which is in itself a great source of motivating employees to recruit women with or without digital competencies. Hence, the women with digital skills and right level of qualification stands better chance to be selected by employers to fill in the jobs requiring digital skills.

Another example of a reward system introduced by Saudi government to motivate the employers for recruiting only Saudi nationals including women is the Saudization policy. In

addition, the government has instituted a system of rewards for employers with high rates of female employment in Saudi Arabia.

One prominent example in response to government legislation is the phasing out of foreign workers from mobile phone and electronic shops and their replacement with Saudi women. The majority of participants indeed affirmed that they had been affected by the legislation, with Thamer/B giving an account of significant progress:

> *"*We support women working in the private sector. The Ministry of Labour decisions made a very big move. They recently concluded that the employment of Saudi women is cheaper than hiring from another nationality. Saudi girls began to learn in a higher education, and higher knowledge enables them to work in a variety of fields."

Thamer/B reported that women are employed in HRDAF Company in various departments. Indeed, the Ministry of Labour and Social Development has created a new system to employ Saudi women. Such a system appears to be an effective way of reducing unemployment, while the employment of foreign workers may have an adverse effect on the state budget in terms of higher wage rates.

Some organizations participating in this study described the introduction of HRM practices favouring the recruitment and training of women in digital technologies related to science, technology and engineering disciplines. For example, Seham/G mentioned, one possible example of the potential of HRM is the King Abdul-Aziz City for Science and Technology (KACST) which supports women's participation in the field of technology. KACST is a government initiative that provides a good environment for conducting research. It represents a significant, progressive step in women's empowerment in digital technology, opening opportunities for women to be employed in line with their qualifications and experience:

> "The HR assumption is to employ females in the technical field. Women in King Abdul-Aziz City for Science and Technology are doing research in the technical field in terms of education and

> scientific support. In administrative support, it [women's participation] is according to qualification and experience."

When I met interviewees in the KACST, I encountered new ideas about how Saudi women are conducting space research using highly advanced technology, where both qualifications and experience are obviously essential in this field. Other interviewees added that, in a wider company context, HR departments tend to employ women who have a proven ability in creativity, planning, organisation and production, so supporting the extension of their skills through training.

Mariam/G, from the Ministry of Labour and Social Development, mentioned the leadership of the Ministry is in the process of making regulations which would bind employers in public sector to provide equal training opportunities for male and female staff:

> "The equal opportunity for male and female staff at the workplaces in Saudi Arabia is important for reducing the gender gap in the workplaces. When the employers are asked about the lower number of female employees, they give the reason of lower level of digital competencies on behalf of female staff. This means that improving digital competencies of women in the jobs can increase the female-male staff ratio."

Also, Fahad/B commented on the great interest in the employment of women with appropriate digital skills within the Saudi business community:

> "They are very interested in the employment of women and this forms a vital part of company's strategy. There are 290 companies that now employ Saudi women. HR policies value the employees based on the level of digital competencies regardless of gender."

This is an example of an HR policy encouraging the employment of Saudi women as a step towards achieving Saudisation. The government's participation in this initiative, especially in the private sector, reveals their objective of reducing the unemployment generally and that of women specifically. Hence, Fahad/B was able to highlight that across Saudi Arabia's business

sector, a total of 290 companies now provided digital skills-based jobs for Saudi nationals of both sexes, which is a finding consistent with the employment mix in neighbouring countries and represents the new reality.

For example, most telecommunication shops in KSA have replaced foreign workers with Saudi women who have had digital skills and training in the maintenance of mobile phones. Omer/B added a significant point that women should have digital competencies:

> "The management must take into consideration women's aptitude in dealing with technological programs and bank applications, as these ultimately affect customer services. The company has already started implementing training policies for women in digital technologies."

Many others had agreed to the perceptions of Omer/B, which indicated that HRM professionals had taken on the responsibility of providing training in order to improve the digital skills, and importantly, digital skills are considered by participants from the business community to be an important asset for women aspiring to establish careers in the tech-dependent businesses such as banking sector. It should be mandatory for every company to offer some courses or training through its HRM department with the aim of improving women's skills.

Many participants argued that though digital skills are important, but cannot be a concluding factor in offering employment to women, some non-digital skills, which include personal attributes, multilingualism, training and qualifications are also required for considering the suitability of applicant for employment. For instance, Latifa/B argued that:

> "Our business requires the staff to have close interactions with customers, the women are required to convince customers about products, so the interpersonal skills and digital skills are needed by female staff to sell the products successfully."

The businesses require the staff to interact with each other in order to learn the organizational knowledge from each other, and they also communicate with customers. For example, in online

business, the description of products to the customer's needs, and answering the queries from customers will require the problem solving and interpersonal skills along with digital skill of targeting customers

HRM technology helps most companies to perform all the processes involved in employing workers. I have personal experience of companies using online interviews to recruit applicants, especially those who live at a distance from the work-place. Shatha/B gave another example of an interview being conducted from a city in the west of the country to an applicant living in a city in the east of KSA, a distance of several hundred kilometres, while Seham/A also mentioned how he used technology to recruit employees to the university.

Hence, technology makes the process easier and faster. Moreover, in addition to these specific benefits, other interviewees mentioned the general benefits of technology. For them, modern IT saves time and effort, improves the speed of the research process and achieving an augmentation in experience and knowledge, as well as providing mental stimulation, self-education and access to information (such as free downloads).

Nonetheless, new technologies are often complicated and require planning and extensive training. The introduction of new technology, such as robotics, 3D printing, laser technology, genetics and programming, requires a plan for private sector organisations. Before deciding on the introduction of specific technologies, consultation between HR managers and employees will help to identify any potential problems.

It is then possible to conclude that across different sectors of the economy, employers and employees alike need to understand how technological change will help them in the long run, irrespective of the shared positive and negative points of such approaches. For Saudi Arabia, the technological approach involves a three-step process of planning, implementation and evaluation which, if well-designed and based on a collaborative effort, offers the best chance for

success. One participant, Hind/B noted that these great developments in highly advanced technology are increasingly being implemented:

> "A 3-dimensional and laser technology plan is needed in media, advertising and marketing. In addition, meetings via video conference instead of travelling between cities are required."

In fact, as a dynamic female entrepreneur Hind/B had established a company specialising in consulting and feasibility studies, utilising highly the advanced technology in advertising and marketing. She conducted most business meetings online and did not need to move from city to city. Hence, it might be possible to conclude that these technologies constitute a positive development, but for the moment many of the operations are only at the micro level, varying from firm to firm.

Facilitating the employment process

Many participants from the businesses were of the view that, due to social-cultural restrictions, women were reluctant to attend the job interviews managed by remotely located organizational headquarters of international and national companies in Saudi Arabia. The participants such as Fahad/B and Thamer/B confirmed that the use of 'Taqat' program at recruitment phase helped improve the participation of women in job interviews, and hence is proved to be very effective for the employment process. As Thamer/B stated,

> "The 'Taqat' programme for employment allows people to apply remotely. Most companies have applications to facilitate the procedures for effective HRM service delivery, facilitating the candidates, especially females to attend the job interviews through the online channel provided by 'Taqat'."

His example of the 'Taqat' programme has proved highly significant in helping Saudi women to participate in the labour market. Undoubtedly, the refinement of HRM practices through integration of technology in the HRM processes would produce the same outcomes for participation of women with digital technologies in the labour market. However, it must be acknowledged that many others could not report the use of the state-of-the art HRM tools for improving the motivation and participation of women with digital skills in the job interviews.

Moreover, it simplifies the service because most of the companies now use computer applications in different ways to make the process of employment easier and faster. In the past, the process of finding a job was traditional and very slow; for instance, people seeking a job needed to visit the location of the company where they had applied. Those participants grouped under government and academia mentioned several programmes designed to help employment and to facilitate transactions either within the organisation or externally between organisations.

5.4 Women's ability to Compete for Jobs in the Labour Market

The job market requires individuals to demonstrate proficiency in terms of their education, training and skills to apply successfully for a job. Most career opportunities are provided by the public sector, particularly in education and medical services. Unfortunately, these activities are adversely affected by digital technology, entailing that Saudi women need to be prepared for the future opportunities arising for producers of the technology.

In 2009, Nora Bint Abdullah Al-Fayez was appointed Deputy Education Minister. This expert on girls' education was the first woman to have a top position in a new department for female students in the Ministry of Education.

> "I competed for the current position [management of online recruitment process] I have in Ministry, and I strongly believe that women have motivation to compete to get high-level jobs, then there is an enough space for them. The situation is not like the one which we used to have a decade ago." [Ashjan/G]

At present, female students can apply for the largest Saudi government scholarship programme, amongst whose benefits for Saudi women are Western university educations. The foreign education for girls can further increase their abilities to compete for the relevant jobs in the labour market. Mona/B mentioned:

> "The girls with foreign education and experience are welcome in my organizations, as we need workers who can perform the tasks effectively and efficiently. If they can show that they have better knowledge and skills compared to men for the same positions, then we will pick the right candidate for positions regardless of genders."

Returning to the research participants, various opinions were expressed from Saudi women across a range of age groups about the tools available to them and, as discussed below, their opinion of their value and efficacy. Most of the interviewees emphasised the necessity of education, including specialisation and qualifications as essential tools to compete in the job market. For example, Lama/A mentioned her level of education,

> "My Master's degree helped me and opened the fields of training advice and development."

She has studied for a master's degree in Australia but currently worked as an assistant manager. I was surprised about her current employment status while noting that the university is giving her another opportunity to complete a PhD. If successful, she would be offered an academic position rather than the position being given to someone from another country, which would contribute to the government's objective of Saudisation. Hence, although Lama/A has found more career development openings in the field of training advice and development, her answers give the impression that she lacks job satisfaction.

> "I believe that there are more employment opportunities in the training and consultancy, but I was not given the academic position which I deserved. The current role which is given to me is below my qualifications and experience. But I will not give up on competing for the job I require."

In turn, Mona/B spoke more widely about the competitiveness of the labour market, referring to the necessity of training, skills and experience.

> "I have tools to compete in the job market with a percentage of 85% education, training courses and my experience in the communications fields. I have been travelling between three cities in the Kingdom of

> Saudi Arabia, Riyadh, Jeddah and Taif, to work in the Mobily Company for a period 11 years."

This female participant was both highly skilled and successful, having proven her value to her employer in working with the Mobily Telecommunication Company for 11 years. Moreover, she had demonstrated teamwork, leadership and organisational skills in serving three urban centres across the country, serving as an example of a career woman and her language suggested that she was both confident and proud of her accomplishments.

Another participant, Reem/A, mentioned that she was interested in the field of technology and would obtain the digital skills and competencies in order to compete successfully in the job market.

> "Definitely! Especially if I continue to update my information in the field of the digital technology."

In the interview, she mentioned that she was enthusiastic about artificial intelligence (robotics), giving an example of a Saudi girl who participated in a major competition to demonstrate her invention to other students from different countries. She had acquired this knowledge and experience in secondary school, which is a good example of a relevant curriculum providing the opportunity for students to learn technology at a young age. In this sense, there seems to have been several key factors contributing to her desire to enter the technology field and compete at an international level. Reem/A thus demonstrated her high level of desire and ambition, the quality of her teacher and family support.

Here, the cooperation between academia, employers and government is important for enhancing the competitiveness of women in order take up the employment opportunities resulting from digital technologies. A joint effort with input from all the stakeholders can lead to positive outcomes for increasing employment opportunities for women. This approach is particularly valid for Saudi women who need relevant education, training and support to be successful in the

job market. The next section will describe the cooperation between academia, employers and government

5.5 Academic-Government, Academic-Business, and Business-Government Collaborations

It cannot be denied that the Ministry of Education works hard to create a national system that encourages as many students as possible a high level in education. For instance, the ministry has established a nominated company (Magraha) located in the U.S.A. with whom it communicates - as well as with authors and reviewers - about how the Ministry of Education can develop the curriculum.

In addition, the collaboration between government and academic institutions was found, which made it possible for provision of e-government facilities by the government to the educational institutions in order to deliver the online training and education to women who cannot travel to other cities. Finally, distance training was mentioned by some participants, particularly online courses, which offer some skills and professional training to those students who can avail themselves of the courses. Ahmad/A noted that:

> "Recently, there is the e-government facilities provided by government to the vocational institutions which help deliver the vocational programmes provided 'General Professional Diplomas' online or as learning-distance."

In fact, most Saudi universities use this e-government facility and most of the participants were in agreement on this point. This type of online or distance learning enables collaboration between KSA universities. For instance, Ethar/A was the Head of the Women's Department in the Computer Training Institute and she confirmed this last point, adding that available online courses outside KSA include a course from Cambridge University:

> "There are academic courses, such as a course from the Cambridge University in Britain. We teach the students, and the test is held online. Computer courses are for one or two years."

The use of communications technology is a new phase in the development of Saudi Arabia's academic sector. Hence, it is my belief that the establishment of many online or distance-learning courses can contribute to skills achievement for Saudi women through collaboration between educational institutions. Efforts within academia to offer traditional and online courses in a wide range of subjects, from multiple international sources, can contribute significantly to the development of skills training for Saudi women. Indeed, access to distance-learning programmes opens up many opportunities for students who are unable to attend higher education institutions.

Moreover, the cooperation between the Ministries responsible for education of Saudi citizens and the academic institutions is remarkably helpful for delivering online and offline training to female students, as was perceived by many participants. For example, Manal/G highlighted the role of the Education Ministry and Ministry of Labour and employees in working together to improve professional work for females:

> "Two months ago, Ministry of Education and Ministry of Labour signed an agreement [about linkage] between (education and work), it included encouraging professional work and availability of training opportunities for female secondary students. After that they have training in technical colleges to give them a different understanding about professionalism."

This cooperation between the two Ministries and between Ministries and academic institutions is useful in creating opportunities for professional work and training for women. However, in order to succeed, the government will need to manage the relationship between education outcomes and labour market requirements.

Alongside academia and government, I have outlined how business or private sector can help Saudi women to develop their skills. I would thus recommend that larger companies or private sector organisations should provide various training courses for women, including external and internal training, in collaboration with educational institutions for developing female employees' experience and technological skills.

In recognition, that the government and the academic sector now cooperate to improve external training, the research participants' views on this issue were divided into two groups. The first group were in agreement that Saudi women could receive training in technological skills, as affirmed by Salah/B, Fahad/B, Latifa/B, Olfat/B and Hatem/B. First, Hatem/B highlighted a case of external training where the women working in the company owned by Hatem/B owned received advance training in technology outside KSA:

> "We sent females on a mission for a period of more than six months for training on the latest technological devices."

In addition, recognising that the government is seeking to improve women's training and skill Nouf/A pointed out that Saudi women are training abroad as part of their studies. Salah/B then highlighted internal training in power generation equipment use in his company:

> *"*We are training the members of our employees and General Organisation on Power Generation Equipment and some of the employees and gender staff of the industrial city in Al-Fanner Company."

The Al-Fanner Company has two locations; one is in Riyadh, while the other is a factory in Al-Kharj, near Riyadh. They provide some training for their employees and other staff from a different place. It seems that despite being a small company, it is professional and provides a healthy work environment in which to develop skills.

The examples were collaboration between the government and private organizations as reported by Manal/G. Many organisations support the government plan to reduce the unemployment rate by increasing the rate of employment through contracts with the private sector (Ramady, 2013; Al-Asfour & Khan, 2014; Parveen, 2014). This is the mission of the HADAF programme, which has already achieved some success.

Nevertheless, others amongst the research participants were critical of deficiencies in government planning, suggesting more focus is required in their projects, such as a national

project with standards to measure the performance of qualifying female employees. As Seham/G noted,

> "The government listed employment pathways for women, but we still need a national project with standards to measure the performance with qualifying female employees."

Being that the government is actively seeking to have a diversified economy through inclusion of women in the labour market, particularly in the private sector, which is the cornerstone of this policy, I believe that the government has worked hard recently to improve the relevant processes that can empower and advance Saudi females in their organisations.

In the support of government's commitment to promote women's participation in the labour market, Abeer/A recounted how she has achieved success without any support from her family.

> "I got training and qualification from Cisco and done some programming courses with help of government support. I know that if government' scholarship was not there, my family would not able to give any support for learning the computing skills."

It is clear from Abeer/A's comments, that the government and education sectors encourage Saudi women to reach a better position through gaining the desired training and skills in digital technologies. It would thus appear to me that the government is trying to find a balance between its decisions and the existing position of the community or culture to arrange resources for equipping Saudi women with digital technologies – related skills and training. However, it is likely that Saudi women might take some time to obtain economic empowerment through the government-sponsored training and skills programs in digital technologies for female members of Saudi society, which is due to any program and initiative brought forward to bring changes at social level takes time to show its desired effects and outcomes (Waddell, 2017).

The respondents also expressed the view that women are becoming visible in the process of success and are making the necessary adjustment to these changes. Thamer/B suggested that I visit Al-Fanner Factory, which manufactures electrical appliances using technology, where women perform the majority of the work, then adding:

> "Whenever there is a technological advance in the country, women are important partner in the progress. Technological industrial growth in the country has begun to rely on the contribution of women."

Then Thamer/B further underlined that government has introduced legislations to accept candidates for employments based on the principle of equal opportunities.

> "Government has made legislation in relation to Vision 2020, which require employers to hire candidates without discrimination to gender of Saudi citizens. This paves the way for Saudi women with required digital skills to enter the labour market."

Supporting the government's serious efforts in promoting equal opportunities for women, education and skills-oriented initiatives are introduced by Saudi government, which further strengthen assumptions of participation of Saudi women in digital technologies-assisted labour market. Omer/B confirmed this corresponding change in social attitudes,

> "Government-offered scholarships for educating Saudi women have changed the social view about the women's position. Saudi women with better education and skills will be in better position to find employment in the labour market."

From comments of Thamer/B and Omar/B, it is apparent that government's offerings of scholarships to Saudi women indicates the collaboration of government with the academic institutions, and making legislation in relation equal employment opportunities results from the collaborative efforts of government and employers in the labour market. However, to which extent, these legislations and collaborations for educating women and providing employment to Saudi women in digital technologies will impact the employment opportunities in digital technologies is not clear from the perceptions of participants. Education and skills in digital technologies will only benefit women, when proper legislative efforts and made, and monitoring mechanisms are established at the labour market to ensure the implementation of relevant legislations.

One finding emerging from my result is that a clear relationship exists between academia and business through which students are provided with the education and knowledge necessary to

satisfy the employment requirements of business. In theory, students meet the needs of the "job market" and benefit from career opportunities that are available, but in practice there are still limited opportunities for women. Academia and business frequently create networks for the exchange of ideas, demands and co-operative joint-ventures.

However, another significant element in the support of student and business networking is the relationship between students and the Chamber of Commerce. Ahmad/A emphasised that the Saudi Arabia Electronic University also facilitates this support. He said:

> "The University provides access for all [female] students to the Chamber of Commerce, training agencies and the public sector for research."

This is an important point because it shows an additional link between the academic and business sectors. In other words, universities can help students connect with business networks and training agencies to acquire more knowledge and to satisfy the employment requirements of business.

This collaboration between academia and business can help identify and nurture career/employment opportunities for women aspiring a career in digital technologies, as Ethar/A added an important point about the connection between private companies and student projects. She said:

> "First, providing those [students] with access to the Internet. Second, providing them with institutions and private companies to support their final projects or applications."

Private companies can play a key role in developing future talent through their support of students' projects or applications. One example is the Badeer programme, a business incubator service to help students in KSA to develop entrepreneurial skills and improve their projects, including technology start-ups, so applying them in the marketplace. In addition, such cooperation between academia and business can improve students' employability and develop the economy.

Other participants referred only to the availability of the Internet in all universities and the issue of student access by their user name and the improvement this delivers to the service. Sultan/A gave one prominent example of this new services and context here:

> "The university always provides some supports. First, it provides research of scientific documents. Second, the curriculum of the academic is available on the website every semester. Next, female's students can use her own code to log in to her page."

One goal of the contemporary university is to provide an effective and useful system that exploits the capabilities of the new technology. Now, Saudi universities use websites for most education processes and services, which are linked to the students' development. For example, networking takes place between all universities and the King Abdul Aziz library, where students can connect more easily by the Internet.

Moreover, one private university, Effat University, now conducts networking with a Cisco Programme that provides hands-on digital skills training. The benefits of the Cisco Programme are to provide IT training and career opportunities for females after they graduate (Dennis et al., 2010).

Here, Afrah/B emphasised that technology can be used for exploration and as an efficient and time-saving method for undertaking experiments.

> "Certainly, it has many benefits. I will give you a simple example that I have in mind now; workers in Aramco Oil Company can explore an oil field by using some of the advanced devices. It is accurate and organised work. I discovered yesterday that there is a technical program for the production of an enzyme from bacteria in which we can make 50 experiments to save effort and time."

Afrah/B's testimony confirmed that use of technology is widespread across all sectors of the economy of KSA. She gave an example of a certain application in geological mapping of the oil industry using digital technology. Furthermore, she pointed out how technology helped her in her specific study, such as the production of an enzyme from bacteria. In addition, Afrah/B hoped to programme a specific application to select, develop and manufacture a natural enzyme that researchers would find beneficial in their work.

The diversity of the application of technology was further emphasised by Hanan/A. This participant cited some of the advantages of technology, those linked in particular with the academic sphere, such as the development of education using technology.

> "It develops education; for example, when a female teacher is able to be skilful in terms of using technology, she will remove primitive learning."

In the Saudi academic sphere today, technology enables education to be accessible anytime anywhere; for example, through online courses (MOOCS) and through distance learning networks. This service requires teachers with ICT skills who are proficient, both technically and pedagogically, and thus able to apply this new method of teaching in schools and universities.

In fact, this teaching and learning method is now active in KSA through distance-learning services. In the government sector, Manal/G gave an example of how teachers have introduced an effective method for educating women who live outside urban centres and so develop their skills for the technology sector; simply put, they travelled to different places to teach computer skills. At the same time, Fjr/A added that the approach in the Saudi Arabia Electronic University is almost entirely through the use of technology (distance learning).

The one way to enhance the digital competencies of women pursuing careers in digital technologies is to increase collaboration between academia and industry for training women in digital technologies for enhancing the digital competencies. Omer/B had signalled the possibility of collaboration with academic institutions for starting the training and organizing internships for female students who are interested to start their own future businesses.

> "There is and will always be possibility for us to have some collaboration with academic institutions, which will make it easy to train female students as to how they can start their businesses, where they can get funding to put their business ideas into practice, and which information and communication tools would be the best fit to support the business ideas women come up with." [Omer/B]

Batool/B reinforced the statement of Omer/B by stating that

> "The help from business community is an important to inform women and academic institutions about the potential of women to become entrepreneur. Before it might be a dream for women to start their own business ventures, but nowadays it has become easier for women to use the information and communication tools to start their own businesses without violating the social customs."

The above comments show the significance of the help from business community in training women as to how to set up their own ventures depending on the conditions imposed by families. For example, the women living in the families which do not permit to go outside and find jobs can now use the digital technologies to start their own businesses at homes or in the open market without fear of being mixed up with male members in the workplaces. The collaboration between academic institutions and business community can be helpful in organizing workshops or internships for ambitious women to create, refine and implement the business proposals. Hence, it is acknowledged that collaborations between the industry and academic institutions should be included in any framework designed to increase the women's employments in the digital-technologies-mediated labour market.

5.6 Career Advice

The previous section illustrated some positive developments in the sphere of professional development and networking within academia. However, in a society where there continues to be the perception of an essential difference between "men's work" and "women's work", there is a strong need for access to career advice can serve to inform women of their employment and career options.

The necessity of professional guidance is particularly needed in the technology sector which, globally, is male dominated. If they can access a satisfactory level of career information, women can then choose the higher education path that will provide them with the knowledge and skills needed to compete in the job market.

In Saudi Arabia, women are mostly employed in the public sector within the fields of education and nursing services. The government has announced its plan to diversify the economy and to encourage women to participate in wider fields of activity (AI-Rasheed, 2010). Hence, according to the government's Vision 2030, one important goal is to increase the number of Saudi nationals in the private sector employment and support SMEs in the name of diversifying the economy and create new career opportunities, including those for women.

These political, social and economic changes make it imperative for female students to have access to comprehensive career advice programmes and counselling starting at secondary education level. Career advice also helps students to plan their education pathway and to focus on those skills, technical or otherwise, needed to prepare them for the future. Participant Wedad/A outlined the general advice available in Saudi Arabia and its implications for more gender equality in education:

> "The career advice is the target of skill development of students. Students work in networks and maintenance as volunteers to gain experience. Then, we give them certificates."

Universities can provide students with significant support in the form of career advice and access to opportunities. For example, universities are connected to the commercial world through their networks, alumni, patrons and research, all of which can be useful to students in their future careers. Volunteering and internships are another area where the university can help students, enabling them to acquire experience and build networks and future opportunities.

Hence, the role of universities is not only to deliver a good quality, competitive education but to counsel students on how to maximise these benefits for their future careers. Here, Asma/A, Ahmad/A and Samar/A concurred, also emphasised on the importance of using online programmes to share information and support career advice. To begin with, Asma/A stated:

> "Career advice is available in two parts: seminars and refresher parameters, meeting in specialisations within the school, or inquiries among themselves. In addition, every female teacher goes to a training course outside the school. She teaches others what she learned from it. One of the training is about "Noor", which is a

> program used by female teachers in order keep students' data. The Ministry of Education has provided it to all schools."

Although the "Noor" program is used throughout the education system in boy's and girl's schools, the Ministry is trying to encourage more female teachers to participate in it. Asma/A thus highlighted a variety of activities in which female teachers have participated, such as seminars and refresher courses for specialisations or training out of school to obtain career advice and improve their skills and knowledge.

It has then been an imperative of the Ministry of Education to encourage female teachers to attend Noor program training, which has proved to be a highly beneficial application by providing many electronic services to students, staff and parents. The Noor initiative has also put in place a centralised database linked to the system of the Ministry of Education to facilitate most of their procedures.

When participants discussed the role of technology in providing access to career advice for professionals, they also mentioned another aspect of student guidance is on-going career development advice and guidance. As Nouf/A stated, management, supervisors, peer groups, professional associations and commercial organisations can provide such guidance:

> "The General Department of Information Technology helps us in each place to provide the software, to provide support and advice, and they have a permanent presence with us in meetings, conferences and activating the vote of municipal elections through technology."

Social networks and online forums are now widely available and can be used successfully to provide advice and, in some cases, networks for career advancement, collaborative projects and entrepreneurial opportunities. There is a link between career advice and technology insofar as it empowers professionals to participate actively and with confidence in meetings, conferences and to mobilise the electorate, particularly women, to vote in municipal elections.

However, an element of critique was notable amongst the participants. Mariam/G appeared to suggest that career advice is limited to workshops, stating that:

> "To be honest, there is some career advice but not all [every form], only workshops."

Mariam/G's reference was hence to the current limitations of the role of workshops in career development and re-training with the possibility of networking. In this sense of lacking an adequate career guidance structure within the education system, there is no doubt that Saudi women are hampered from the beginning of their post-education careers in being able to participate fully in the workforce and the wider economy.

Nonetheless, there was a diversity of opinions in interviewees' views on this issue. According to the more positive Laila/G, the situation for women is now significantly different from what it was in the past and women are now able to participate in many committees, and she was able to confirm that:

> "Only now but in the past, there was no presence of women in that plan. For example, now we can be part of a committee of contract that goes abroad to bring nurses from various countries such as Japan, China and the Philippines."

This participant was clear that current developments are a good starting-point for Saudi women to participate in the planning and decision-making process. Mariam/G too mentioned that the role of women is very important because they are intelligent and excel at using social media applications for consumer trading:

> "Women cannot be ignored, because they are excelling and intelligent. Women must work through communication programs such as the Instagram program through which they can have customers, merchandise and exposure through the program and begin the process of buying and selling."

Some women have their own business and sell their goods through online social network platforms such as Instagram, as was mentioned earlier (section 5.2.3), suggesting that they have a range of skills in marketing, buying and selling, business administration and import-export, all supported by technology. For one, Hassan/G anticipates that the future of Saudi women will be very different when presented with opportunities in new fields; for example, they may choose to work in the power generation field if that is what interests them and if it is what they want to do:

> "Certainly, we may witness in the near future women working in power generation and other fields. Believe me, if they have a passion for something, they will excel in anything."

This participant raised an important point about women's self-confidence, passion and interest, questioning whether women have adequate levels of aspiration, confidence and desire to exploit these opportunities or are these qualities currently missing.

5.7 Training in Cutting-edge Technologies

Indeed, the consensus amongst Saudis today is that work in the future will involve artificial intelligence, robotics and big data. Here, participants gave various responses about career choices. Most of the participants claimed that they were able to pursue a career of their choice driven by individual factors. For example, Sara/A mentioned that motivation and knowledge could affect her choice of a better career.

> "I think that the motivation and knowledge are playing an important role. I think that if I graduate, I think I can be the chief executive of the company."

Sara/A had her own accounting consultancy business and delivered accounting classes online using the relevant software. She was hired because of her knowledge and her ability to help others. Like Shatha/B with robots, Sara/A had a clear picture of her future career plans.

> "I feel that I can, in particular in the field of robotics."

Sara/A thus wanted to pursue her interest in technology and update her knowledge and skills in the field. What is more, she wanted to be employed in the field of robotics.

Artificial intelligence and the use of robotics, tools and apps are the area of future cutting-edge career opportunities. These advanced activities underscore the importance of training and educational courses in technology for Saudi women, including their use in the academic sector for training purposes.

Sultan/A, Ahmad/A and Amal/A agree that vocational education and training are available in the health sector in different specialities, such as robotic surgery in the uterus, urinary tract and brain tumours etc. For example, Sultan/A said:

> "Vocational education and training are available, such as using computers in the surgery, robotic surgery in the uterus, urinary tract and brain tumours, female technicians for operations, female technicians for equipment and medical engineering, which suffers from the weak demand."

When I visited the hospital to conduct the interview, I observed a high rate of digital technology adoption in the radiology and physiotherapy departments. The implication here is that students being trained for the health sector receive training in the use of highly advanced technology.

Finally, other participants expressed the view that education is improving with further work needed on the balance between practical and theoretical instruction. As Ahmad/A attested, the secondary school curriculum is currently being developed to train Saudi girls on how to deal with robots,

> "Vocational education and training are strongly available. For example, some female teachers trained female students on high-tech Artificial Intelligence (robot) programming and applications, and then they participated in a contest in Canada to view their inventions."

Studies of training in robot programming and applications in Canada support the previous claim made by Seham/A about overseas training in Western countries (Vaganova et al., 2019). It seems that the education sector has achieved a degree of development in the robotics field and the government has launched a number of vocational training and educational programmes. While these training programmes are intended to prepare people in private or public sectors to work in their own business, trade and craft using technology, Saudi Arabia's Ministry of Labour has also created programmes to improve the training of employees.

One example is the HRDF programme in which the government sponsors specific training programmes for women, such as mobile phone maintenance and repairs. The government has also introduced some programmes, such as training abroad, practical vocational training, digital

art and animation, as well as the use of advanced technical devices that help in the study of space science, earth sciences or nanotechnology.

Here, Areej/G noted that although the HRDF programme has the aim of 'Saudising' the sector, and thus represents a very important initiative observed, the government is still focused on practical training in the service of producing the conditions of greater gender equality:

> "Focusing on the practical rather than the theoretical side and focus on training in all disciplines and linking technology."

However, Ethar/A gave an opposite point of view about education, focusing on the theoretical side rather than practical applications. She noted that most undergraduate students who studied computer sciences attended extra courses in the computer institute to develop programming subjects.

> "Recently government and academic institutions in consultation with employers have agreed to provide extra training in the areas where female students struggle. The example of such initiative is that the female graduates in computer science lacking in skills and competencies are given extra course by the academic institutions or vocational colleges for increasing their digital competencies, so that they can meet the requirements of the labour market."

Areej/G and Ethar/A and voiced the similar opinions about the availability of the extra training opportunities for female students in the engineering and technology disciplines. However, it is not clear from the data that to which extent these training programs are implemented across the national academic institutions for fulfilling the women's needs for digital competencies in Saudi Arabia. The participants could not reveal the scale and scope of training opportunities, which might be due to sensitivity of data and confidentiality of data-related policies within the participating governmental bodies.

In girls' secondary schools, for instance, the curriculum includes some programmes in computer sciences. Yet this seems insufficient, as students need more curricula focus and training to improve their technical skills to achieve a better career in this area. Mariam/G raised a new point about technological arts:

> "Government policy for vocational training is to support technical training. For example, the Technical College for Girls helps to provide training in some skills without limitation in all areas, such as technical support of Technological Arts."

Mariam/G also gave the example of digital art. She confirmed that Saudi technical colleges encouraged training in this area to keep pace with the technological advances in animation, graphic design and 3D modelling, to take some examples.

In addition, Seham/G mentioned that the King Abdul- Aziz City for Science and Technology (KACST) has a great interest in advanced technical devices for women:

> "King Abdul-Aziz City for Science and Technology provides each researcher with a training plan including training on some of the skills and advanced technical devices that help in the study of space science, astronomy or Nano [technology]."

This initiative represents a great opportunity for women who study science and technology in offering a stimulating mixed gender environment for undertaking research using advanced technical devices in diverse science and technology subjects supported by leading education specialists.

Many participants said that the government-sponsored education and training programs are playing an important role in nullifying the family pressures on females who are not allowed to travel without their family members through provision of scholarships to women and mahram (brother, husbands) both for allowing women to complete their training and studies in the digital technologies, which is an attempt for changing the status quo.

> "The Ministry of Education offers to talented women and willing to study abroad scholarships for their husbands or brothers to accompany them during their study periods." [Manal/G]

The academic group reported the similar strategy for allowing female staff to complete studies and training in foreign universities as part of staff development programs.

> "We provide generous scholarships to female staff to support their studies and male member of their families who do not want to send their daughters alone to the foreign universities." [Ahmad/A]

These data indicated that both government and academic institutions encouraging and supporting Saudi women aspiring to pursue careers in digital technologies. Many participants from government group. However, these data do not reflect on the status quo of those women who have male members of their families unwilling to travel due to some other family responsibilities. This means that they can not avail of developing skills and competencies in digital technologies.

According to Hamdan (2005), very Saudi citizen has a right to education from primary level to college. Over time, the number of women graduates has increased in public universities in different fields, while today about fifty-eight per cent of all graduates are female.

These changing trends of participation in education are very important to my research because it is an established fact that higher learning leads to better employment and higher pay. Moreover, to compete in the new information economy, women will need an education and training in technology to access the jobs of the future.

Indeed, half of the interviewees believed education has changed dramatically, having been driven by programmes such as the King Abdullah Scholarship Programme. Batool/B, Sara/A, Lama/A, Mona/B and Shatha/B again expressed this view. For example, Batool/B said,

> "The education system is in constant change … I heard about this from my cousin because I stopped studying due to a disagreement between my mom and dad. On the other hand, the scholarship system allows Saudi girls to learn about the outside world and other cultures by studying abroad."

The King Abdullah Foreign Scholarship Programme could be said to constitute the first significant transformation of the education system in Bachelor's, Master's and doctorate degrees. This programme represents a considerable evolution of the quality of education and learning obtained from other cultures, with the consequence Saudi youth will be able to improve their level of education for the benefit of both public and private sectors.

5.8 Vocational Training Opportunities for Women

Many participants from the academic, business and government groups agreed to the availability of training opportunities for women in digital technologies to a certain extent. Fjr/A agreed to the compatibility of curriculum of Computer Science with the labour market.

> "Currently it is unified and developed. For example, the Computer Curriculum at vocational institutions now works in harmony with the labour market."

Fjr/A has a Master's degree in curricula and teaching methods and is a computer teacher. She had helped her students to invent robots and participate in a competition in Austria. She was able to encourage her students in high school to enter the competition, which is an example of teacher leadership encouraging the skills required in the new economy.

Her opinion reflects the improvement in the teaching of technology subjects and suggests that education in KSA has the potential to develop future career opportunities in technology. Some progress in this area has been made, such as a contract between the government and the Microsoft Corporation to improve digital technology in the field of education. This is a positive start to considering a progressive role for the private or business sector, working with the Saudi state to foster a climate of greater gender equality within education.

In some cases, students could set up online joint-ventures and faculties could offer Massive Open Online Courses (MOOCs) that provide anywhere-anytime access to academic subjects. To preserve cultural gender segregation which is important in Saudi Arabia, electronic filters are also used to enable male-female interaction in which the male cannot see the female, although they can communicate either in speech or text.

Distance learning, tele-conference or group participation is now possible in real time, facilitating teacher-student interaction through face-to-face or remote connection. Some participants from the Academic group (Ahmad/A, Samar/A, Amal/A and Ethar/A) felt that they were now

successful in using this new communicational technology to provide a high level of assistance to develop their students, such as advanced technical workshops for graduates. As Ethar/A attested:

> "The Institute provides the students with the knowledge by making the curricula available on the website and technical workshops for [soft] skills development."

She indicated that there is development in the way of applying the technology in education process, including using websites and technical workshops, which can potentially make a difference to learning. One example is when the presenter explains his or her subject and the attendees have real-time communications through which all participants can exchange information instantly.

Fjr/A was a very active teacher, going beyond conventional expectations in working with her students. She felt that Saudi education in general, needs high quality teaching skills:

> "Teaching skills is available. It was through the announcement of a competition between schools, in the programming of the robot. We trained the students more hours per week in a dedicated activity. Then we went to Austria to show the robot with the competing schools from China."

In computer science, for instance, it is not uncommon for robots to be used as a learning tool. Indeed, training in the field of robotics is a good starting point enabling Saudi girls to explore new knowledge and skills. Among other things, such skills have relevance to their careers, even if they should ultimately choose the dominant fields of female employment in education, nursing and health services.

Fjr/A understood this advantage and worked hard alongside her students to participate in a competition between schools internationally. This example shows that practical training is now available and should improve the opportunities for other applications in the future. Hence, the interview with Fjr/A focus on teaching policy towards technology skill acquisition from the perspective of academia alongside other technology-related programmes available to women in universities and schools.

Indeed, there is currently a debate about the merits of a practical or theoretical education in digital technology. It is true that many people can secure well-paid jobs using their 'practical' computer skills without knowing any theory. Nonetheless, they may not progress very far without the understanding of the theory on which their skills are built.

Practical education means acquiring knowledge with practical experience, so enabling the student to learn how to do things in the real world. In a world of computers, this means being fully trained and competent in using software programs, apps, communications and the electronic devices on which they operate.

Sultan/A showed a deeper understanding and insight of technology education. In addition to academic skills, he mentioned that emotional/caring attributes and professional ethics awareness, were also required and that these are included in the curricula. These attributes are relevant because of the high percentage of women employed in the medical field. Sultan/A said:

> "Our curricula are based on solving problems. Everyone can read the medical analyses and radiology reports. Female students in our university are able to deal with the recent anaesthesia machines in the anaesthesia department and equipment of the intensive care unit (ICU) in addition to all equipment of heart, kidney and respirators. Also, they learn how to use technology to fill the health file or enter the health information through collecting information about the patient and doctor."

In the health sector, it seems that all students, both female and male, study the same curriculum. As a result, both sexes develop the ability to operate technical equipment used in specialist medical fields, such as in anaesthesia and intensive care units (ICU). In addition, the above comments refer to the giving the practical digital skills to medical students, but it does not mention that development of skills in the technologies in other disciplines such as education and information systems used by business organizations.

Sultan/A also referred and gave examples of the different types of tools that use technology. Women excel in these areas because of the continuing emphasis on this domain as a suitable career path for women. Moreover, women receive highly advanced training as part of their higher education.

Vocational education is available, through academic institutions, in subjects that prepare students for technology-related occupations. In some cases, the university may have special training labs and tools to teach students the practical skills and applications. Taking a more positive perspective, Olfat/B and Latifa/B confirmed that women receive special training in their work environment and that training is available in technological areas. As Latifa/B attested,

> "The private sector provides female workers with training to use technology in call centre jobs and cashiers. In our company, all female employees are professionally trained to use software/ a program that allows them to communicate and hold meetings remotely."

There have been some improvements in education in the technology sector, but it was mostly theoretical in approach. Indeed, Ethar/A agrees with comments from Latifa/A, but there is a lot yet to be done for improving the training experiences of students at the vocational institutions. She said:

> "Vocational education is available through the Institute plan for four semesters…. I think that effective polices at the institutional levels are required to improve the training experiences of students in order to be able to teach at the University using the educational technologies."

Technical competency is not limited to a university education. For many women, a vocational education/training programme is more useful. One good example here is the recent training of women to maintain and repair mobile devices. Technical competency goes to the heart of technological training as an outcome that is now pertinent to Saudi women and their career progression in the technology sector. Sultan/A suggested that training is now widely available,

> "Practical training is available in the Department of Pharmacology. Also, training is available in the applied sciences, such as laboratories, radiology, physical therapy, anaesthesia and heart technology."

The health sector is second only to the education sector in terms of women's employment in Saudi Arabia. Both these fields require vocational and professional training, while the Department of Pharmacology now offers practical technical training for women, an activity

previously dominated by men. This change in policy improves access to equal skills training for women, thereby helping them to compete and achieve equal access and opportunity to employment and careers.

These data from participants showed that vocational training opportunities in digital technologies are available for Saudi women. Simply training women how to use technology or software is too restrictive, for if they had the opportunity to understand how the technology works, then they would be empowered to pursue multiple career choices. In addition, the Saudi government has put reform of the education system at the centre of its initiative to diversify the economy and prepare the workforce for the jobs of the future, known as Vision 2030. In starting to reform the curricula related to subjects of science and technologies and policy, the aim of the Ministry of the Education here is to harmonise them to improve computer science education and training in general. Moreover, Vision 2030 includes the objective of providing women with the opportunity to pursue careers in the technology-based occupations generated by the new economy.

In the next section, I will present data regarding significant obstacles in the way of pursuing careers in digital technologies for women in Saudi Arabia.

5.9 Barriers in the Women's Employment in Saudi Arabia

The data discussed in the previous sections answered the research questions relating to the employment opportunities available for women aspiring to pursue careers in digital technologies. The employment opportunities were found to be in different areas of digitalized market, and in the form of training and skills development programs which can enable women to successfully take up employment opportunities in the labour market. The question is whether women are still able to take up the employment opportunities as a result of digitalization of Saudi economy. This section presents data in relation to obstacles as perceived by participants in

the way of women's pursuance of careers successfully in digital technologies. The data in this section highlight some important hindrances arising from the socio-cultural constrains on the women's ability to take up potential employment opportunities due to digitalization of Saudi economy.

5.9.1 Socio-cultural Barriers: Dominant Role of Men

One major factor obstructing women here is the universal socio-cultural belief in traditional 'men's roles' and 'women's roles', which prevents women from progressing in technology-related activities. However, a more specific factor is male domination in the study of science and technologies-related subjects which became clear when I asked all forty participants about a gender-neutral curriculum in education and many respondents reported that men have better opportunities for studying certain technology subjects.

> "Men are dominant in the study of science, technology and engineering. The challenges facing women (pointing to his head with his index and middle fingers) are the way of thinking!" [Hassan/G]

Hassan/G mentioned the dominance of men in the science, technology and engineering disciplines, which might be due to the skills and competencies gaps between men and women in digital technologies in the given Saudi context. If this is the case, then skills and training opportunities offered to women can bridge up this gap to some extent, thereby paving the way for women to adopt the digital career opportunities successfully. However, in second part of the quote, use of 'way of thinking' by Hassan/G is alarming for women pursuing careers in digital technologies.

Though Hassan/G could not elaborate clearly as to what does he mean by 'the way of thinking' in the above quote, the 'way of thinking' reflects the dominant character of men in Saudi society, and might be suggestive of the men being superior to the women in terms of abilities and capabilities to perform digital technological roles better than women in the same positions.

If this is the case, then women aspiring to pursue careers in digital technologies might face significant barrier in adoption of digital careers in the Saudi context despite the rapidly digitalization of Saudi economy which can pose a significant barrier to the successful pursuance of careers in digital technologies by women in Saudi Arabia.

The views from another participant Wedad/A supported the 'way of thinking' issue referred to by Hassan/G. She expressed her surprise by raising a question as to why she could not be a director with men working beneath her, being that he is highly qualified and a director in the Women's Department of a university. Nevertheless, in her current position she is subordinate to a male director, leading me to conclude that her reality reflects the traditional, dominant role of men, which continues to have a significant restrictive influence on women. The dominant role of men emerges from the socio-cultural beliefs regarding the women's role in the household activities, while the men's role as bread-earners for the families.

In support of views of Wedad/A, another participant from business group Batool/B emphasised the numerous career opportunities available to Saudi men compared with those for women. From a contemporary female perspective, this participant worked in a small shop while seeking to start another career better suited to her:

> "Males enjoy many more career opportunities than females, such as the military sector, aviation, forensics, genetic engineering, the technological sector, and power generation."

Batool/B was also infuriated that men have more career options than women. Nonetheless, it might be argued that individual cases and experiences differ radically here, as attempts are being made in some sectors of the Saudi economy to attract women to work in non-traditional fields such as solar energy, as Nouf/A mentioned this to be the case in the Princess Norah University.

Conversely, other participants had a psychological critique of women in Saudi Arabia. Here, Wedad/A argued that personality weaknesses and a refusal to change could be major factors

affecting women's ability to pursue the digital careers in digital technologies. In Saudi Arabia, women have many responsibilities and face multiple pressures in their lives. Wedad/A explained what is expected of women, alongside the opportunities open to them and the socio-cultural demands that limit their freedom of choice:

> "Once a woman is married, her life is devoted to pregnancy, birth and raising children. Also, half of the men do not want their wives to work in mixed places such as telecommunications companies, banks. They do not want their wife to work as physicians, nurses or pharmacists, so she may only work as a teacher. Women face obstacles because of their vulnerability. Some of them do not have strong personalities, and some others are against change."

For most Saudi women, their dominant role remains that of child bearer, mother and homemaker, extending over a period of several years. As a result, they may be unable to cope with additional responsibilities; furthermore, devoting themselves to these domestic roles may deny them professional opportunities. As one of my participant examples showed, there also remain a significant number of Saudi men who believe that wives should stay at home and certainly not work in a mixed environment, such as banks and telecommunication companies, or even in the health sector. In fact, they prefer women's work to be limited to a specific field – namely, teaching.

Salman/G was sceptical about my research and admitted candidly that although he did not accept the premise of the research topic, he agreed to do the interview. In his opinion, women are more fit for doing household duties rather than outside work.

> "Women can work but their work should be restricted to the home. For example, they can do household duties and if they are free, then they can also do some online businesses which is in accordance of our social values." [Salman/G]

The comments of Salam/G are of clear indication of the men's mentality about the women's status as a housewife. Unfortunately, this traditional viewpoint is still quite widely held within Saudi society, insofar as many men do not want their wives to work outside the home, being of the opinion that they should focus on raising children and running the house. This means that

men in Saudi Arabia wants to keep control over the activities of women, which is reflection of male hegemony in the society, and represents a form of violence against the women. The violence in terms of stopping the skilled but unemployed women to seek employment in the public/private organizations.

Indeed, one participant, Manal/G, pointed out that the Ministry of Labour and Social Development still retains a list of professional occupations that are deemed suitable for Saudi females:

> "I think the Working Directory in the Ministry of Labour stipulates that woman can perform all work except mine work, risky work and work that is physically demanding. In Saudi Arabia, women often prefer work in the education field due to their female nature. Women also like to work in medicine and nursing which are associated with people's health. Besides that, there is no problem if women integrate into other fields."

Manal/G refers to the government policies in relation to the women's work and employment opportunities. It is clear that Ministry of Labour does not distinguish between men and women in the 'Working Directory' published by the government. This indicated that if discrimination exists at the recruitment levels or training levels for women in digital careers, then it is related to 'way of thinking' as referred by many other participants. The men occupying senior positions in the public and government firms can be a source of discrimination between men and women, thereby causing a negative consequence for the adoption or promotion of women in roles within the both public and private sector organizations.

Despite the stereotypical approaches taken by many participants, some male participants recognised the need for a progressive approach to gendered participation in the Saudi economy. Sultan/A insisted that domestic responsibility should be shared between women and men, while also pointing out that Saudi society and culture stand against changes to the traditional way of life.

> "The household responsibilities can be shared between men and women as it is done in the advanced societies, but the cultural and traditional way of life, at the moment, can cause issues in balancing

> the roles of men and women in households. With passing of time, there might be some change in the existing culture." [Sultan/A]

Though Sultan's views were reinforced by Hassan/G and Omer/B, indicating the presence of some sane voices favouring the balancing of the responsibilities in the domestic environment, and enabling the women to take up employment opportunities arising from the advancement of Saudi society which is happening in the form of digitalization of Saudi economy and accompanies social changes. However, it should ne acknowledge that perceptions of balancing men and women roles in domestic environment are raised by only few participants, indicating the presence of stereotypical mentality of men, which may cause the potential obstacles in women's successful adoption of digital careers resulting from the digitalization of Saudi society. It seems that government carries more responsibilities to make legislations and policies in regard of giving freedom and empowerment to women for realization of their dreams to pursue careers in digital technologies. In addition, the presence of moderate views in the men occupying senior positions in the public and private organizations raise hopes for the women for adoption of and progression in the digital technologies-aided career opportunities in the future.

5.9.2 Lack of Family Support

Family support plays a critical role in enabling women to take up outside roles/employment opportunities in the conservative societies (Selwaness and Krofft, 2020). Hence, the perceptions of participants regarding family support for women aspiring to pursue careers in digital careers. Several of our participants perceived that families in many cases are not supportive of their daughters to work in the public and private sectors due to mixed gender environment at workplaces using digital technologies for operations. As Shatha/B said:

> "The family, including husband, brothers and parents. They do not support their daughters."

Another participant from the government added:

> "The issue with married women, even they talent, is that their husbands and families on husband side are reluctant to allow them to work in digitalized workplaces due to men working along with women." [Hassan/G]

To take a particular case, Omer/B, who has a company employing Saudi women, mentioned that when a female applicant came with her father looking for a job in his company, her father answered questions on her behalf and selected the working hours and the specific job for her. It seems that paternal control is part of the cultural background, customs and social tradition in Saudi Arabia. Some females cannot discuss their future career without male approval from their father, brother and husband.

From perceptions and experiences of above-mentioned participants with many female interviewees, it was shown that families still control the working life of their daughters. It was pointed out that some parents prefer girls to teach rather than work in any job related to technology because the latter might involve a mixed environment. The upshot is that girls most commonly choose education as their subject of study at university.

There may be several reasons why some families in Saudi Arabia are unsupportive of their female members. First, the background of the family's knowledge may be traditional and, as a result, they may believe that technology is not important. In other cases, the family want their daughters to study and obtain a certificate to be employed as teachers; a career that is socially acceptable and accepted by prospective husbands.

The second reason is that the fear of working with technology will entail mixing between men or women, which is generally not permitted. In reality, however, when I did the data collection, I saw women working alongside men in a private company and did not observe any problems because everyone was focused only on the job.

Nonetheless, the lack of support for women's career aspirations is especially problematic where decision-making is controlled by traditional-minded men. For example, Sara/A mentioned that there was no support from her family after the death of her father and explained how her brothers controlled her decisions:

> "My family does not support me; my father died and I have brothers. I should refer to them in everything that I do. My family does not encourage me. When I ask their opinion on anything, they usually answer with: "Do whatever you want to do", and when I decide to do anything, they ask me why! They make me hesitate towards doing anything."

Unfortunately, this example is typical of what can happen in some Saudi families. When the father passes away, his eldest son assumes control and applies his values to his sisters. Here, Sara/A proved a very good example, for she was a very strong woman who seemed to have improved herself despite the lack of help from her family. In another case, Afrah/B struggled with her family situation but still managed to save money so that she could take computer courses without any support from her family.

In Saudi Arabia, a female child is registered on her father's identity card. In the case of Batool/B, however, she was not added to her father's identity card because there was disagreement between him and her mother. Consequently, she lost everything, including her official identity and the opportunity to study. Her solution was to take a job in a small shop while studying online courses in English language and computing.

Similar accounts of social or familial obstacles to women were given by the other female research participants. For example, one interviewee pointed out that some girls receive a little support from their family, although some families prefer their daughters to study in the education and health sector rather than technology sector. This preference is evident in the national statistics (World Bank Edstats, 2008).

Recently, the business sector, especially business incubators, has started to support and encourage many projects and potential innovations. Hence, Olfat/B highlighted that career opportunities are actually open for women, but that they continue to face some challenges from society and family.

> *"*Women face challenges, such as society and family. If we speak about education and government, both encourage girls by giving them a monthly bonus during study and distinction bonuses for outstanding female students. Society and the environment (family) are responsible for the default that makes [a woman] make progress or stop. Women have a great power to develop, progress, and succeed in many fields."

Society and family can impede women's development although women do have the ability to achieve success in every field. I find that interviewees note certain obstacles that affect women's success in technology, such as society and family amongst others. Batool/B agreed to the afore-cited participants, and claimed that women struggle to find career opportunities, while society does not support their efforts.

In contrast, Reem/A, Jana/B, Abeer/A and Shatha/B all confirmed that their families encouraged them in the field of technology, such as computer engineering, attending the right courses and dealing with the practical applications of IT devices. As Shatha/B attested,

> "My family supports and encourages me. They consider me a technology engineer in the home because I have a great ability to deal with the devices although it is not my specialism. It is only practice. I'm always keen on updating these practices and knowledge. Technology is the future."

This is hence an example of how a family encouraged their daughter. It is worth mentioning that Jana/B too was skilled in using technology, especially on the practical side working with new devices.

Although families have an influential role in the development of girls in Saudi culture, many families remain conservative and closed-minded. However, I saw conversely that some Saudi

women are supported by family and encouraged in their ambition to study and work in the field of technology.

5.9.3 Insufficiency of Experience and Training in Digital Technologies

Some of other interviewees argued that the curriculum does not comply with the needs of the labour market as there is a big gap between education and employment needs. Thamer/B, Omer/B, Hind/G, Seham/G and Mona/B were all critical of the education system in KSA, which they claimed does not fit with labour market demands. As Thamer/B commented,

> "Sometimes the degrees do not comply with the labour market. There must be consistency between education outputs and the requirements of the market. Therefore, some undergraduate majors do not fit in the labour market. Therefore, the rate of unemployment is higher."

Moreover, there is a widely-held belief that women are neither interested in nor equipped for the technology field, as evidenced by the low rate of women in science and technologies-related education and senior positions in the technology sector worldwide. Indeed, Fahad/B was very candid about the constraints to professional gender equality within the traditional education framework, while other participants highlighted the inequality of the curricula.

Participant Fahad/B cited two additional factors impeding women's progression in the workplace. Here she emphasised both the reluctance of employers to employ women to work in IT and the corresponding limits that exist in many women's education.

> "In the IT and engineering fields, most employers do not have confidence in women. Men and women's career choices are not equal, of course; the reason is due to education. The infrastructure of education needs to be addressed."

In the above comment, Fahad seems to shift the focus to the academic institutions rather than the business community to prepare and train the females in technologies and science related disinclines so that female candidates should have enough practical and theoretical background to be considered for a particular position in the industries. However, critically speaking,

business community cannot shift the whole responsibility to the educational institutions, as far as the practical experience and skills are concerned, the educational institutions are dependent on the infrastructure from the business community to provide space and time to the students for obtaining necessary skills during internships.

If the educational institutions are not able to provide internships programs due to the lack of interaction between the academic institutions and the business firms, then it can be real issue. Fahad refers to the unequal career choices of men and women, which is probably an implicit reference to the lack of the consultancy services. Nevertheless, his comments are broad in nature, and cannot be applied to all educational institutions in Saudi Arabia. Fahad/B seems to say that the development of infrastructure such as consultancy services, quality cells, and communication cells which can review policies in line with the requirements of labour market are important for equipping women with rights level of skills and knowledge for pursuing careers in digital technologies.

Jawad/B has voiced the similar opinions, and argued that men can pursue studies in a wider range of subjects, giving them a career advantage over their female peers; for example, IT engineering careers are only currently available to men in Saudi Arabia.

> "Men are fit for grabbing the employment opportunities available in the technologies and science sectors, as they are in better position to learn and develop the digital knowledge and skills compared to females."

Samar/A added:

> "The communication channels between female universities and business firms are not strong as that of the male universities, which is a big hurdle in giving women hands-on training to female students at firms in digital technologies."

Jawad/A seems to refer to the better employment opportunities for men in digital technologies in science and technological sectors compared to females with lower level of skills and competencies. Sarmad/A attributes the lower level of women's digital skills due to lower level of internships opportunities available for female students studying science and technological fields in the firms using the state-of-the-art digital technologies. In addition, Samar/A is of the view that there are some communication issues between female educational institutions and the firms. In contrast to male leaderships, the females are not unable to set up regular contacts with the firms using the digital technologies for arranging the internships for women aspiring to pursue careers in digital technologies. This leads to the skills and experience gap between theoretical and practical domains of knowledge, which can be a hurdle for women intending to pursue careers in digital technologies. This indicates that there is a need to establish a communication channels between the female educational institutions and firms through the government agents acting as mediators between business firms and female educational institutions, as voiced by some participants from the business group and the academic groups.

> "The government agents or consultancy firms can mediate a communication between the academic institutions and the business group, which can make it possible the internship opportunities for female students. This in turn will increase employment opportunities." [Ahmad/A]

Similar views were expressed by some participants from the business group. For instance, [Fahad/B] perceived like that:

> "The female candidates can be in stronger position to take up employment opportunities in digital technologies, if they do the internships at the business groups. Their internships can be seen as good addition to CVs of the female candidates." [Fahad/B]

From the above comments, the need for the communication channels for arrangement of internships and requirements of employers is a key for ensuring the availability of the women intending to pursue the careers in digital technologies. Does it so simple to arrange the internships of females at employers with most of men workers at workplaces as suggested by

above-mentioned participants? This requires a special arrangements and regulations to accommodate women and keep them safe environment from harassment from men at workplaces, and social and cultural factors might be a big hurdle again. However, with modernization of Saudi Arabia, and digitalization of Saudi Arabia, norms of giving separate space to female from male workers might change this scenario, and facilitate the better prospects for bating hands-on experience.

Latifa/B asserted that women's education is unequal to that of men, which is one of the main reasons for women lagging behind men in finding the employment opportunities resulting from the digital technologies. Males have more opportunities in most fields, while there are limited disciplines for women, such as their exclusion from the domains of computer and software engineering fields. Latifa/B stated,

> "The curriculum is different between genders. Engineering and programming are very limited for women."

The consequence is that men benefit from higher paid jobs and even those women who obtain academic science qualification abroad may be excluded from career opportunities in their field when they return home. The phrase 'very limited for women' can be challenged, as most of participants in the opportunities for women, sections 5.2_5.8 have provided data regarding opening up the opportunities in science and technological disciplines for women with digitalization of these disciplines. It is possible that Latifa/B means that female universities have limited courses availability for females aspiring to pursue careers in digital technologies.

Many participants from the government and academia groups seem to favour the theme of the lack of training and practical sessions during studies could be an important cause behind the lower employment level for the female students compared to the male students.

In their view, many subjects in the science and engineering disciplines are not available to female students. At least not at the level required for gender equality today, as Ashjan/G asserted,

> "It provides more diversity in the fields of technology, but it concerns the practical side more than the theoretical. We need to develop education and provide an opportunity for the students to enter the sciences. For example, my daughter's desire is to study genetic engineering, and this specialisation does not exist in Saudi universities. Therefore, women are forced to travel abroad."

In the new economy central to the information age, digital skills in science and technologies-related disciplines are required (Leggon, 2006). The science and technologies-related disciplines have traditionally been seen as largely male-oriented subjects, as evidenced by the low take-up rate among women. This is a global problem and many governments have already, or are developing, programmes to encourage girls to study these subjects. Owing to the potential impact on the digital training on women's employment, initiatives and programmes to improve the digital education and training for Saudi girls are essential.

According to her, both genders have similar curricula. Indeed, she highlighted that the Ministry of Education is trying to develop curricula through the efforts of specialist committees, especially in science and technology, for both boys and girls. Although this represents an improvement from the past, both Lama/W and Mariam/G commented that women struggle to be successful in computer skills, even after taking many courses, for reasons yet to be explained. Mariam/G summarised,

> "Now most of the curriculum is one course. But the success rate for females to get jobs after gaining their qualifications in science and technologies disciplines are very low compared to their male counterparts, which is partially explained by the less training and limited exposure of female students to the practical contents of the coursework compatible to the needs of the labour market."

Mariam/G has been working in Information Technology in the Ministry of Education and has extensive experience of the education sector. She maintained that the curriculum for female

students does not comply with labour market needs and certainly needs improvements especially in the area of increasing training sessions for female students within the academic institution.

Indeed, a number of interviewees thus made the connection between education outcomes and the labour market in terms of the lack of career opportunities for well qualified, educated Saudi women. They added that in the field of technology the curriculum is predominantly theoretical, with the result that female students have a lack of exposure to highly advanced technology. For example, Nouf/A described the limited contribution of the practical part of the syllabus in this way:

> "The curricula designed for the technologies and science puts more emphasis on the theories, because most of questions are related to theory in the exams, and there is limited contribution of the practical performance of students in the overall academic scores of students."

From the above comments, it is obvious that academic institutions examine the students in theoretical knowledge rather than giving the higher weightage to the practical side of the education. The education in science and technologies-related subjects is practical education, and the digital competencies of the students cannot be developed without the dedicating the major proportion of the curricula for the practical performance of students.

Although it is arguable that digital literacy is less about tools and more about thinking, there is a relationship between theoretical and practical skills and the needs and opportunities of the labour market. For instance, Saudi women find it difficult to study computer courses because it is a relatively new subject of study and there is a lack of qualified and experienced female teachers. Nevertheless, they are determined to overcome this and push themselves. Hind/A expressed her thoughts in the following way:

> "The reason of less focus on the practical part of the course work is partially related to the lack of the female qualified trainers and teachers for showing digital technologies in action at workplaces and educational institutions."

Hind/A justified the lack of skills in digital technologies for women pursuing careers in digital technologies. The female trainers are required to train female students in female universities, suitable arrangements for training and providing the female staff can be a suitable approach, but this again depends on the government support and cooperation from the business firms to arrange the training opportunities. Though data in the opportunities for women section 5.8 mention the training opportunities for female staff, but it seems that training opportunities reported by participants might be limited to few science and technologies-related disciplines. From comments of Hind, it is obvious that intensive training programs are required for training and supplying female demonstrators for fulfilling the students' training and skills development needs for women aspiring to pursue careers in digital technologies. Hence, training female staff to deliver the contents of the curricula in the practical way is a key solution for proving the students with digital competencies in science and technologies".

Speaking about the option of vocational training for women, one participant, Turki/G, was not convinced about vocational training for females is not widely available for women in science and technologies-related areas.

> "Honestly, mostly held belief is that women do not fit with vocational training, and this is appropriate for men, which is why there is a smaller number of vocational training institutions for women compared to ones for men throughout the country."

It seems that Turki/G agreed with the biased social approach towards training the women in science and technologies-related disciplines about gender equality in training in the belief that there are differences between males and females in terms of their "nature". Yet his perspective is consistent with the theory of cultural feminism that men dominate women within the domains of women's culture, women's power and women's pleasure (Corea, 1987). I would state at this

point that should such a viewpoint prevail in Saudi society, then it would be a barrier excluding women from many aspects of learning and developing technologies. The persistence of these social perspectives could alone have a negative impact on women in terms of damaging their self-confidence and reducing their capacity for technical improvement.

Hence, the pressures emerging from socio-cultural value are considered as a main barrier for women missing out on the learning and training opportunities in the field of technologies, while men are in more advantageous position to learn digital skills which are required by employers either by travelling to other parts of Saudi Arabia or studying abroad. Though the caution should be observed while interpreting the above comments, as they cannot be generalized to all women in Saudi Arabia. There are some liberal families which allow women to study abroad, but this freedom does not come without restrictions. The girls going out to attend academic institutions are required to be accompanied by their male family members. If the male members of females such as brother, husband, or fathers are not available to accompany them, they cannot travel to other cities or abroad for studies.

Some of participants from the business group viewed that tendency of females is more towards health and education, which makes them unideal for the digital work. The applicants applying for jobs in health and education and health sector is many folds more compared to the digital-dependent companies. This is mainly due to the lack of digital skills possessed by women, which convinces them that they are suitable for employment opportunities. For example, Salah/B stated,

> "The lack of digital skills is a big reason which stops women from entering into jobs demanding the digital skills, and is a factor behind women taking up non-digital technologies-related roles."

Aliya/B supported the claim of Salah in this way:

> "The lack of digital skills becomes a threat to women trying to find work in health and education sectors which are rapidly being digitalized".

These comments also raise the question of what is "men's work" and "women's work" where, during the transition from viewing women as mothers and homemakers to qualified working professionals, there is a tendency to accept certain occupations as being more suitable for women. Accordingly, the social emphasis in Saudi Arabia could be said, for the most part, to be placed on educating and training women for occupations in the education and health sectors.

From the above data, the digital skills are very important for women to secure jobs in any sector in the era of digital technologies. The lack of digital skills may pose a great barrier in the way of employment opportunities.

5.9.4 Childcare System in the KSA

Here, a fundamental issue is the constraints imposed by childcare and, as all the interviewees mentioned, the childcare system in KSA. It is notable that Saudi government programmes currently seek to assist working women by giving them appropriate alternatives and support so that they do not lose their jobs and livelihood. Yet this is a difficult objective to achieve because of financial and practical constraints which entail, for instance, the maternity leave allowance is only a quarter of the woman's normal salary, even if some men are very jealous of this system.
The advantages of childcare are self-evident, enabling the mother to provide care for her child at certain times and thereby permitting her to keep her job. However, the problem of inadequate facilities is a concrete obstacle to women's employment, particularly in the cases, where there are no nurseries close to where the mothers work.
Another participant Omar/B's similar opinion on limited childcare services,

> "Child care services: There is no serious approach regarding changing women's work environment through adding a nursery

> section in a special section for children, close to the workplace. All nurseries are separate places and far from parents."

In referring to the issue of childcare others amongst the working-women interviewees stressed how they need nurseries in their work environment to be confident that their children will be safe and secure. Hence, I believe that the Ministry of Education and the Ministry of Labour and Employment should work together to resolve this issue and provide a reliable and flexible solution to meet the needs of working mothers and their families.

One of the participants Hassan/G, who is around 39 years of age was relaxed and confident in the interview and made a very interesting point,

> "I cannot ask my wife to take responsibility for the home and children. Our religion did not require this, but women naturally just like participating. The man is the one who is responsible, while a woman has the right to choose to participate, and I believe this is the correct culture."

His viewpoint is commonplace among Saudi men today insofar as he acknowledged that he had responsibility towards his children, but as his religion does not provide any specific instruction, his wife can choose to contribute economically as she wished. Hassan/G went on to say that he did not impose this requirement on his wife, but he nonetheless believed society and culture should change so that father and mother, husband and wife can work together in harmony. Finally, I was surprised with Salman/G's response, when he said:

> "Man and woman have duties and responsibilities as well as common things and equality starts from religion. [Angrily] I think it would be risky to discuss this question. Women are the basic of community; she gets her alimony from her husband. Meanwhile, other communities do not accept this situation. The religion and constitution prescribe that husband should give alimony to his wife. The options of work shall be different according to the nature of women."

In fact, Salman/G has a senior position in a government organisation and he was clearly not happy with both my topic and my audacity to take it on. As a result, his responses to my

questions were short, blunt and sarcastic. He kept looking in his watch from which I concluded "he wants to finish the meeting"

Indeed, when I started to ask him questions about women and issues, Salman/G gave short answers but still expressed his belief that women and men have equal but different responsibilities. In effect, it is his opinion that a wife is to be provided for financially by her husband and that he did not approve of women working, concluding that job options depend on the nature of each woman.

Even if he was a participant with an elevated position in Saudi society, Salman/G's viewpoint reflects widespread social-cultural beliefs. It was difficult to discuss the problems of Saudi women with him and I wondered whether or not his views on Saudi women truly address the issues faced by Saudi women in the labour market and how they might be so empowered.

In effect, this participant has the power and decision-making authority to affect women's employment, yet his predominant view was that women's career opportunities are naturally restricted by their physical nature. In reflecting on such viewpoints, I started to question my assumption that, with a suitable level of education, modern Saudi women could use modern information technology to advance towards more gender equality in employment. In other words, the patriarchal nature of Saudi Arabian society reflected the opinions of too many of the male participants that in some way and to some extent, Saudi women should not be working in the first place.

5.9.5 Inadequate Level of System's Support for Women's Employment

In this section, system refers to the social structures including the business organizations, academia and the government, in accordance with concepts discussed in chapter 4. Some

participants mentioned that if Saudi society is slow to adapt, then the policy of the government is also limited in terms of employment opportunities for women. For example, Afrah/B argued that

> "I can see the government is sincere in its efforts to increase the employment opportunities for women and made many policies in this regard regarding the education of women in digital technologies, and involved employers to introduce training of women. However, the polices are not mature enough to produce any positive impact on the women's employment."

From the above comments, there are two important aspects mentioned by the participant, which are formulation of polices for educational institutions in terms of developing curricula for educating and training women in digital technologies, so that they can play a positive role in building the national economy. Second aspect is related to the involvement of employers in the training the existing women employees and potential women employees (students) to educate and train them in using the digital technologies productively.

Another participant from women corroborated the comments, Hanan/A

> "Though some policies for women training and education for using the digital technologies are there and some are under progress, but all legislation whether for education at the educational institutions or training at the workplaces are limited to the paper, and implementation is not even across all organizations and women groups with different level of qualifications in digital technologies."

Hanan/A in her comments stated with clear confidence that government has formed the legislations regarding the preparation of women to pursue digital careers in digital technologies through the placement programs in the educational institutions and workplaces, but they are not followed up regularly, and there is no mechanism to implement the all of legislations regarding training women to pursue careers successfully. I would challenge the views of Hanan/A in respect of 'all legislations.....limited to paper work'. This is the extreme stance taken by participant. Beyond doubts, the government has been strict to implement digital technologies in institutions and providing work force to support the proliferation of digital technologies in public and private sectors (see details in chapter 2, section 2.5, and chapter 6, sections 6.3-6.8).

The comments from Hanan/A were partially were partially supported by some participants from government group. The participants from government bodies were of the view that that infrastructure for supporting the women's participation in the labour market is still under process, and we are moving towards empowerment of women, and one of our goals is to economically empower women. Turki/G voiced his concerns like this:

> "One should bear in mind that we are moving from conservative society to the liberal society, and we aim to increase the women empowerment as part of liberalization process. The spaces and infrastructure may take some long to be developed and implemented, which ultimately will give more opportunities to women for getting and education and training in digital technologies."

From the comment, it is clear that government participants voiced some hope for fruition of efforts for increasing women employment through giving them access to the education and training. The major obstacle, described by above participant, is the lack of fully developed infrastructure to support the training and education of women in order to improve the digital competencies. For example, the societal rules do not allow the women mixing freely with workplaces where men are being trained.

Hassan/G and Ashjan/G mentioned the slow speed of progress in Saudi Arabia is inadequate to delivering the fast changes necessary for the demands of the modern era of globalisation and computerisation. As Hassan/G concluded,

> "It is a very weak policy. However, the Government is trying to support women, but this support and development are slow … (Laughed) [Women face] Unequal wages and work opportunities are limited between being a teacher or a doctor and transportation [is a problem] as women depend on private drivers with a high monthly salary."

Usually, Hassan/G used his hands to explain comfortably. In fact, Hassan/G also mentioned other issues that have an unfair impact, which bypass men, but adversely affect Saudi women. What Hassan/G was referring to is the obstacles communicate to young women that career opportunities are not for them. These may be intentional or otherwise, such as the transport difficulties intended to discourage women through inconvenience and cost, even if these may

now be eased with the repeal of the driving ban. What continues to be a major obstacle, for instance, is the inadequate provision of childcare facilities curtailing their ability to consider a career path that men would otherwise take for granted?

The women need separate spaces to be allocated in separate sessions only dedicated for women training, which limits the ability of businesses to train women and male worker at the same level. Hatem/B said that development of infrastructure for women employees in terms of training and education at workplaces puts extra burden on companies' revenues. The small businesses cannot afford to bear extra cost for women's training in order to improve the

> "The employees are trained by the instructors and we are required by law to train women through female trainers, and male through male trainers. This makes it difficult to find the female trainers for female workforce with the same level of experience as the male trainers have."

Another participant Shatha/B referred to the cost of building infrastructure for female trainer as an obstacle in the way of improving digital skills of female workers.

> "Building spaces for training of women workers, hiring experienced trainers and compliance with social customs regrading protection of women are the main barriers which prevent the business to launch the full-scale training programs for female staff in using the digital technologies."

The social customs mentioned in the comments of above participant refers to the common belief that women should not be allowed to mix with men folks at the workplaces and educational institutions. The society as a whole believed in educating women, which is evident from the separate educational institutions for women, however, there was not widespread support for women employment in Saudi society, which led to the male workers dominate the workplaces. In the last two decades, the movement of women's empowerment and emancipation started, which caused the government to do legislation regarding the permission of women to work in government and private organizations. However, to which extent families have accepted these legislation remains a controversial point. The exploring the resistance from families against

government legislation or business support for allowing women to work needs another research project, as this is beyond the scope of my research project.

The forgoing data regarding the inadequate system's support for training and educating women in order to increase the women's digital competencies suggest that although some progress have been made, there is perhaps a will to make further improvements while there is still some way to go before there is a level playing field for women's employment, regardless of the path they choose.

The working hours, transport and flexibility of the work plays a key role in motivating the employees to work or continue to work. The participants described that working hours are non-flexible. The women, like the male employees, are required to work between 9AM to 5PM, which makes it difficult for women to do the jobs in situations where they are required to perform household duties.

In most of situations, women are bound to perform household duties, such as cooking, looking after kids and husband's family. This make it difficult for women who wants to work and perform the household duties. The women without household duties can do their job with ease.

Hind/B commented on the women's difficulty to balance the family and work balance due to the inflexible working conditions:

> "There is great risk that working women can upset their families if they don't give a proper time to looking after the household duties. There is a risk of breaking one's house if women continue ignoring household work. Therefore, working conditions in private and public sector do not support the working conditions for women."

From the above comments it is obvious that non-flexibility of the working conditions is a great barrier in taking up the employment opportunities created by digital technologies in the Saudi labour market. In the comment of Hind/B, the element of family is very crucial for enhancing the ability of women to avail the job opportunities in the labour market. The family may be

coercive, which can serve as a major barrier, which is reported in details in section 5.9.2. The flexible working condition can enable women to balance the work and family. As the employers might put a pressure on the women to work at the workplace rather than working at homes, which may force a female employee to quit the job or not to consider the job offer at all.

Jana/B, Mona/B, Olfat/B, Hind/B, Latifa/B and Shatha/B said that they do not offer any pick-and-drop facilities to the women workers, which means that women need to travel on public transport to get to the workplaces or depends on their male family members to drop them at the workplaces. For example, Latifa/B said,

> "My employer does not offer me any pick-and-drop facility, and travelling allowance is not available as well. This increases burden on my family to drop me at workplaces, which is not positive condition favouring my long-term employment goals."

Also, Lama/A, Abeer/A, Shatha/B, Afrah/B and Mona/B talked about the deduction of salaries by employers just because they arrange private drivers for give them pick-and-drop services. For example, Mona/B talked about reduction in salary due to deduction of wages towards the travelling allowance:

> "Indeed, the main disadvantage of working in the private sector is low wages. Hence, female employees feel that it is unfair that men and women have a similar transportation allowance because men use their own cars while women must pay around 50% of their monthly wage to hire a private driver."

Hence, it can be argued that absence of the travelling allowances or free pick-and-drop services for female workers can hamper their abilities to take up or continue with the employment opportunities resulting from the digital technologies.

As long as businesses are concerned, there is no regulated policies about flexibility of work conditions for women. For instance, Jawad/B argued:

> "Currently, there is no such policies to support the flexibility of women's working conditions, which might be the reason that we do not receive so much female applicants at the recruitment stage."

The participant from another business organization [Mona/B] reported the similar feedback about the creation of flexible working conditions at the policy-level. It is important to note that Jawad/B comes from the business group, and has knowledge directly in the HRM polices of his company. In his comments, he referred to the lower number of women applicants at the stage of recruitment, and reason behind the lower turnover of women applicants for the advertised posts is due to the lack of flexibility of women's working conditions. Some other participants from the business group agreed to the Jawad/B's comments relating to the lack of flexibility of women's working conditions [Thamer/B], and one of the participants from government group added to the above comment:

> "Though, currently we are lacking in the flexible digitalized operations to allow women for working flexibly, but we are still working to digitalize our operations to consider the flexible working conditions for women." [Laila/G]

Similar comments from the academic group, though situation with academic institutions seems to be better, but there are still insufficient digital structures to support flexible working conditions for all female worker across all disciplines. For instance, one of participants from the academic group commented on flexible working conditions like that:

> "There are applications of educational technologies, which are used in some departments in universities such as online support provided by female staff to the students from their homes, but this is not the case with all departments, and all subject areas." [Lama/A]

From comments derived from Thamer /B and Laila /G, the issue of lacking in digitalized technology-aided flexible working conditions are not available due to the digitalization of economy at its infancy in most of organizations in Saudi Arabia. Nevertheless, if the flexible working conditions were not provided by the organizations (government, academic, business), then it can pose a serious issue for women pursuing careers in digital technologies to continue with or look for job opportunities created by digital technologies. The comment from Lama/A

shows that flexible working environment is not offered to all female employees working in universities, despite some exceptions in certain departments. The Lama/A did not provide any specification of departments, which do offer such flexible support service to female employees for allowing them to balance the family-work responsibilities. However, the comments from Lama/A cannot be extrapolated to the female employees working in distance and online learning universities in Saudi Arabia, as the business model for online learning is based on provision of flexible learning environment for both employees and students

Taking the perceptions from the governmental bodies, it was learnt that government has passed some legislations regarding the flexible working conditions at workplaces in both public and private sectors; however, implementation of the legislations is yet to be done. Salman/G said like this:

> "The government is actively working to increase the women share in the employment, some legislation has been done regarding introducing the transportation allowance for female workers, and allowing some part of work to be done at home for women using the digital technologies. However, there is no monitoring mechanism to track the implementation of such legislations."

Afrah/B also supported the above claim:

> "Though legalisation about the preparation allowance is there, but actually some businesses do not put such legislation in actions. The government also shows commitment to make the work flexible, but employers are not willing to consider women during recruitment process if the flexible work is mentioned."

From the above comments, government commitment to increase the share of women at workplaces is clear. The government supports for the transportation allowance to facilitate the travelling of women within safe environment to the workplaces and affirmation on the introduction of flexible working conditions speak of the positive measure to increase women's participation in the labour market. However, without the support or implementation mechanisms, such measure can be said to be restricted to the paperwork, and there is limited

overall impact of government sponsored policies regarding the support to women's employment in the labour market, which means that non-flexible working conditions and absence of transport allowance for women workers is still a barrier for participation in the labour market. Moreover, it is owing to this evidence that I may conclude that the patriarchal, conservative structure of Saudi society still has an over-whelming influence on male-female employment inequality despite the efforts of the government to introduce change into the business world.

5.10 Summary

This chapter has summarised the perceptions of forty participants from three stakeholder groups (Government, Academia and Business) regarding the topics of impact of digital technologies on women employment. Personal perspectives, opinions, examples, agreements and disagreements have been documented according to their relevance to the thesis topic and the research questions. The findings revealed various opportunities are available for women aspiring to pursue their careers in digital technologies due to the digitalization of the Saudi economy.

For career building in digital technologies, government, academia and businesses have documented various programs available for Saudi women to help find the suitable career opportunities in digital technologies. Despite the skills building programs and existence of career opportunities were female, participants also expressed obstacles in the way of women pursuing career in digital technologies, the perceptions from different participants regarding obstacles and suggestions for improving the capability of women to build their careers in digital technologies were contrasted and compared.

Thorough discussion on codes and themes described in this chapter will be conducted in the next chapter in context of existing literature and implications of the research for the Saudi women pursuing careers in digital technologies in the next chapter.

Chapter 6: Discussion

6.1 Introduction

In the previous chapter 5, results are described from the data collected from participants from government, academic and business groups. Three major themes: employment opportunities for women in digital technologies, training opportunities for women and barriers in way of women to exploit employment opportunities for Saudi women aspiring to pursue careers in digital technologies were discovered in data and presented in chapter 5. In this chapter, themes presented in the previous chapters are discussed in the light of existing literature. This chapter has been divided into three main sections. The section one discusses the results related to the employment opportunities created by proliferation of digital technologies in Saudi Arabia. The second section is arranged around discussion of training opportunities offered by government, business and academic in response to digitalization of Saudi economy with aim to increase the participation of women in Saudi labour market. The third section is organized to discuss findings in relation to barriers which women can face while exploiting employment opportunities in the labour market generated by the digitalization of Saudi economy and society.

6.2 Employment Opportunities in Digitalizing Economy of Saudi Arabia

In this section, findings related to employment opportunities created by deployment of digital technologies in Saudi Arabia are discussed.

6.2.1 Digital Embroidery

The findings of this study revealed that women have employment opportunities resulting from the applications of digital technologies in Saudi Arabia. Several other studies have reported in

line with the outcome of my study. Joshi et al (2009) described that trends in textile dressing using the embroidery has increased, which involve the development of needlework patterns and other elegant textile forms using the computer-controlled tools. The women with knowledge of digital technologies are more efficient in producing the 3-D woven and non-wone fabrics in their traditional home-made textile products. Kim et al (2018) reported the use of designs and patterns developed using the design technologies among Korean women to increase the economic empowerment of women in South Korea. The author showed that women accomplishing the computerized designs on the home-made textile products have become popular in the market, thereby attracting the women textile designers to start their own start-ups in South Korea (Kim, 2018). The examples of Korean women can be followed by Saudi women to use the computer graphics and digital machines for converting the traditional textile design into modern and elegant textile products.

Another artist called Maggie Grey featured an article in the Textile Artist Organization showing the increasing application of computer textile design (GEM Paint) in accomplishing patterns and design on fabrics with ease and within short time (Textile Artist Organization, 2016). It was further concluded in the article that women' participation in the digital embroidery has increased due to time saving and ease of use of the designing and stitching the textile products. The digital technologies such as computer design has great potential for women in rural and urban areas to seek economic empowerment through the production of elegant design and patterns while sitting at homes, which supports the outcome of this study for Saudi women aspiring to pursue digital careers.

Xue-ou (2015) also showed findings in relation to the earning by women through teaching the embroidery and knitting skills to students via the applications of computer knitting and embroidery technology for teaching students. Though the paper focused on development of innovation of experimental teaching, but it clearly construed to the potential of women having knowledge and expertise in knitting technology and computer embroidery process can gain

economic empowerment through arrangement of teaching classes to other female students. This corroborates the findings of this study, which showed that digital embroidery has potential employment opportunities for Saudi women aspiring to follow digital careers. Many other studies have supported the increased economic empowerment gained by women through the digital technologies, thereby corroborating the finding of my study (Hasiru et al., 2020; Luckman, 2013)

Taken together, it is obvious that Saudi women with knowledge and expertise in handling the computer knitting and computer embroidery are only able to exploit the employment opportunities. Hence, the condition of training, knowledge development in the area of digital embroidery seems to be prerequisite for exploiting the employment opportunities resulting from the deployment of digital technologies in the textile industry in Saudi Arabia. The perceptions in relation to employment opportunities for Saudi women due to digitalization of textile industry mostly come from the academic and business groups which are supposed to hold good knowledge about the market potential of digital embroidery in increasing the employment opportunities for Saudi women due to their close links with the labour market. This adds strength to the finding showing the link between the digital embroidery and career opportunities for Saudi women. Moreover, participants sounded confident with smile on their faces and movements of hands while talking gave me impression that they were sure of what they were expressing.

6.2.2 Entrepreneurship and Family Enterprises and Discussion

This study found that entrepreneurship opportunities have become available for women aspiring for digital careers in the Saudi labour-market. Women can start the start-ups with the help of digital technologies. Joshi et al (2015) supported the same outcomes in the Indian context that women women-run enterprises run by women has significantly increased due to the proliferation of the digital technologies in the textile, food sector and many other areas in the online businesses. This is in line with the perceptions of participants in this study. Supporting the

outcome of this study, Danish and Smith et al (2012) reported the increase of entrepreneurship opportunities for female, and concluded that overall increase in the entrepreneurship opportunities for female boosted the family business run by women in Saudi Arabia. Similarly, Kargwell (2015) also showed that improvement in entrepreneurship opportunities is potentiated by the digitalizing economies of the Middle East and Saudi Arabia. Al-Munajjed (2019) reported the rise of female entrepreneurs in event management, ICT, e-commerce, marketing, public relations and education, which is due to the proliferation of digital technologies in Saudi society. She further documented that commercial register in Saudi Arabia demonstrated 98,853 women in July 2018, which again exhibits the increased participation of women in business ventures developed with the help of digital technologies. These data corroborate the outcome of my study.

Reporting in agreement with the outcomes of this study, Statistical Data on Women Entrepreneurs in Europe, showed a rise in the entrepreneurship opportunities for women aspiring for careers in digital technologies. The report highlighted that with advent of digital era, the female entrepreneurs in Europe has risen by 30% which represents a massive leap for women aiming to increase family income (European Commission, 2014). Pappas et al (2018) reviewed literature in both developed and developed countries, and found that rate of women's businesses has increased due to the digital applications such as social media tools.

Moreover, they argued that social networks have created tremendous potential for women to establish their home-based small ventures. Another survey showed that women's participation in the online businesses has improved through the establishment of online shops. Women have more freedom to sell their own products with ease and flexibility bestowed by digital technologies on them. Similarly, in line with perceptions of participants in this study, Scuotto et al (2019) showed that shift is occurring from male entrepreneurship to females' entrepreneurship in creative industries involving design, music, crafts, fashion and publishing

due to digitalization of these industries in Italy. They concluded that digital technologies in the creative industries has opened up entrepreneurship opportunities for females all around the world, which is consistent with the outcomes of this study.

Many other studies have supported the finding of this study by referring to the emergence of entrepreneurial opportunities for women due to proliferation of information and communication technologies and adoption of digital media (Davidson and Vaast, 2010; Sarason et al., 2010). Sarason et al (2010) focussed on the inseparable relationship between the entrepreneurship and the opportunities to be created in the labour market under influence of digital technologies. Applying the arguments and thesis put forward by Sarason and her colleagues in the context of entrepreneurship opportunities for Saudi women due to proliferation of the digital technologies, there is a strong association between the exploitation of opportunities and availability of role models. If there are limited role models for enabling women to implement their business ideas, then the rate of translation of business ideas into practical ventures decrease (Mole and Mole, 2010). This suggests that if women will not be able to find the suitable role models in form of female entrepreneurs from their own localities in Saudi Arabia, the perceptions of participants about the availability of entrepreneurship opportunities can be challenged.

In the same way, participants' views about the opportunities in the area of establishing family enterprise can be challenged in the absence of the training opportunities and proper communication mechanisms between the industry and the women aspiring to develop careers in digital technologies. The structural theory as discussed in the chapter 3 explains the extent to which women aspiring for digital careers can avail the entrepreneurial activities created by digital technologies in Saudi Arabia.

Drawing on the tenets of structuration theory, the coordination between the women and the agencies (academic, government and business) also determines the ability of the women to achieve for what they aspire in the context of career opportunities (Mole and Mole, 2010). The

training and development opportunities for women aspiring for entrepreneurship is critically important for enabling them to exploit participate in the labour market. The detailed discussion on training opportunities as enablers for women to exploit the training opportunities will be offered in section 6.5.

The finding relating to entrepreneurial opportunities for female intending to follow careers in digital technologies was bolstered by Mathew (2010) who peeped into the entrepreneurship opportunities for women in the two Gulf countries: Oman and UAE, and reported that digital technologies have opened up the entrepreneurship's opportunities for women and men. The women, like their male counterparts, can participate in the business world and start their own ventures, however simultaneously, he signalled the cautious approach as the male dominance in the Gulf countries, which can reduce the ability to women to initiate their own business ventures.

6.2.3 E-marketing

The data from this study showed that e-marketing opportunities have become available for Saudi women to follow their careers in digital technologies. Crain et al (2016) highlighted the importance role of information and communication technologies in increasing the economic empowerment of women, and reducing the gender gap in the labour market. They argued that ICTs not only improved the empowerment of women in terms of expressing their thoughts on social issues, but it increased their prospects for earning income through the e-marketing. The data from this study also demonstrated the potential of social media in marketing of businesses. The employers have recognized the potential of ICTs in enhancing their revenues, therefore, they are looking for experienced human resources to advertise their products on social media. Several studies have highlighted the role of social media in advertising the businesses to larger inaccessible customers (Corrigan, 2015; Duffy and Pruchniewska, 2017; Kuehn and Corrigan, 2013). These data support finding reported in my study.

Gandini (2016) concluded that with advent of social media and ICTs, women in Middle Eastern countries, who are restricted to homes due to home responsibilities, are in better position to increase their income by adverting their own products or products from other companies on social media platforms. Jones (2016) called women workers working for advertising products for other companies as invisible workers, as they work in background for increasing their income. Some scholars have mentioned that women on social media may work for increasing their social exposure and increasing their own incomes. From the data presented in this study, participants noted the application of social media.

6.2.4 Call Centre Jobs

The findings revealed that call centres present the promising employment opportunities for women. Of note, this finding was derived from business participants who are supposed to have a sound knowledge of business needs, operations and suitability of employees. They reported the potential job opportunities for women aspiring to follow careers in digital technologies in the call centres. Call centres in this finding might have dual meaning; non-digitalized call centres and digitalized call centres. This makes the interpretation of the finding a bit difficult. However, I would preferably infer the digitalized call centres from the quotes relating to 'opportunities in call centres', which is mainly because of the nature of question and aim of my research project of which the participants were aware prior to the beginning of interviews. In addition, my question involved the opportunities arising from the digital technologies.

The simple operations of the call centres are not dependent on the state-of-the-art digital technologies. For example, contacting the customers via telephones or answering the queries of the customers through the telephones. However, with advent of digital technologies such as social media, the customers services provided via the call centres is undergone the digital transformation (Richardson and Howcroft, 2006). The desire for fastest and productive customer

service, organizations in public and private sectors have introduced or will integrate the social media element in the call centre-based customer services.

The employees in the customer services in the digitalized customer care centres use the social media tools such as Facebook, twitter, and mobile-based social media applications to become engaged with the customers regardless of the time and place (Chikandiwa et al., 2013). Koivunen (2011) argue that digital technologies-mediated operations at call centres are instrumental in increasing the flexibility in the employment terms for employees in order to deal with customers efficiently and productively. Noronha and D'Cruz (2009) posit that flexibility mediated through the social media tools and social attributes of women required for effective customer care make the call employment opportunities in call centres reality for women aspiring to follow careers in digital technologies. Scholarios and Taylor (2010) reported the increased proportions of women in call centres compared to men, which is due to greater ability of women in terms of providing social care to customers than that of men.

In addition, some studies have provided a direct evidence of potential of increased applications of internet of things (IoT) in the customers services for exchange of data about the customer' needs and the features of products (Haviland, 2020). IoT means a "network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data" (de La Bastide, 2018).

De La Bastide also reported the survey taken by Oracle and International Customer Management Institute (ICMI) which revealed that more than 350 executives and managers intend to install the IoT technologies at the call centres for management of customer's data efficiently and effectively. Oracle and ICMI further concludes that with potential applications of digital technologies such as social media, mobile messaging, live chats and IoT at customer care centres, the opportunities for women workers with skills and training in the digital technologies

are mostly likely to expand, thereby fostering the inclusive workplaces. These data are in line with the outcomes reported by my study. It must be acknowledged that job opportunities arising from the digital technologies will only depend on the extent of digital proliferation in call centres of different companies.

Glasgowski (2020) reported the most of companies are not well prepared to introduce mobile messaging, social media-supported communication, and Live chat for the customers in the Telcom, Financial services, E-commerce and utilities. These data suggest that women aspiring to follow digital careers in Saudi Arabia will only be able to exploit the employment if the management of main sectors including Telecommunication, e-government, E-commerce, financial services and travel will implement the digital technologies-mediated communication with the customers. It is possibility that companies participated in this study might have already installed or planned to establish the digital technologies-mediated communication with customers at their call centres. Participants from and academic group did not mention 'call centre related opportunities, which might indicate they were yet to implement the social media or other technologies to interact with customers.

The emergence of new employment opportunities due to proliferation of digital technologies at call centres will also bring some negative impact on the overall women inclusion in the workplaces. The women who would not be able to equip themselves with the skills of working through the digital technologies at digitalized call centres are mostly likely to suffer setbacks in Saudi call centres. Hence, right level of skills, qualifications, experience and training are critically important for harvesting the employment opportunities arising from the digital technologies at call centres.

6.2.5 Graphic Designing, Programming and Coding

The results showed that women have employment opportunities in different professions relating to web-deigning, programming, coding and application development. Most of the participants

who expressed these views came from the academic background, and some participants from the business background. The participants from the government did not mention the availability of graphic deigning, programming and coding for female, which might be due to being in government and their less exposure to such professions. The academic and business participants vehemently indicated the potential employment opportunities for women aspiring to follow digital careers in the graphic design, programming and coding.

Various reports showed that women's participation in the graphic designing is increasing, however, this growth of women in the programming and coding and application development is slow globally (Webster, 2014). Another study conducted by A List Apart organization surveyed 33000 web professionals from the USA and worldwide, and showed that web-designing profession consists of 82.8% male web designers and 16.1% female web designers, showing that web-designing profession is male-dominated, and carries potential for creative female web-designers to participate in the web-designing industry.

It was further demonstrated that female participation in the profession is on rise due to availability of more role models in both developed and developing countries (ALA Staff, 2008). Burns (2014) surveyed 7 most influential female web-designers from India, Canada, Norway, England and Korea, which expressed the most positive prospects for female web-designers in the web-designing industry for women aspiring to follow careers in digital technologies, which in consistent with the findings of this study.

Similarly, the programming, coding and application development areas have potential for women inclusion in the IT industry. Many studies have showed that female representation in the programming, application development and coding is lower than that of male counterparts, which attracts the female application-designers, programmers and coders to fill in the gap in the Tech Industry (Du and Wimmer, 2019; Zarret and Malanchuk, 2005). This is in line with my study, showing the participation of Saudi women in application development, coding and

programming is limited, nonetheless, the employment potential for female workers aiming to follow digital careers have arisen from the rapid deployment of digital technologies across a variety of sectors (e.g. banking, solar energy, health).

Without knowing the main drivers causing the low participation of women in the web-designing, application development, coding and programming, one cannot predict whether the Saudi women will be able to exploit the employment opportunities arising in afore-mentioned professions. One study showed that though the women are better than man at the artwork, but the only issue they face is the coding and programming for developing the elegant web-designs. The availability of training and female role models in the web-design industry are main drivers in motivating the women to participate in the web-design, coding, programming and application development professions. The outcomes of interviews with female leadership in different programming and IT companies in the UK clearly reflected a wealth of career opportunities for women in digital careers, especially in the web designing, coding and programming areas of Tech industry (Golpys, 2018).

In addition, the study concluded that women's participation in web designing, coding and programming areas is showing the increasing trend globally, through the growth is slower than expected by experts in Tech industry. The reason of low representation of women in the web-designing, programming and coding is that academic institutions and employers pay excessive attention to male tech. The report highlighted the number of women in web-designing, coding and programming can increase with positive attitude of parents, employers and academic institutions in changing the mind-set of women towards adopting the IT profession in the areas of web-designing, programming and coding (Golpys, 2018).

Taken together, the above literature reported in line with the findings of this study, that Saudi women have good career opportunities in the field of web-designing, programming, coding and application development. The demand of workforce is triggered by the rapid proliferation of

digital technologies across a range of business in both public and private sectors in Saudi Arabia under the umbrella of Vision 2030 aiming to transform the Saudi economy through digital technologies. The change in attitude of parents, employers, academic institutions and government policies is critically important for enabling the women aspiring for digital careers to exploit the employment opportunities in web-designing, coding and programming.

The limited female web-designers, programmers and coders as role models may have demotivating influence on the Saudi women aspiring to develop careers in the afore-said areas. The socio-cultural factors such as male dominance or stereotypical attitude of men towards women in Saudi Arabia may also pose additional challenges in the way of women aiming to participate in the web-designing, coding and programming professions. Thorough discussion on the male dominance and social-cultural factors as threats to the women's employment opportunities will be given in section 6.9.2_ 6.9.5.

6.2.6 Advanced digital Technologies

Few participants from academia mentioned job prospects for female in nanotechnologies, artificial intelligence, robotics, and solar technology. These opportunities might be related to the research opportunities, as only academics mentioned about them. Additionally, the foregoing advanced sectors of technologies are actively being researched globally, and women with high qualifications and expertise are required to play an active role in these areas. It also shows that participants from business and government groups did not show a deep understanding about the artificial intelligence and nanotechnologies and solar sector. The possible explanation for this limited understanding is that they were not from the business or government sectors directly dealing with nanotechnology, solar energy, robotics, and artificial intelligence. Furthermore, these areas are still under extensive research and development stages, and their applications are tested in limited organizations in developed countries (Webster, 2014; Brown, 2012). Participants in my study from Saudi Arabia, a developing country in the digital technologies,

might not be aware of the latest developments and their potential applications in the local industries and their resulting employment potential for Saudi women.

6.3 Employment Opportunities – Boon or Bane for Saudi women

The availability of employment opportunities in digital technologies does not come without banes for Saudi women, as the invisibly coercive and controlling strategies will still be planted by men to control the work of women in digital technologies. The recurring rhetoric from male participants in this study in relation to the home-based women's work in digital technologies is reminiscent of keeping the control over the women. This also implies that women working through ICTs can be scrutinized and monitored by male members through the very ICTs being used by women to work and contribute to the family income. This indicates the multilevel factors influencing the extent and limits of work to be conducted by women in digital technologies.

In response to a Sex and Power Report written by Jewell and Bazeley (2018), women rights activists pointed to the fact that despite the emerging employment opportunities for women globally, men will try to keep the reins of power and progress in their hands, and are more likely to make the progression of women at workplaces painfully slow. This phenomenon is more visible in male-dominated societies in Middle East including Saudi Arabia (Algerholm, 2018). Al-Asfour et al (2018) suggested reformation of organizations restructuring the family structures through political interventions in order to promote economic empowerment of women aspiring for digital careers in Saudi Arabia.

Women can gain economic freedom; but at the same time, they have to live under coercion of males in a family-structure. The economic liberty does not truly depict the social empowerment in real sense. Saudi Arabia enjoys the male-dominate society, where males are so-called guardians of women, and are responsible for making all decisions regarding their shelter,

education of children, and marriages of children regardless of opinions of women (Pharaon, 2004). However, situation has changed since the government's liberal stance about women's rights, though it will take a while to show the real change in women's status quo as workers or as independent citizens earning their income without excessive interference from males in families and workplaces (Thompson, 2015).

Digital technologies, as highlighted by this study, appears to be boon and blessing for Saudi for women, because it displayed a promising future for women aspiring for careers in digital technologies. Simultaneously, the perceptions of men in Saudi society seem to promote the home-based economic activities on behalf of men of Saudi society. This may restrain the true economic empowerment under the shade of digital technologies; and may be disadvantageous for long-term employment goals of Saudi women.

6.4 Shift from Conservativeness to Liberal Stance

The findings indicated that number of men are increasing, who agree to the notion of women taking up the employment opportunities arising from the digital opportunities, but there are still men who are keen to see women to stay in the home environment, and do whatever they can do to increase their family income. This indicates the shift from the conservative to the liberal approach of the men. For example, findings showed that some participants were of view of sharing of household responsibilities can be considered if the women are planning to work at homes or outside. As it was evident from the perceptions of many men from government, business and academia acknowledged the important role of women in contributing towards to the Saudi economy if they avail of the employment opportunities resulting from the digitalization of industries in the Saudi Arabia. However, there is a considerable proportion of the male participants from government, academia and business groups who still perceive that

women's top priority is the household, and cherish the conservative views in relation to the women's aspirations for following careers in digital technologies, as was evident from perceptions of participants in the Barrier section of Finding Chapter.

Many studies have reported the conservative nature of men towards women employment in Saudi Arabia, nonetheless, the men's perceptions towards favouring the women's digital technologies seems a blessing, which is happened due to digitalization of society (Thomspon, 2015; Al-Asfour et al., 2017). Previous research works have showed that digital technologies have contributed towards creation of open-minded societies, which embrace the fact that women are human beings, and deserve the empowerment in terms of expressing and implementing their own ideas (Barak, 2018; Chan, 2019). Though the shift of men's mentality from conservative to liberal was fast in the developed societies in Europe and America, nevertheless, it is too slow in the developing societies, especially in the Arab world (Sabbagh et al., 2012). The same observation was made by me through data collected from men participants in this study, that change is happening, but it is painfully slow.

The changing attitude of men towards consideration of women employment opportunities and support from the system (business, academic and government) in terms of emphasis on training and programs for skills development as indicated by outcomes of this study speaks of women's potential ability to exploit the employment opportunities in the future if training and skills programs will be implemented effectively (see sections 5.8) and social pressures will be relaxed (see section 5.9.1). The slow change in men's attitude to the women's work in Saudi society, is still a big threat to the women' capability in relation of achieving economic empowerment via the employment opportunities offered by digital technologies in Saudi Arabia. Sabbagh et al (2012) view that change of men's' attitude towards women's status in digital era is determined by extent and scope of digitalization of societies and economies. I agree with the preposition of Sabbagh et al (2012), and conclude that outcomes of this study signal a ray of hope for women aspiring to pursue careers in digital technologies.

Positive attitude of men towards the working of women as reported by this study was also supported by Bursztyn et al (2018) who revealed similar finding showing that vast majority of men in Saudi Arabia have privately support the participation of women in the labour market, however, they do not express this support publicly because they think that other men are not supportive of the women's participation in the labour force.

However, their experimental approach showed that when the men are informed of the positive approach taken by neighbours and other men, their belief about others were corrected, which ultimately affected their wives' decision of participating in the labour market. These data indicate that with digitalization of society, and flow of active information among Saudi men about the positive approaches taken by different Saudi men to their women in terms of working out of home can be favourable approach of increasing women's participation in the labour market created by digital technologies.

6.5 Entrepreneurship Training

Training and knowledge about how to develop the business plans and set up the small and medium sized businesses are critically important for women to become successful entrepreneurs (Mehtap et al., 2017). And this study found that training arrangements for entrepreneurial activities have been made at the institutional level in order to support the participation of women aspiring for digital careers in the digital technologies-mediated career opportunities in Saudi Arabia. The government, as revealed by my study, started the support in training and knowledge delivery through the workshops and courses about the businesses for women aspiring for careers in digital technologies.

All of participants recognized the role of training for enabling women to participate fully in the career opportunities created by digital technologies. This is in line with several other scholars who championed the empowerment for women stresses on the training for female entrepreneurs to provide them with sense of self-efficacy and confidence for running independent businesses.

Roomi and Harrison (2010) showed in similar Islamic context of Pakistan, that digital technologies have created opportunities for women but training was perceived to be great barrier in the way of exploitation of entrepreneurship opportunities. The women provided with training and education to create and run the businesses were willing to show greater enthusiasm to set up their start-ups compared to women without training and education. The study further showed that Islamic countries can make the training effective through establishing the women-only training centres where they can acquire self-efficacy, competency in accordance with socio-cultural norms and gender asymmetries. As Saudi Arabia is Islamic country and shared socio-cultural features with Pakistan, so I would agree to the outcomes reported by Roomi and Harrison in provision of training in entrepreneurship in women-only settings.

This study revealed the arrangements for training on behalf of government institutions such as the Ministry of Commerce, and the Ministry of Social Affairs have already initiated training, education and funds for women to run their businesses. Though the scale of such programs and efficacy in terms of training and establishing women as entrepreneur in Saudi labour market is still lacking in the literature. Nevertheless, the presence of training mechanism in the form of various governmental programs does indicate the availability of training avenues for gaining competencies, application for funds and establishment of start-ups. The training arrangements dedicated for women entrepreneurship in digital technologies is the step towards increasing women's participation in the labour market, so that women can contribute effectively to the digital economy as part of the Saudi Arabia's national development plan. Vision 2030 intends to boost the small and medium scaled organizations as vital players in the economic development, and encourages all citizens regardless of gender to participate in the economic growth of the country. Altokhais (2017) showed the establishment of Small and Medium Enterprise Authority (SME Authority) for managing the business loans for men and women under "Kafala Loan Guarantee Program" which can help young Saudi women to market their business ideas independently or in collaboration with

Similarly, findings from this study also revealed the willingness of the business organizations in Saudi Arabia to provide training in digital technologies for setting up their own online shops. The business organizations take advantage from such training programs in the form of creating more online business outlets where their products can be sold, while the women acquire the competency to gain the economic empowerment. This is reminiscent of the symbiotic relationship between the businesses and the society in which they operate (Fernández and Rajagopal, 2014). The question is that as to how many females have benefited from such arrangements with the business organizations. If this model is replicated by other organizations, then women would be able to gain self-efficacy and skills in managing their own business in partnerships with successful business models. However, partnerships with the business models run by mostly men in Saudi Arabia can pose additional challenges for women given the socio-cultural environment of Saudi Arabia. The home-based business in partnerships with family-related male members might be some opportunity for women who are lucky to enjoy males running their businesses. Hence, the real potential of women as entrepreneurs cannot be tapped in the absence of socio-cultural reforms with greater freedom in terms of expression and movement

Universities have also participated in training the women aspiring for digital careers in order to create business proposals, applying for funds and skills to run the digital-technologies mediated business successfully. For example, it was found by this study that the Business Entrepreneurship and Innovation Research Centre, Mehwar Program, and King Salman Institute for Entrepreneurship were the women-only centres involved in training women to gain entrepreneurial skills and competencies, and advice for women to design the business proposals in digital technologies. The women aspiring to be entrepreneur can easily use these opportunities for obtaining the necessary education and skills for establishing the digital technologies-dependent small and medium sized organizations.

Mehwar Program, as reported by Al-Munajjed (2019), endorses the business proposals from women in digital technologies or any other sector, and enhances the competencies and skills for running business ventures through the Innovation Academy. King Salman Institute for Entrepreneurship is established in King Saud University‘s Women Campus, and delvers the high-quality training and education for female entrepreneurs in digital technologies. She acknowledges the important role of universities-based training institutions and courses for women in building women’ entrepreneurial capabilities and encouraging their participation in the labour market as successful entrepreneurs. Due to different entrepreneurship programs initiated by universities and government has greatly influenced the motivation of women to initiate their businesses, which reflects the importance of training in enhancing the capability of women to exploit the employment opportunities created by digital technologies.

Taken together, findings from this study showed the availability of the training opportunities for female aspiring to be entrepreneur in digital technologies, which predict the enhanced capability of women to embark on the digital careers arising from the digitalization of Saudi economy and society. In addition, there is currently no data available to assess the effectiveness of training offered by programs mentioned by participants in this study to showcase the Of note, these findings cannot be generalized to all academic institutions and business models pursuing the training strategies for female in the women-only settings due to qualitative nature of this study.

Based on my experience and observations, there are still several female universities which are without training centres dedicated for female entrepreneurship. The establishment of training and education centres in women-only settings can contribute significantly in increasing the entrepreneurial competencies and skills for Saudi women pursuing careers in digital technologies. Therefore, the academic institutions can collaborate with other women universities in terms of giving support and advice to establish entrepreneurship training centres for females. In addition, businesses need to extend the training opportunities for females outside of the

marketing realm in order to encourage them and train them to initiate business start-ups in collaboration with female members in order to ease women to market their business ideas.

6.6 Training Opportunities through Collaboration between HRM Practices and Government

This study found that Saudi government' policies and cooperation with the businesses has played a key role in transforming the HRM practices towards upskilling and supporting the participation of women aspiring for digital careers in the labour market. This coincides with the existing literature on the government and HRM, which supports the role of government in almost all countries, though to a varying level, in shaping the HRM practices in both public and private organizations (Godard, 2002; Botero et al., 2004; Kuruvilla, 2006).

It was found by this study that government has introduced various funding and incentive arrangements for private sector in order to motivate them for employing the Saudi nationals including females. The females' employees are being trained under the government sponsored programs at the business organizations. This study found that Human Resource Development Fund (HRDF) program is one of the key government initiatives towards motivating businesses for recruiting, training and strengthening women's positions in the roles requiring digital training and competencies. HRDF program assumed the dichotomy approach in training the male and female citizens of Saudi Arabia with aim of building capabilities and developing skills of Saudi citizens, so that they can easily participate in the employment market created by digital technologies.

Another study indicated that HRDF offers the free training courses on digital technologies in collaboration with HRM departments of businesses, which served a vehicle for improving the retention of female employees in the citizens, and motivated women pursuing the digital careers to participate in the market. These data supported the finding of my study showing the role of

HRDF in upskilling women aspiring for digital careers and increasing their participation in the labour market.

Shoult (2006) argued that most of companies in Saudi Arabia are run by the local Saudi businessmen, and very limited proportion of foreign companies in the area of defence or engineering are available in Saudi Arabia due to business restrictions on the foreign investors. The local businessmen often run short of funds to improve the HRM practices in the area of employees' training. Therefore, the government support is a welcomed initiative for business community to partially support the training and skills development for male and female employees. This in turn boots the female participation in the labour market, which is the goal of the Saudi government.

Saudization policy was another program identified by this study, which is found to have potential of increasing the participation of women in the labour market created by the deployment of digital technologies in Saudi society and economy. This study revealed that rewards and funding warranted by Saudization Policy for the companies are dependent on the display of female employees on the training and employment register of the business, which indicates that Saudi policy not only serves as legislative framework but also a motivation framework for employers to focus on recruitment, training and retention of female employees.

The role of Saudization Policy in encouraging and motivating employers to train farmworker workers as discovered in this study is supported by many scholars who reported the positive impact of the recruitment, retention and training of female employees working in businesses (Al-Dosary and Rahman, 2005; Al-Asfour and Khan, 2014; Kiwan, 2013). These studies showed that Saudization Policy provides a legislative framework to companies for proving necessary training and skills to all Saudi employees with focus on female employees who are considered to be the most neglected human capital in the companies. Edgar et al (2016) reported in line with the finding of this study demonstrating the positive impact of Saudization Policy on the HRM practices including women employees' recruitment and retention in banking sector.

Kiwan et al (2013) signalled the dream of the inclusive workforce is only possible if the government refreshed Saudization policy in accordance with changing needs of the society, and accept challenge of implementing policies for promotion of inclusive workplaces.

There are two main approaches adopted by governments to streamline the HRM practices of the private firm, which are hard interventions and soft/normative interventions. The hard interventions appear in form of strict HRM rules and regulation, while the soft interventions aim to institutionalize the HRM practices which are considered to be good HRM practices by the government through the incentives and rewards to employers for adopting specific HRM behaviour towards employees (Kuafman, 1997).

Based on these approaches, it can be concluded that my study has found that soft interventions in form of Saudisation Policy and HRDF for creating favourable training and retention outcomes for the female employees pursuing careers in digital technologies. Soft intervention such as Inventors in People-UK (IIP-UK) and ISOs awards have won success in terms of encouraging employers to meet certain HRM development standards. Therefore, it is likely that HRDF and Saudization Policy can achieve success in terms changing belief of managers about upskilling and training women in digital technologies, thereby increasing the women employment.

The limitation of normative approach is that it does not legally bind the employers to adopt the desirable standards or behaviours, therefore, it can bounce back to the government (Schlumberger, 2000). Mellahi (2007) viewed that combination of normative and hard practices is the best solution to avoid failure in HRM initiatives of government. Based on these data, I would recommend that Saudi government should use the combination of normative and hard approaches for implementing the upskilling programs in digital technologies for women in the private sector. This will help avoid failure of the HRM development programs, and ensure the achievement of the objective of increasing women's contribution to digitalizing Saudi economy at larger scale.

I would also emphasize here that from the data presented in this study it is not clear as to which types of organizations are being considered by government for allocation of funds and support under Saudization Policy and HRDF. In addition, it is ambiguous to which extent female citizens of Saudi Arabia are being considered or recruited for training programs in technological areas. These ambiguities and uncertainties in data do reflect the limitations of the current study, and invite the separate research project on government sponsored programs at HRM and their role in improving the HRM practices in order to increase the digital competencies and training of women aspiring for digital careers.

The real danger in government sponsored HRM development programs identified in this study is that they are not well monitored and controlled as was evident from some participants comments discussed in section 6.9.4. which can limit the performance of such programs. Subsequently, the desired goal of increasing women's participation in the digitalizing economy through provision of training in digital technologies will not be fully achieved. Therefore, without strict controls and monitoring mechanisms, the success of Saudi government initiative for training g female employees at the companies cannot be guaranteed.

6.7 Training Opportunities through Collaboration between Academic Institutions and Businesses

It was found by this study that aura of cooperation between academic institutions and businesses exist in Saudi Arabia for training and upskilling female students and women employees. The results showed that universities are willing to provide library services and allocation of slots on different courses dedicated for female employees in industries, while the stakeholders from different industries in this study showed prospects for accepting female students in the internships programs allowing them to complete their final year projects in digital technologies. These arrangements raise the potential of equipping women with digital skills and training, so that they can participate in the labour-market created by the digital technologies.

Though provision of library services were not reported by all participants from the academic group, however, the initiative itself represent the positive sense of cooperation and supports the symbiotic relationship between female academia and industry. If this approach is replicated in all female academic universities, then strength of association between the industry and universities will not only be strengthened for exchange of resources, but it also will pave the way for higher entry of women aspiring for digital careers in the digitalizing economy of Saudi Arabia. In addition, this should be noted that provision of library services was reported by a single female academia participating in this study, and therefore, I cannot extrapolate this finding to all other participants from academia group.

Many other studies have showed the similar findings. For example, European Union has adopted the approach of striking collaboration between academic institutions and industries in order to provide the most needed digital skills and training to female employees (European Commission, 2017). Smith (2006) expressed that training provided by businesses to women in digital technologies most likely impact positively on motivation and participation of women in the labour market. Digibyte (2018) affirmed that exchange of resources between the academic institutions and industry can decrease the gender gap at workplaces, and is an important step to enhance the participation rate of women in the digital transformation of economies and societies.

According to Bassanini et al (2005), there is an intrinsic relationship exists between the academic institutions and the industry, which naturally drives the collaboration between these institutions within a given socio-cultural context. Both academia and industry are dependent on each other for satisfaction of their needs. For example, businesses are reliant on academic institutions for filling the knowledge gap of women employees through collaboration with academic institutions, while the academic institutions are in need of businesses for internships for female students, so that they can gain the hands-on experience in the industrial environment

(Ellinger, 2002). These measures are more likely to increase the employment prospects for women.

The issues relating to socio-cultural norms can affect the extent of collaboration between the educational institutions and the industry. The corporate world is male dominated, while the academic staff in female universities encounter difficulties in meeting men for signing collaborative initiatives with male dominated industries, This issue was highlighted by Tartari and Salter (2015) in the UK universities where female academic staff were found be less oriented towards making collaborative arrangements with industry compared to male counterparts in the universities.

6.8 Vocational Education and Training Opportunities

The findings reported the training opportunities at two levels: educational level in form training events organized by academic institutions for female students in order to train them for competing for employment opportunities resulting from the deployment of digital technologies in Saudi Arabia. It was found that academic institutions have in place good arrangements for providing training in vocational fields such as applied science, pharmacology, public health sector and IT. Interesting patterns were observed in relation to training arrangements.

The academic institutions were found to provide the vocational training to women employees from business, and women students aspiring to build careers in digital technologies without any affiliation to any business organization. Therefore, vocational education and training institutions appear to serve as bridge between the potential employees and the business world.

Several studies have acknowledged the role of vocational educational and training institutions in provision of employability skills to women with aim to reduce gender gap in the international labour market (Rainbird, 2009; Cooke, 2005; Bosch and Charest, 2009). Hence, it can be argued that with availability of vocational education and training opportunities in Saudi Arabia, Saudi

women stand a better chance to gain employability skills required by employers in the labour market created by digital technologies in Saudi Arabia.

It was discovered that Computer Science curricula are designed by academic institutions in line with the labour market. This theme was not found for other subject areas mentioned by participants such as medical and applied sciences. This shows that curricula of applied science and medical and health related education might not have updated in accordance with other subjects. As this was not the main research question to be addressed by this study, therefore, future research work needs to be planned to discover whether the training related programs and curricula follow the trends of labour market's needs. It is very critical to organise the vocational education and training for Saudi women in accordance with market needs which can determined through surveys of local and international employers' employability skills (Bosch and Charest, 2009).

Participants seem to agree to the fact that compatibility between vocational curricula and labour market needs is required for allowing women to pursue careers in digital careers. Bosch and Charest (2009) viewed that academic institutions can show productivity and contribute to national economy through providing training and education to students in line with the market needs. Another study reinforced compatibility between vocational curricula and labour market, which support the conclusion reached by my study (Van de Werfhorst, 2004).

Ozkanli (2007) found that working women in the Turkish universities were entrenched into their jobs due to attending vocational courses, thereby increasing chances for women to go up the ladder of progression and promotions. The vocational training provided by academic institutions in Saudi Arabia for women in areas of teaching, workshops in digital technologies might increase the similar employment and promotion opportunities for women. Murgor et al (2013) reported the technical and vocational training acquired by female in Kenya, and came to conclusion that vocational and training opportunities are available for women, but they are given the skills to apply numerical skills, critical analysis and interpersonal skills, though they

provided with IT skills. This situation led to a lower participation of women in the labour market. Hence, this underscores the focus of employability skills while organizing the vocational education and training systems in Saudi Arabia.

Interesting it was revealed by data some vocational training institutions send women to foreign universities to obtain vocational training. My personal observations also affirm this finding that several academic institutions are following lead of sending their women employees aboard to learn as to how to apply the digital technologies in various business contexts such as robotic technologies which were mentioned by participants in this study. Rainbird (2009) argued that UK-based vocational and training educational system enhances the learning experience of students, and aims to equip women students with essential skills valued by employers.

Some studies in Chine indicated that vocational education and training systems in Chinese and Australian academic institutions provide the vocational training and employability skills matching with regional national and global workplace settings (Potter et al., 2011; Cooke, 2005; Bosch and Charest, 2009). These data indicate that Saudi women given the opportunity to study in the internally recognized vocational education and training systems, have higher probability of participation in employment opportunities resulting from digitalization of Saudi economy and society.

Does the availability of technical and vocational opportunities for women ensure the increased participation of Saudi women in the labour market? There are two types of skills: non-digital skills (e.g. critical thinking, team work, interpersonal skill, communication) and digital skills. If the technical and vocational training opportunities for women enhances the digital skills, and are unable to foster non-digital skills, the participation of women in Saudi labour market can be compromised (World Bank, 2007; Foster, 2012).

There are some studies which showed that if women are not provided key skills in areas of communication, team work, interpersonal skills and critical analysis skills despite the provision of IT skills, it causes to reduce participation of women (Murgor, 2013; Kazilan et al., 2009).

Some other studies have reported the soft skills and digital competencies both are needed to reduce gender gap in the labour market (World Bank, 2006; Rahim and Hanafi, 2007). These data indicate the importance of some non-digital skills for participation of women in the labour market.

This is one of limitations of the data presented in this study, that it does not reveal different types of vocational and technical skills from training opportunities given to the women aspiring to pursue digital careers in Saudi Arabia. Hence, future study is required to investigate into the types of employability skills offered to Saudi women in vocational training institutions in Saudi Arabia. This will help find out the participation rate of women based on employability skills rather than building conclusions in relation to women's participation in Saudi labour market based on only availability of vocational training for women.

6.9 Barriers in way of Exploitation of Employment Opportunities by Saudi Women

In the previous sections, discussion was centred on skills development opportunities offered by government and academic institutions in collaboration with businesses and academic. Does organization of skills and training opportunities for Saudi women ensure the availability for and exploitation of job opportunities on behalf of Saudi women? Several scholars have acknowledged the importance and significance of social levers such as families, parents and husbands and mind-set of peers in motivating or demotivating women's decisions whether to join the labour market. Therefore, this study sets out one of its objectives of finding the potential barriers which can delimit the abilities of women to participate in the labour market generated by digital technologies in Saudi Arabia. In this section, the discussion on findings about the barriers in the way of women to exploit the employment opportunities in digital technologies is presented.

6.9.1 Men Stereotypical Attitude

The gender stereotypes which refers to the socio-cultural approach which is based on discrimination of separate roles and functions of men and women. The stereotype approach also attaches the element of 'masculinity' to certain roles, while some rules and functions are purely considered as feminine. This study found men's stereotypical attitude towards employment of women. It was discovered from data retrieved from many male participants that women have household duties and other duties such as taking care of children, and looking after elders. Therefore, they were against the working of women out of homes, and were of the view that if women aspiring for digital careers need to work, the work should be done at homes. Also, it was found by this study that women were considered more suitable for teaching jobs, while science, medical and engineering subjects are considered to be male-specific areas within society. These are classic observations of gender stereotyping promoting the segregation of functions for male and female within Saudi Arabia.

As long as gender stereotyping exists, the goal of Vision 2030 to increase women's participation in the labour market cannot achieved. Abalkhail (2017) demonstrated the issue of gender stereotyping in the way of women's motivation and participation in the labour market in Saudi Arabia. Several other studies have reported in line with outcomes from this study by showing that the gender stereotyping exists as a main barrier in taking up the employment opportunities outside of homes in different occupational contexts (Almansour and Kempner, 2016; Al-Asfour et al., 2017; Al-Ahmadi, 2011; Varshney, 2019). Nonetheless, the gender stereotyping seems to be universal issues, as it was not restricted to only Saudi context, several other studies have pointed out the presence of stereotypes of gender roles in more developed countries, through intensity of the stereotyping may differ between Saudi Arabia and developed countries.

The report of European Union (2018) showed that similar trend of men towards female status exists in Europe. It was discovered that 44% of European men perceive that women should dedicate all their energies in taking care of their homes and families. It was further reported that

in one third of European countries, around 70% of men hold the same perception about the status of women in society. OECD report (2017) on employment barriers for women in Middle East and North African countries corroborated the finding of this study, and showed that men's stereotypical attitude restricted access to the labour market and employment opportunities created by digital proliferation.

Al-Asfour et al (2017) claim that gender stereotyping in embedded in the Saudi cultural instead of being related to the religion. She argued that religious teachings champion the equality of men and women, but Saudi males are more protected towards men and expect their women to obey their decisions in all matters. The gender stereotyping may change in near future due to young generation being exposed to Western and American culture. The young men being educated by the Western universities have come up with more liberal stance towards employment of women, which is evident from the responses gathered from some males in this study (see Section 5.9.1). The participants who expressed liberal stance in relation to women's employment were discovered to be educated in the foreign universities. This indicates that upbringing and educational; context of men may be determinant of severity of the gender stereotyping in the strata of organizational management.

The perceptions of leaderships of the institutions and organizations taking part in this study is indicative of stereotypes which are probably developed as a result of traditional growth of employment relationships. According to Kiausiene et al (2011), the stereotypes emerging from the traditional development of employment relationships is the most difficult obstacle to be surmounted for creating a gender equality in the labour market. If the gender stereotyping is not dealt with nation-wide strategy by the government, then rate of participation of women in digital technologies-mediated labour market may increase, but the difference between genders will stay significant. This will ultimately impact the poor performance of Vision 2030 which aims to increase participation of women in the labour market by 40% by 2030. Organizations in public

and private sector should promote the liberal thinking of the men, and value the services and roles fulfilled by women in various situations in Saudi society.

Bursztyn et al (2018) experimentally reported that provision of active information about beliefs of men regarding women's employment from different sections of society seems to be an important action need to be taken in order to change stereotypical attitude of men towards the women's work in digital technologies. This can be done through conducting the experimental research works as done by Bursztyn et al (2018). Hence, the dissemination of liberal and privately supporting the liberal views about the empowerment of women can help change the stereotypical attitude of men, thereby increasing women's capability to obtain training and employment opportunities in the digital technologies-mediated labour market.

The gender stereotyping can be addressed through adopting the legal reforms and public policies promoting and accelerating the shift of socio-cultural norms which is already under way in Saudi society at slower pace, running diversity campaign on governmental levels in collaboration with public and private sectors for enhancing representation of women at workplaces in roles requiring digital skills and training, and challenging the gender stereotyping through engagement of male leaderships for championing the gender equality. These measures can enhance the participation rate of women pursuing careers in digital technologies in the labour market.

6.9.2 Gender Biases in Hiring Systems

It was also found by this study that there are more employment opportunities on military sector aviation, forensics and genetic engineering compared to women, which indicated that hiring and recruitment systems are designed to favour the men to the women. A study conducted by BSR Report (2019) demonstrates that gender bias is present in the hiring and promoting system which promotes the gender bias in business organizations. It further shows that 75,000 employment listings across the UK-based marketing and science industries were biased towards

men, while the job listings in the education and customer services were biased towards women. This is an example of invisible gender biases penetrating in the business world. These data corroborated the existence of gender biases in employment opportunities in different technologies-dependent industries as identified by this study. Saudi government needs to investigate into the gender biases embedded in the hiring and promotion system in both public and private sectors in order to discover the HRM practices promoting gender inequality, and form the laws and policies for discouraging the gender biases at the hiring and promotion levels. These steps may lead to elimination or reduce gender biases in public and private organizations, whereby leading to availability of employment opportunities created by digital technologies for women.

6.9.3 Family Pressures

Family pressures were found by this study as an active force restraining Saudi women's participation in the labour market resulting from the digital technologies. This finding was in line with outcome reported by Al-Ahmadi (2011) who showed that family pressures affected decisions of women to actively participate in the labour market. Varshney (2019) reinforced the outcome of this study by showing that guardians of the unmarried women and the husbands of married women exert a lot of pressure on women to stay away from employment opportunities out of homes. Several other studies have pointed to the family pressure as a barrier in preventing women's participation in the labour market (Alfarran et al., 2018; Ramady, 2010; Bosbait et al., 2005), which is in agreement with results from my study.

How does family pressure work on women's decisions to do or stay out of jobs? Bhakhali (2012) argued that contemporary Saudi family settings does favour the education women, but when it comes to employment of women, a sharp contrast is observed in the views of families. Many studies have described that family unit works as a family institution in Saudi culture, which is strengthened by male guardianship (Budhwar et al., 2010; Al-Asfour et al, 2017). The

male guardians are responsible for breadwinning, and set the social rules for women to obey them in order to keep benefiting from perks and privileges (shelter, protection, pocket money) associated with being a family (Al-Asfour et al., 2017).

This gives rise to a male guardianship system working to keep socio-cultural norms intact, and promote the stability of the Saudi social fabric. The family system in Saudi Arabia puts emphasis on the Saudi women's role as a mother and wife as a primary objective of family maintenance. If women are interested to work, then they are required to maintain a balance between family duties and work responsibilities. Hence, Saudi women are unable decide to do jobs independently, factually, their decision is more of a joint decision of family.

Due to strain between family cohesive and work, women most often have to quit jobs or drop the idea of employment out of homes in order to keep the family bonds cohesive. The Saudi women are required to prioritize cohesiveness of families over the personal interests of women in Saudi Arabia. Al-Harthi (2014) reported some women who preferred to stay at homes after completing their graduations, as family's pressures on them stopped them from searching for jobs, which corroborates the views of participants in this study. The data from my study also referred to the guardianship system as a main barrier in dropping their decisions to find employment in their areas of expertise in digital technologies, which confirm the existing literature showing family and guardianship as barrier in participation of Saudi women in the labour market (Suliman, 2017; Al-Harthi, 2014).

The Vision 2030 targeting to increase the women's participation in the digitalizing economy and society of Saudi Arabia cannot be improved until and unless reforms are made in the family-based guardianship system. The mere emergence of employment opportunities from the digital technologies cannot guarantee that such opportunities will actually be consumed. The family system is an important factor in women's decision to take up employment, which should be targeted by government to motivate parents/guardians to allow Saudi women to exploit employment opportunities.

I would acknowledge here that it is a daunting task to change the socio-cultural fabric of Saudi Arabia, but it is not an impossible either. Hard-hitting legislations and policies for reformation of family as an institution, introduction of innovative social norms on behalf of government and equal participation in the labour-market is more likely to promote the liberal and lenient approach of Saudi families towards women's employment in digital technologies. These measures can play a fundamental role in enhancing women's participation in the labour market, thereby boosting their roles as active agents in promotion of digital transformation of the national economy of Saudi Arabia.

6.9.4 Mismatch between Skills and Jobs

This found that employers gave reason of not employing the women for digital technologies-related roles because of the lack of required skills and qualifications. The mismatch between the skills of women candidates and job specifications can be a big deterrent for gender equality and exploitation of employment opportunities for females. This situation is not restricted to Saudi context, but was also reported by many other studies in other parts of world. PwC survey on technology, jobs and skills revealed that men are more actively involved in learning new digital skills compared to female counterparts, which can cause the under-representation of women in the employment opportunities resulting from the digital technologies (Plasschaert, 2019).

In line with finding from my study, Calvert and Al-Shetaiwi (2002) reported that employers are unable to find the young female workers with right digital skills in Saudi Arabia, which results in selection of male candidates for jobs requiring technical and vocational skills. McKinsey survey of young men and women also revealed the 40% of employers were of the view that lack of digital skills on behalf of women is the main cause of under-representation of women in the labour market created by digital technologies (Manyika, 2017). Several other studies undertaken in the Saudi context showed the similar finding by reporting that mismatch between

employment and skills for women is a major cause of gender disparities observed in the labour-market (Alfarran et al., 2018; Madhi and Barrientos, 2003; Samargandi et al., 2019).

These data reinforce the outcome of this study, and underpin the gap in digital skills as a main barrier for participation of Saudi women in the labour market evolving from the digital technologies. The mismatch between the women's digital skills and employers' needs is a reflection of the fact that educational system in Saudi Arabia is unable to keep pace with the changing needs of employers in the wake of digitalization of Saudi economy and society. This proposition is supported by several other studies undertaken in Saudi context (Bashehab, 2013; Baqadir et al., 2011). Therefore, I argued that the equipment of women with right level of skills in accordance with demands of employers can improve the employment opportunities for women aspiring for careers in digital technologies, and help overcome digital skills as barrier in the way of Saudi women for adoption of digital careers.

Though the results of this study highlighted the efforts and initiatives on behalf of the government, academia and businesses for training Saudi women (see Section 5.5), however the outcomes of these training initiatives will take some time to improve the existing gap of digital skills for women in Saudi Arabia. The development of digital skills of women will put a positive employment prospects for Saudi women pursuing digital careers. Of note, the success of the outcomes of training and skills initiatives initiated by government, academia and businesses can only be granted if other barriers such as family pressures, stereotypes, discriminatory government policies are removed. Otherwise, training and skills in digital technologies provided to Saudi women is not going to make a significant impact on women's exploitation of employment opportunities.

6.9.5 Inequality of Opportunities

It was found that government is in process of designing policies relating to equal opportunities for females in Saudi Arabia, which do indicate the possibility of equal opportunities for females

based on their skills and competencies in digital technologies. Perceptions of participants revealed the inequality of opportunities which was evidence from the variations in wages, maternity leaves, the lack of transportation and flexible work arrangements. The key to become successful in terms of finding employment or starting business ventures for women is to acquire the adequate level of training, so that they can compete with men for jobs in digital technologies.

Many participants' views were found in favour of training for women to exploit the employment opportunities in digital technologies. With development and implementation of equal opportunities along with normative HRM development approach of government, women pursuing careers in digital technologies will be in better position to gain economic empowerment. Several other scholars have reported positive role played by equal opportunities in different social contexts in establishment of inclusive workplaces. These data demonstrated that women's participation in the labour market created by digital technologies is not possible unless and until the equality of opportunity policy is developed and implemented in Saudi Arabia. Women in both developed and developing countries have encountered the issue of the inequality of opportunities in digital technologies, though the situation of inequality of opportunities for women is more visible in the developing countries (Agarwal, 2004; Hillbert, 2011; Krieger-Boden and Sorgner, 2018).

Thus, inequality of opportunity faced by women seems to be a universal issue in the labour market created by digital technologies. The countries using digital technologies for modernization of society and economies such as Saudi Arabia can boost the economic activity through incorporating the equality of opportunities policy at all levels of labour market resulting from proliferation of digital technologies, thereby allowing women to contribute effectively to achieve the desired economic input within short period of time (Suwana, 2017). Vision 2030 affirm to increase the participation of women in the labour market by 40% for country's' economic prosperity, which cannot be realized without establishing the legislative frameworks

to discourage the forces promoting inequality of opportunities in both educational and labour market-contexts.

Al Hareth, Y & Al Dighrir (2015) argue that Islam can be used as a tool for discouraging the inequality of opportunities for women in Saudi Arabia. Islamic teachings emphasize on equal work opportunities in controlled environment in science and medical disciplines. Using Islamic teachings, women were granted the right to obtain higher education which was not possible before 1970 (Al-Hariri, 1987). Islamic teachings also helped women to reach their potentials in higher education in Egyptian and Tunisian contexts (Megahed and Lack, 2011). Similar approach can be used by government to make legislations in accordance with Shariah which should bind employers to give equal opportunities for women pursuing digital careers in the labour market.

6.9.6 Childcare and Transport Issues

This study found that most of participants expressed the issues of childcare and transport in affecting their abilities to continue the existing jobs or explore jobs in the labour market. Many other studies have reported the reduced participation of women in the labour market due to personal issues such as child care and transport, which coincides with findings of this study (Syed et al., 2018; Alrowaithy, 2018). Participants in my study have suggested the establishment of childcare centres through collaboration between government and employers in order to increase the number of women at workplaces in Saudi Arabia.

Women participants in some studies conducted by Alghamdi (2014) and Al-Dehailan (2007) concluded that Saudi women expressed their willingness to join labour market if they are provided with childcare and transport facilities. These data indicate that both childcare arrangements and transportation to and from workplaces affect decision of women to participate in the labour force; they recommended building of enough childcare centres for helping women

to continue their existing jobs and encouraging other women to join the labour-market in Saudi Arabia.

Saudi society places a great emphasis on the roles of women to fulfil their duties towards bringing up children, which put the childcare duty in the centre of the women's responsibilities. The specification of gender roles inside and outside family was considered to be great barrier in disempowering women to participate effectively and independently in the labour market. Therefore, building sufficient number of childcare centres with assurance of good safety and education standards for children in the absence of mother can help empower women by solving gendered issues in Saudi Arabia in terms of taking up employment opportunities created by digital technologies (Alghamdi, 2014).

According to Islamic and cultural norms, women in Saudi Arabia are not allowed to travel alone or drive a car by themselves, which causes difficulties for women in commuting to the workplaces. Though government is planning to lift the ban on car driving and travelling alone by 2018, but the male guardianship will continue to act as a barrier restricting women's participation in the labour market (Al Asfour et al., 2017; Syed et al., 2018). Many studies have concluded that provision of travelling facilities in secure and comfortable environment without being mixed with male members of society can enhance prospects of women's participation in the labour market created by digital technologies (Metcalfe, 2007; Human Rights Watch, 2016; Elamin and Omair, 2010). Therefore, removal or reducing impact of transport must be achieved for allowing Saudi women aspiring to follow careers in digital technologies to participate in the labour market easily.

The government should utilize its existing legislative and policy frameworks such as Saudization Policy and HRDF to reserve funds for establishment of sufficient number of childcare centres. In addition, cooperation between employers, government and women rights organizations can join hands together in order to provide child care and transport facilities for working women in digital technologies-created labour market.

Government can achieve target of increased participation women in digitalizing economy through forming legislations and motivational policies for employers, women and families. In addition, the government should also make legislation for all employers in Saudi Arabia to provide adequate transport facilities for women employees in order to encourage families to allow women to do job and motivate women to join labour market created by digital technologies. The Ministries of Labour and other relevant government agencies can launch incentive schemes for employers to comply with legislations regarding the childcare centres and transport facilities. Moreover, Government can sign contracts with local transport companies (especially taxi companies to provide transport to working women at subsided rates in secure and comfortable environments.

6.10 Summary

This chapter has given the through discussion with the support of contemporary literature in the field of employment opportunities and digital technologies. The employment opportunities in areas of digital embroidery, designs, graphics, coding, application developments, e-marketing and entrepreneurship were reported by participants. However, the ability of Saudi women to take up these employment opportunities are dependent on appropriate level of skills, training and qualifications. This study found the commitment of government to foster participation of Saudi women in the labour-market generated by digital technologies. The cooperation between business and academia was reported, which is geared up towards upskilling Saudi women to exploit employment opportunities in digital technologies.

Similarly, the government was observed to be active with academic institutions and businesses for providing skills and training for Saudi women aspiring for careers in digital technologies. These data indicated that there is sufficient level of skills and training opportunities for Saudi women to increase their competencies in digital technologies, therefore, Saudi women appear to be in better position to participate in the labour market. Despite the sufficient training and skills

development opportunities, Saudi women can be disempowered by various socio-cultural issues including pressures from family members to perform household duties, men's stereotypical attitude in organizations demotivating women to stay away from workplaces, the availability of limited supporting infrastructure such as childcare and transportation facilities, unequal employment opportunities, and mismatch between skills and employers' needs.

The barriers appear to be strong, and must be dealt fiercely through hard-hitting legislations and policies for reformation and restructuration of workplaces and family mind-sets in order to realize the job opportunities created by digital technologies in Saudi Arabia. In addition, the skills and training programs needs to be aligned with the market needs through extending the level of existing cooperation between all three key stakeholders (academic institutions, government and businesses).

Chapter 7: Conclusion and Research Implications

7.1 Introduction

The main research questions raised in this study are given below:

- What is the role of government, business and academia in providing women with the digital knowledge and training in increasing digital skills they need to participate successfully in labor market in KSA?

- What do government, business and academia perceive to be the career/employment opportunities available to Saudi women that enable them to successfully participate in and contribute to the new economy created by the application of digital technologies?

- How do government, business and academia perceive the challenges facing Saudi women and what effect these challenges have on their success in a world of work dominated by information technology?

Using the qualitative approach, all of the above-mentioned research questions were addressed. More importantly, Giddens's structuration theory provided me with methodological procedures for undertaking this research, gathering and analysing data. The results were described in Chapter 5, while the discussion on findings were given in Chapter 6. The summary of the results is presented in the conclusion section, while implications of this research work for policy-makers (academic, government and businesses) are described in section 7.3. The limitations of the research work are presented in section 7.5. The directions for future research work have been illustrated in section 7.6.

7.2 Conclusions

The findings in relation questions as stated above revealed that participants believed that digitalization of the Saudi economy and society has created several employment opportunities for Saudi women aspiring for careers in digital technologies. Participants from business, government and academia groups expressed a deep knowledge of the basic digital technologies being proliferated as a result of the digital transformation of Saudi Arabia, and the resulting employment opportunities for Saudi Arabia.

The opportunities in the area of home-made embroidered products due to the digital technologies in graphics and textile designs. The computer-based graphics and designs blended with traditional floral patterns are in vogue in Saudi Arabia, and have boosted women's capabilities to market their products in different regions of Saudi Arabia in order to increase their income (Xue-ou, 2015; Kim, 2018). The employment opportunities in the areas of programming, coding, job centres, e-marketing, entrepreneurship and teleworking were reported in this study, which is supported by several researchers showing that the digital technologies disrupting the economies and providing employment opportunities for both men and women globally (Xu et al., 2018; Zhang and Chen, 2019).

However, few participants from academia mentioned job prospects for female in nanotechnologies, artificial intelligence, robotics, and solar technology. These opportunities might be related to the research opportunities in digital technologies, as only academics mentioned about them. Additionally, the foregoing advanced sectors of technologies are actively being researched globally, and women with high qualifications and expertise are required to play an active role in these areas. It also shows that participants from business and government groups did not show a deep understanding about the artificial intelligence and nanotechnologies and solar sector. The possible explanation for this limited understanding is that they were not

from the business or government sectors directly dealing with nanotechnology, solar energy, robotics, and artificial intelligence.

Furthermore, these areas are still under extensive research and development stages, and their applications are tested in limited organizations in developed countries. Participants in my study from Saudi Arabia, a developing country in the digital technologies, might not be aware of the latest developments and their potential applications in the local industries and their resulting employment potential for Saudi women. The reports indicated that overall percentage of women in the areas of artificial intelligence, solar energy and nanotechnologies in particular and in other areas mentioned previously is far lower than men, which is probably related to the overall lower participation rate of women in science, technologies, and engineering disciplines all over the world (Garcia-Holgado et al., 2019; Garcia-Penalvo, 2019; Saucerman and Vasquez, 2014).

Here, important question is whether Saudi women will be able to exploit the employment in digital technologies as reported in this study. Several researchers have come up with conclusion that women's lower participation in the employment opportunities created by digital technologies is mainly due to the lack of appropriate qualifications, skills and expertise in the relevant areas of digital technologies, which led to the gendered differences in the labour market (Grigoleit-Richter, 2017; Mishra, 2017). Therefore, the skills development and training programs are highly pivotal for Saudi women's abilities to exploit the job opportunities resulting from the digitalization of Saudi economy. Training and skill development for Saudi women was another important theme emerged during the data gathered from participants from all three groups.

Data revealed the interactions and collaboration between government and business, and academic institutions and businesses for providing the skills and competencies to Saudi women. It was found that HRM departments of local businesses are being transformed through the government policies and programs for increasing the skills and qualifications of existing and potential female employees. Participants from government and business groups asserted that

HDRD program and Saudization Policy were found to be important contributors to increasing Saudi women's participation in the labour market. Under HDRF program, government has launched funding and incentive schemes for employers in order to train and upskill women in respective digital technologies.

Furthermore, it was demonstrated in this study that academic institutions and businesses cooperate with each other. The cooperation was mainly detected in the areas in the internships for female students in digital technologies at the relevant business organizations, library services provided by some academic institutions to the employers for knowledge update, support for course selection and slots for employees in the requested courses represent the collaborative environment between academic institutions and business, which can provide a suitable environment for Saudi women to gain the training, skills and competencies in order to compete for employment opportunities in digital technologies.

The vocational education and training institutions were also reported to play their roles in upskilling Saudi women in digital technologies. However, data did not provide a deep insight into the areas of digital technologies in which skills and training are being provided by vocational educational and training institutions to Saudi women. Moreover, it was not clear from the data as to which vocational and technical skills are given to Saudi women as a result of vocational and technical institutions. These reflect weaknesses of this study. Future studies can be organised to answer the unaddressed questions in relation to types of technologies and skills which are being considered by vocational and technical institutions for Saudi women aspiring for careers in digital technologies. Several studies have acknowledged the fundamental role of vocational education and technical systems in increasing employability skills of both male and females to reduce the gendered differences in the labour market (Ozkanli, 2007; Van de Werfhorst, 2004; Murgor et al., 2013). The data showed that some skill development programs initiated by universities in collaboration with government and businesses in only female settings, which involved Mehwar Program for increasing digital skills and competencies of

women in female educational setting. This approach can be replicated across other academic institutions for motivating women and parents to join skills development programs and subsequently enhance their employment prospects in digital technologies.

Can simply the availability of employment opportunities and suitable training in digital technologies ensure Saudi women's participation in the labour market created by digital technologies? This study has reported the presence of different socio-cultural and family related pressures which can inhibit the government's efforts under Vision 2030 Program for increasing the participation of Saudi economy in the labour market. Men's stereotypical attitude recognizing the segregation of roles of women and men in the society was found strong among participants. The bias towards the working of women at homes in digital technologies could be detected clearly in participants' responses. Responses from Women's leadership from academic, government and businesses groups highlighted it a potential barrier in restricting ability of Saudi women to gain economic empowerment. The stereotypical attitude has been reported by many other studies in European cultures as well (European Union, 2018), which is more related to the ancient concept of women's role in caring of children and male members of society embedded in different religions and cultures. This demonstrates that discovering stereotypes in Saudi culture is not a unique cultural phenomenon, whereas it seems universal importance and need to be addressed in order to fulfil the objective of increasing Saudi women's participation in the labour market resulting from the digitalization of Saudi economy and society.

Gender biases in hiring system was described by participants in some professions which use the digital technologies such as engineering jobs, forensics and military and aviation sector, which can be disadvantageous for women aspiring for careers in digital technologies. For this comprehensive legislative approaches and campaigns for changing the mind-sets of leadership is needed (Fernandez and Rainey, 2006). Unfortunately, the current literature has given less attention to promoting women's employment at the leadership level within organizations, and existing studies have showed the far lower number of women in leadership level positions

compared to men globally (Adams et al., 2009; Sartore et al., 2007). Predominance of men at the leadership position is less likely to replace male stereotypes with leadership carrying diverse and liberal perceptions about inclusion of women in the labour market regardless of extent of digitalization of Saudi economy (Al-Asfour et al., 2017). Hence, future research needs to seek ways and means to overcome male stereotypes in Saudi society against out-of-home working of women. Islam can be used as a starting point for any campaign to support women's employment in digital technologies, as it embodies the doctrine of equal rights of men and women in an Islamic society.

The mismatch between skills and job criteria and the inequality of opportunities for Saudi women are found to be some other core barriers found in this study, which can derail all efforts and initiatives on behalf of government to increase women's participation in the labour market. Equal opportunities for women in digital technologies are not reported in literature for even developed countries, however, situation in developing countries like Saudi Arabia is worse than the developed countries. The lack of adequate childcare facilities and transportation to and from workplaces were reported to be some additional barriers preventing women to join the labour-market. Again, this emphasizes on the need of the serious social and institutional reformations at government, academic and business levels for creating transparent, fair and equitable system for empowering women to exploit employment opportunities based on their qualifications and competencies.

7.3 Implications for Policy-Makers: Government, Businesses and Academic Institutions

In this section, the implications for policy-makers including leaderships from government, businesses and academic institutions are presented.

7.3.1 Participation in the Training Programs

This study found a number of government level programs introduced by academia and businesses for training Saudi women in digital technologies. Government should monitor the performance of skills development regularly for women through the proper control and monitoring mechanism, possibly through the neutral third party-mediated monitoring mechanism. This will help ensure the high performance of government sponsored skill development programs in digital technologies for women (e.g. HRDF, Mehwar Program) within Academia and businesses in terms of increasing participation of Saudi women in the labour market.

7.3.2 Employers and Workplace Redesign

The inadequate infrastructure and design of workplaces for female employees were identified to be barriers in restraining the participation of women in employment opportunities resulting from digitalization of Saudi economy and society. In order overcome this barrier, the government should develop the Committees which may be responsible for funding and motivating employers for restructuring and redesigning of workplaces in accordance with permitted social norms involving separate washroom facilities, work benches, child-care arrangements at workplaces, and closely controlling the male and female mixing at workplaces. These measures can help alleviate the family pressures and gender stereotyping discouraging women to participate the labour market for pursuance of digital careers.

7.3.3 Social Media Campaign for Raising Awareness

This study identified several key resources which are either developed or developing for increasing the women's participation in the labour market such as existence of training

programs based at government level, academic and business, and women entrepreneurs. Ministries such as Ministry of Education, Ministry of labour and Ministry of Social Affairs should cooperate with specialists in businesses, established Saudi women entrepreneurs, and academia to run a social media campaigns informing Saudi women of the potential women role models and connecting women to the relevant facilities such as skill development programs, funding agencies, academia, and businesses for acquiring the right skills and training to compete for employment opportunities arising from the digital technologies. These steps may increase the women's capability to be connected to the right resources in order to realize their career goals in digital technologies. Subsequently the government will achieve its objective of Vision 2030 to increase the women's participation in the labour market.

7.3.4 Vocational Education and Training in Digital Technologies

Though this study found that vocational education and training opportunities are available for Saudi women aspiring to follow careers in digital technologies, but utilization of such opportunities may be compromised if women were not motivated to take up vocational training courses for improving their employment prospects in digital technologies. Participation rate of women to take up the vocational education and training opportunities should be increased through incentive program by Saudi government for women and arrangement of employers arranged workshops aiming to raise the awareness among women about the need of vocational education and training in digital technologies.

Existing government capabilities and programs such as HRDF and Saudization Policies should be used to motivate Saudi women to take up vocational training courses and vocational education training institutions to provide vocational education and employability skills with focus on both digital skills and non-digital skills (e.g. flexibility, self-confidence, communication, teamwork skills, creativity and problem-solving skills, interpersonal skills) as per requirements of the Saudi labour market. These steps are most likely to improve Saudi

women's employability skills in digital technologies which will result in increasing potential of women's participation in the labour market generated by digital technologies.

The curricula of vocational education and training programs should be geared towards realization of the employability skills gaps and shortages in Saudi labour market. One way to achieve this objective to identify the skills gaps through market-based surveys, active consultations between academic institutions and employers. The other way to achieve to fulfil the aim of providing labour market-oriented vocational skills in digital technologies is that vocational education and training institutions should also develop some labour market-based observatory mechanism in collaboration with administrators of Saudization Policy to record and report the behaviour of employers towards women candidates at the recruitment stage. This will ensure that women are not only given the right level of vocational education and skills at respective vocational education and training institutions, but also, they are not being discouraged at the recruitment stage.

7.3.5 Using Normative and Hard approaches for the Social Change

The government must acknowledge that changing the social mind-set is not as an easy process, instead it is long and difficult process, where the government, businesses and academia have a strong role of play. The positive approach should involve acknowledging the problem in the social mind-set, followed by willingness to change at the structural level, strong commitment for continuous hard work, and devotion of the necessary efforts and resources for increasing the women's participation in the labour market created by digital technologies. These measures will help create the inclusive workforces in the long term.

I would recommend that Saudi government should use the combination of normative and hard approaches for implementing the upskilling programs in digital technologies for women in the private sector. The normative approaches can involve offering incentives in the form of relaxation in taxes and promotion of businesses via governmental instruments to employer for

increasing diversity at workplaces, while hard approaches may involve penalizing the employers if the required standards and targets are not met in relation to increasing women's participation at workplaces.

7.3.6 Equal Opportunity

Though participants representing government group do believe that proper legislations for equal education, training and employment opportunities are documented as part of Vision 2030, but data does not provide an insight into the implementation of equal opportunities rule within the labour market. The barriers to participation of Saudi women in digital technologies as described in results chapter 5 section, 5.9 can be minimized by exercising the equal opportunity rule within the social structures. According to Giddens's structuration theory, social structures produce and reproduce practices to accommodate changes which are necessary for continuity of structure-agency stability. Based on this premise of structuration theory, the rule/practice of equal opportunity seems to be viable at social structures-level for accommodating the increased participation of Saudi women in the labour market in Saudi Arabia.

Equal opportunity policy should be developed and implemented across national institutions in order to allow women to harness the employment opportunities through participation in training opportunities, and subsequently securing employment in digital technologies. The mechanisms for improving equality of opportunities may include the development of legislative structures governing the flexibility of work allowing the part-time work, teleworking options for female meeting essential criteria for the employment in digital technologies. The establishment of independent equality agency should be set up in order to monitor the implementation of laws related to the equality of opportunity. Minimum wage, maternity leave and competitive pay should be legislated as additional mechanisms for promoting the equality of opportunity at workplaces in Saudi Arabia.

7.3.7 Gender Stereotypes

The gender stereotypes can be discouraged through the adoption of social policies and legal frameworks stimulating male family heads/guardians, male leadership at the top of organizations (business, government and academia) for removal of biases within social and employment systems towards the women pursuing careers in digital technologies. This help accelerate the shift in socio-cultural norms favouring women's employment in digital technologies.

The government should run a diversity campaign targeting the male leaderships in public and private organizations to champion the gender equality and for introducing the hiring and promotion systems which should consider giving employment opportunities to females based on the experience and qualifications of women pursuing careers in digital technologies.

7.3.8 Using Islam as Force against Stereotypes and Unequal Opportunities

As Saudi Arabia is an Islamic country, and Islam emphasizes on the equal job opportunities and strongly discourages any discriminatory approach against women in society. This can be an important tool for government to discourage the forces trying to reduce women's participation in the labour market. In addition, Government should consider the formulation of Committee involving Sharia scientists (Islamic jurisprudents), religious leaders/scholars, and leaders from Ministry of Religion, Ministry of Labour and Ministry of Social Welfare. The proposed Committee should run press media campaign for informing stereotypes in families and businesses of women's equal rights. The efforts from the proposed Committee is more likely dampen the effect of the gender stereotyping and family pressures on women's participation in the labour market resulting from digital technologies.

7.3.9 Changing Stereotypical Attitude of Men

The issue with less democratic societies is that people do not express their liberal thoughts due to fear of being chastised by others in the family. There is an evidence provided by Bursztyn et al (2018) in relation to privately liberal approach adopted by apparent stereotypical men for women's work out of homes. On being informed of the liberal approach taken by other men in Saudi society, the 'apparent' stereotypical beliefs were corrected in favour of allowing women to work outside. The information and communication technologies should be used to record and disseminate the beliefs of liberal men to cause a positive impact on decision-making for women's participation in the labour-market. This will help women to exploit the employment opportunities in the digital technologies.

7.3.10 Legislation about Family Reformation

I would acknowledge here that it is a daunting task to change the socio-cultural fabric of Saudi Arabia, but it is not an impossible either. Hard-hitting legislations and policies for reformation of family as an institution, introduction of innovative social norms on behalf of government and equal participation in the labour-market is more likely to promote the liberal and lenient approach of Saudi families towards women's employment in digital technologies. These measures can play a fundamental role in enhancing women's participation in the labour market, thereby boosting their roles as active agents in promotion of digital transformation of the national economy of Saudi Arabia.

7.3.11 Childcare and transport facilities

The government should utilize its existing legislative and policy frameworks such as Saudization Policy and HRDF to reserve funds for establishment of sufficient number of childcare centres. In addition, cooperation between employers, government and women rights

organizations can join hands together in order to provide child care and transport facilities for working women in digital technologies-created labour market.

Government can achieve target of increased participation of women in digitalizing economy through forming legislations and motivational policies for employers, women and families. In addition, the government should also make legislation for all employers in Saudi Arabia to provide adequate transport facilities for women employees in order to encourage families to allow women to do job and motivate women to join labour market created by digital technologies. The Ministries of Labour and other relevant government agencies can launch incentive schemes for employers to comply with legislations regarding the childcare centres and transport facilities. Moreover, Government can sign contracts with local transport companies (especially taxi companies to provide transport to working women at subsided rates in secure and comfortable environments.

7.3.12 Religious and Tribal Norms for Increasing Women's Participation

Barriers against women' participation in the labour market as reported in this study may differ in intensity based on the tribal norms, regional culture and typical thinking about women's status, and class and status-related differences. Therefore, policy-makers should recognize these differences while planning legislations and policies for reducing the impact of barriers on women's participation in the labour-market created by digital technologies.

Otherwise, efforts to increase women's ability to exploit employment opportunities in digital technologies may backfire. The well-planned and cautious approach (see section 6.4) on behalf of policy-makers may pave the way for increased women's participation by changing the mind-set of Saudi society as a whole, thereby ensuring the achievement of Vision 2030's target in relation to contribution of women to Saudi economy.

7.3.13 Training Opportunities in only Female Educational Settings

The country socio-cultural norms include the segregation of men and women in educational and workplace environment. These norms should be respected. Fullan (2006) described that most of the change initiatives fail because they try to change the basic ideologies of the workers or stakeholders involved in the changed. Therefore, any change radicalizing social settings such as creating mixed workplaces or mixed training and skills development centres for women should be avoided in order to increase the willingness of the guardians of women (father, brothers, and husband) to allow women to participate in the skill development programs mentioned by participants in this study. The best example reported in the data reported in my study included training centres at female campus of King Saud University. Such arrangements should be relocated at every female campus for motivating Saudi women to join their local skills centres without travelling to far-off women's skills development centres.

7.4 Contributions to the practice

Findings from this study contributes to the practice by proposing plan, which if implemented properly at the social structures' level, can lead to an increased participation of Saudi women in the labour market created by proliferation of digital technologies in Saudi Arabia. Structuration theory which guided the methodology and data analysis of this research is extended to propose the blueprint of the Women-Employment in Digital Technologies Promoting Structuration (WEDTPS) theory in the context of Saudi Arabia, which can be used to inform practices and policies regarding an increase in participation of Saudi women in digital technologies-generated labour market.

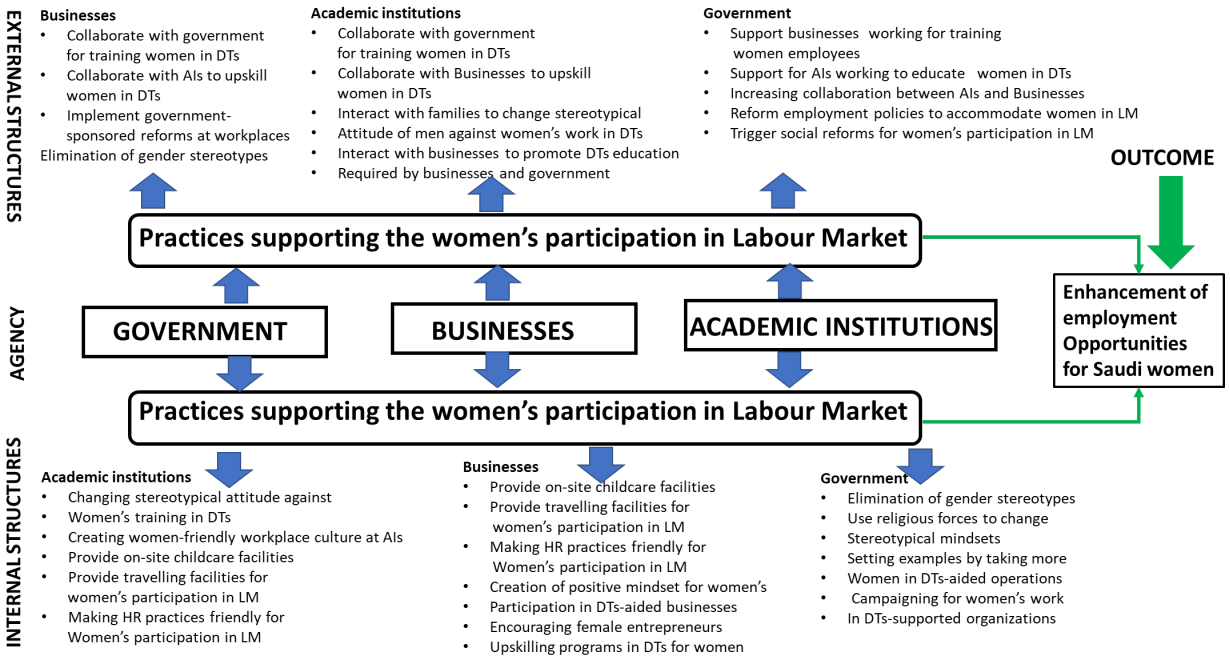


Figure 7. 1: Women-Employment in Digital Technologies Promoting Structuration (WEDTPS) Theory for Improving Practices Leading to an Increased Participation of Saudi Women in Digital Technologies-Generated Labour Market.

The components of the proposed WEDTPS are described below:

7.4.1 Agency

The WEDTPS theory puts agency in the centre stage, as it provides a mechanism for formulation, interpretation and implementation of the polices regarding the rate of participation of Saudi women in the labour market created by digital technologies in the context Saudi digitalizing economy and society. In this study, participating agents operating business, government and academic groups form the core of thesis which can enhance the impact of digital technologies on Saudi women in the form in not only increasing the employment opportunities for women but also enabling women to exploit the employment opportunities available in the labour market created by digital technologies by minimizing the impact of barriers for Saudi women.

7.4.2 Internal Structures

Agreeing to the concepts of Giddens's structuration theory as presented in Chapter 4, the social structures have two layers: internal structures and external structures which are shaped and maintained by the agents who are part of the social structures. The internal structures represent the specific knowledge and strategic orientations which are followed by agents to perform their organizational functions or institutionalized practices, while the external structures result from the exercise of position-practice relations which are affected by the power dynamics and relationships with other organizations.

The internal structures in WEDTPS theory helps to create the amicable environment internally for employing Saudi women in digital technologies by changing the mind-sets of the leaders of organizations occupying higher positions with organizations and are responsible for setting strategies, arranging resources, determining social identities for employees for within organizations. Therefore, internal structures emerging from the dataset constitute an important part of WEDTPS theory for enhancing the Saudi women's participation in the labour market created by digital technologies. Within context of academic, business and government groups, the internal structures can be shaped through the change in stereotypical attitude against women's participation in DTs, which is also expressed by participants in this study. Secondly, creation of women-friendly workplace culture at academic, government and businesses-related organizations.

The participating organizations and other organizations working in similar contexts and operational modes can also arrange on-site childcare facilities and transportation for women aspiring for careers in digital technologies. These policies can help motivate women, both existing and potential female employees, to participate in the labour market. The government and businesses may introduce HR-based policies favouring recruitment of women with matching digital skills or upskill the existing women employees to take up the employment positions in digital technologies. The elimination of gender stereotype is key for all

participating organizations for enabling women to take up the employment opportunities in technologies, as it may turn into the great obstacle for reducing the rate of participation of women in digital technologies-mediated labour market in Saudi Arabia. The internal structures relating to the introduction of campaigns for promoting women in digital technologies-related workplaces on behalf of businesses and government and academia may produce some useful outcomes for increasing participation of women in digital technologies.

7.4.3 External Structures

The external structures arise from the powers employed by the leadership of organizations to implement the policies and practices. In the context of this study, the participating groups in this research may create a collaborative culture which can benefit Saudi women in gaining the right level of skills, so that they can compete for taking up the employment positions in digital technologies. The major barrier found in this study may be the lack of appropriate skills and competencies in digital technologies. The government may collaborate with both academic institutions and businesses in order to upskill Saudi women in digital technologies which may cause an increased motivation among women to join labour market created by digital technologies.

Additionally, academic institutions are closer to the families than the governmental and businesses organizations, therefore, they may assume a proactive role in communicating with male members of families in order convince them for allowing their female members of their families to gain skills in DTs and enjoy some economic benefits through their participation in the digital technologies-created labour market. Businesses and government institutions may help academic institutions in running the communications campaigns. Moreover, the reforms relating to employment for Saudi women in DTs should be made in order to increase participation of Saudi women in the labour market.

The training for Saudi women in digital technologies can be made possible through collaborative projects between businesses and government and academic institutions and businesses which was evidenced from the perspectives of participants in this study. Social reforms for elimination of stereotypes and biasedness against the women's women in digital technologies may be ensured in order to remove barriers in the way of taking up employment opportunities in Saudi Arabia. The government, business and academic groups can cooperate to bring up a change in social mind-set favouring the women's employment in digital technologies in Saudi Arabia.

7.5 Limitations of Study

The limitations of this study are outlined in this section.

7.5.1 Data Limitations

I would emphasize here that from the data presented in this study it is not clear as to which types of organizations/sectors are being considered by government for allocation of funds and support under Saudization Policy and HRDF for training Saudi women in digital technologies (see section 5.9.3). If sectors of services/businesses to which government directs funding would have mentioned, these data might have led to assess the patterns of women's employment opportunities in digital technologies across different sectors. In addition, though there is an evidence supplied by data that women are being recruited for training in digital technologies, but it is ambiguous to which extent female citizens of Saudi Arabia are being considered or recruited in training programs in digital technologies. Does Saudi women from different strata of society or from those areas with developed population such as capital city Ryadth, Jeddah? Are Saudi women from rural areas part of recruitment or training in digital technologies? These ambiguities and uncertainties in data do reflect the limitations of the current study, and invite the separate research project on government sponsored programs at HRM and their role in

improving the HRM practices in order to increase the digital competencies and training of women aspiring for digital careers.

The data in this study does not provide an insight into the household responsibilities of women's participants from business group, academic group and government group. The perceptions of women's participants who are working might be affected by the changes in household arrangements such as care-takers employed at homes for taking care of children or homes.

One of weaknesses of this study is that data could not reveal different types of vocational and technical skills from the training opportunities given to the women aspiring to pursue digital careers in Saudi Arabia. Therefore, caution should be taken to overstretch the conclusion in context of participation rate of Saudi women in the labour market to take up employment opportunities based on data about the technical and vocational training opportunities as revealed in this study.

The policies of government, academic institutions and businesses are constantly evolving due to the greater liberal stance promised by Saudi government favouring women's participation in the labour market under Vision 2030 program. This suggests that policies and arrangements described by participants in this study might subject to changes in response to further sociocultural and economic reforms to be introduced by the Saudi government such as freedom for women to drive cars and travel without male guardians. Therefore, interpretation of data presented in this study should be done cautionary in evolving socio-cultural and political contexts favouring Saudi women to participate in the labour-market created by digital technologies.

7.5.2 Generalizability

This study does not control or provide any data regarding the level of exposure of participants to digital technologies during their careers. I argued in my methodology chapter 4 sections, 4.5 &

4.6, participants perched at the leadership positions and part of handling the digitalization wave in their respective organizations, and have a wide experience of planning, implementing and evaluating the digital technologies in their relevant industry. Therefore, there are strong grounds for believing that their perceptions about the employment opportunities and challenges for women aspiring for digital careers represent the market conditions evolving from the digitalization of Saudi economy and society. This assumption should be kept in mind for interpretation of data from this study in different industrial context. This may affect the generalizability of the outcomes to similar organizations.

In addition, the outcomes from the qualitative studies cannot be generalized due to context specific issues. The context of different organizations in terms of culture, mode of operations, and variations in the levels of exposure of leadership to differing digital technologies limit the generalizability of outcomes to public and private organizations working in different domains than what are included in this study.

7.6 Directions for Future Research

The directions for future research are discussed below:

- The future researcher should lead an enquiry into exploring the interactions between the Saudi women aspiring for careers in digital technologies and the private sector organizations in order to draw a real picture of women's participation in the labourmarket created by digital technologies.
- These ambiguities and uncertainties in data invite the separate research project on government sponsored programs at HRM and their role in improving the HRM practices in order to increase the digital competencies and training of women aspiring for digital careers.
- This study focused on perceptions of institutions in terms of employment opportunities for Saudi women arising from digitalization of Saudi economy. Another study is

required to explore perceptions of women aspiring for digital careers in science, and engineering disciplines to identify the enablers and disablers for women's participation in the labour market generated by digital technologies.

- This study detected a slight shift from conservative approach towards the liberal approach of organizational leadership participating in this study towards out-of-home working of women in digital technologies. Bursztyn et al (2018) has showed using the experimental approach that Saudi men were reluctant in favouring their wives; decisions to work out of home due to fear of sarcastic remarks from neighbour or other family members, even though they were supportive privately of the participation of women in the labour market. The beliefs of men were corrected after being informed of other men's positive attitude towards women' work out of home. This approach should be used by conducting more research works as conducted by Bursztyn et al (2018) in order to correct the belief of men about women's participation in the labour market.
- It was found that some subjects such as IT are designed in line with labour market, but there was no evidence in relation to the alignment of applied science and health/medical training curricula in accordance with needs of labour market, therefore, future research work should be planned to explore the extent to which training curricula fulfil the market needs. This is important because the women with competencies and skills required by labour market will be in better position realize their dream of pursuing successful careers in digital technologies.
- A future study is required to investigate into different types of employability skills offered to Saudi women in vocational training institutions in Saudi Arabia. This will help discover the participation rate of women based on employability skills offered to women by Saudi technical and training institutions rather than just speculating women's participation based on data relating to training opportunities for women as presented in this study.

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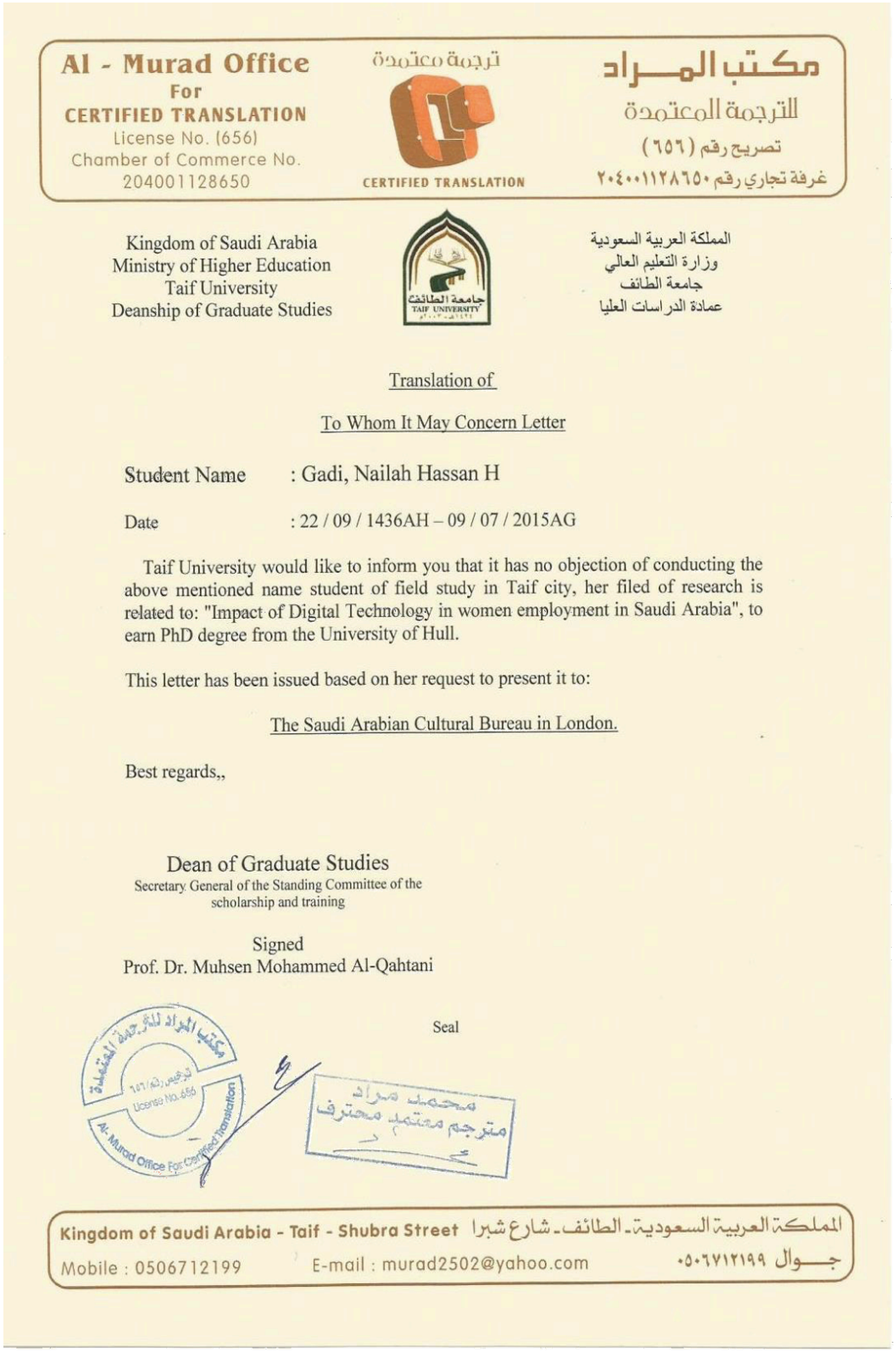
Appendices

Appendix (1): Permission



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Kingdom of Saudi Arabia
Ministry of Higher Education
Taif University
Deanship of Graduate Studies

جامعة الطائف
TAIF UNIVERSITY

المملكة العربية السعودية
وزارة التعليم العالي
جامعة الطائف
عمادة الدراسات العليا

Translation of

To Whom It May Concern Letter

Student Name : Gadi, Nailah Hassan H

Date : 22 / 09 / 1436AH – 09 / 07 / 2015AG

Taif University would like to inform you that it has no objection of conducting the above mentioned name student of field study in Taif city, her filed of research is related to: "Impact of Digital Technology in women employment in Saudi Arabia", to earn PhD degree from the University of Hull.

This letter has been issued based on her request to present it to:

The Saudi Arabian Cultural Bureau in London.

Best regards,,

Dean of Graduate Studies
Secretary General of the Standing Committee of the scholarship and training

Signed
Prof. Dr. Muhsen Mohammed Al-Qahtani

Seal

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محمد مراد
مترجم معتمد محترف

Kingdom of Saudi Arabia - Taif - Shubra Street المملكة العربية السعودية - الطائف - شارع شبرا
Mobile : 0506712199 E-mail : murad2502@yahoo.com جوال ٠٥٠٦٧١٢١٩٩

Appendix D

Sample Consent Form

UNIVERSITY OF Hull

UNIVERSITY OF Hull

Business School

RESEARCH ETHICS COMMITTEE

CONSENT FORM: SURVEYS, QUESTIONNAIRES

I am Dr. Muhsen Mohammed Al-Qahtani, Dean of Graduate Studies- Secrerary General of the Standing Committee of the scholarship and training) , University of Taif

Hereby agree to participate in this study to be undertaken

By Nailah Gadi

and I understand that the purpose of the research is (Exploring the impact of digital technology On women's employment in Saudi Arabia)

I understand that

1. Upon receipt, my questionnaire will be coded and my name and address kept separately from it.
2. Any information that I provide will not be made public in any form that could reveal my identity to an outside party i.e. that I will remain fully anonymous.
3. Aggregated results will be used for research purposes and may be reported in scientific and academic journals (including online publications).
4. Individual results **will not** be released to any person except at my request and on my authorisation.
5. That I am free to withdraw my consent at any time during the study in which event my participation in the research study will immediately cease and any information obtained from me will not be used.

Signature: Prof.Dr. Muhsen Mohammed Al-Qahtani

Date: 29-7-2015

The contact details of the researcher are: 07429029573 - 00966505795489

The contact details of the Module leader are: 00966555706485

In some cases, consent will need to be witnessed e.g. where the subject is blind/ intellectually disabled. A witness must be independent of the project and may only sign a certification to the level of his/her involvement. A suggested format for witness certification is included with the sample consent forms. The form should also record the witnesses' signature, printed name and occupation. For particularly sensitive or exceptional research, further information can be obtained from the HUBS Research Ethics Committee Secretary, e.g., absence of parental consent, use of pseudonyms, etc)

NOTE:

In the event of a minor's consent, or person under legal liability, please complete the Research Ethics Committee's "Form of Consent on Behalf of a Minor or Dependent Person".

Business School

Appendix (2) : Interview Questions

Government interviews

Interview date:

General information about the interviewers:

- The concerned: Governmental – Academia - Business

- Interviewer's code or name:

- Location:

- Gender:

- Age:

- Educational level:

Occupation:

Training:

All interviewers (For general opinions - trends - on key issues)

- The government has a for plan economic diversification. How can you see the role of women in this plan?

- The new global economy requires skilled workers in science, technology, engineering and mathematics. What is your view on neutral curriculum in education?

- The digital technology converts the workplace. What is the role you deem appropriate for women in the workplace?

- Communities all over the world have become more liberal with the new roles and opportunities for women. What is your opinion regarding issues such as gender equality, equal in rights and child care services, equal wages and job options?

Government Environment

- What are the assumptions of human resources in the official national economic plan?

- What is the role that technology will play in the economic diversification?

- Does the participation of women in the labor force play a major role in this plan?

- What is the business strategy for Employment of women?

- How the government plans to tackle the problem of unemployment among females?

- What is the government's policy in teaching science, technology, engineering and mathematics for females?

- As part of a national economic strategy, what are the education requirements for the production of future labor with the necessary knowledge and skills to meet the needs of work?

- What are the government's professional and vocational training and skills policies?

Open question - Please give examples special educational plans for females?

- What is the education plan that must be prepared for the special skills required for the age of technology?

- What is the government's policy with regard to women's rights and equality issues in wages and employment, health, transportation and so on?

(Representatives of the business community and organizations)

- What are the human resources policy in the private sector companies in Saudi Arabia about the employment of women?

- What are the available neutral career opportunities for both genders? What is the provided training?

- What is human resources policy and practice in issues of gender equality and equal pay?

What is the impact of government legislation on employers in hiring women? The nature of work, transportation, security, etc...

- What are the plans of private sector companies (both multinational, and small and medium enterprises companies (small, medium)) for the implementation of technology applications in business, including robot, 3D printing, laser technology, genetics, and programming, etc.?

- What are the available professional technological opportunities for women? What is the provided training and skills of development?

- In the technology sector in Saudi Arabia, What are the available opportunities for women?

The Academia (Representatives of secondary education, and university, colleges and professional training)

- What are the teaching technological skills policy (including the codec) and materials science, technology, engineering and mathematics?

Open question: so how did female Curriculums include these topics?

- How do universities provide technology, engineering and mathematics science for females?

- What is the university's policy with regard to the supply of new students with the necessary knowledge and skills for the new economy?

- How does the university provide support and opportunities for students so that they can contact the business network?

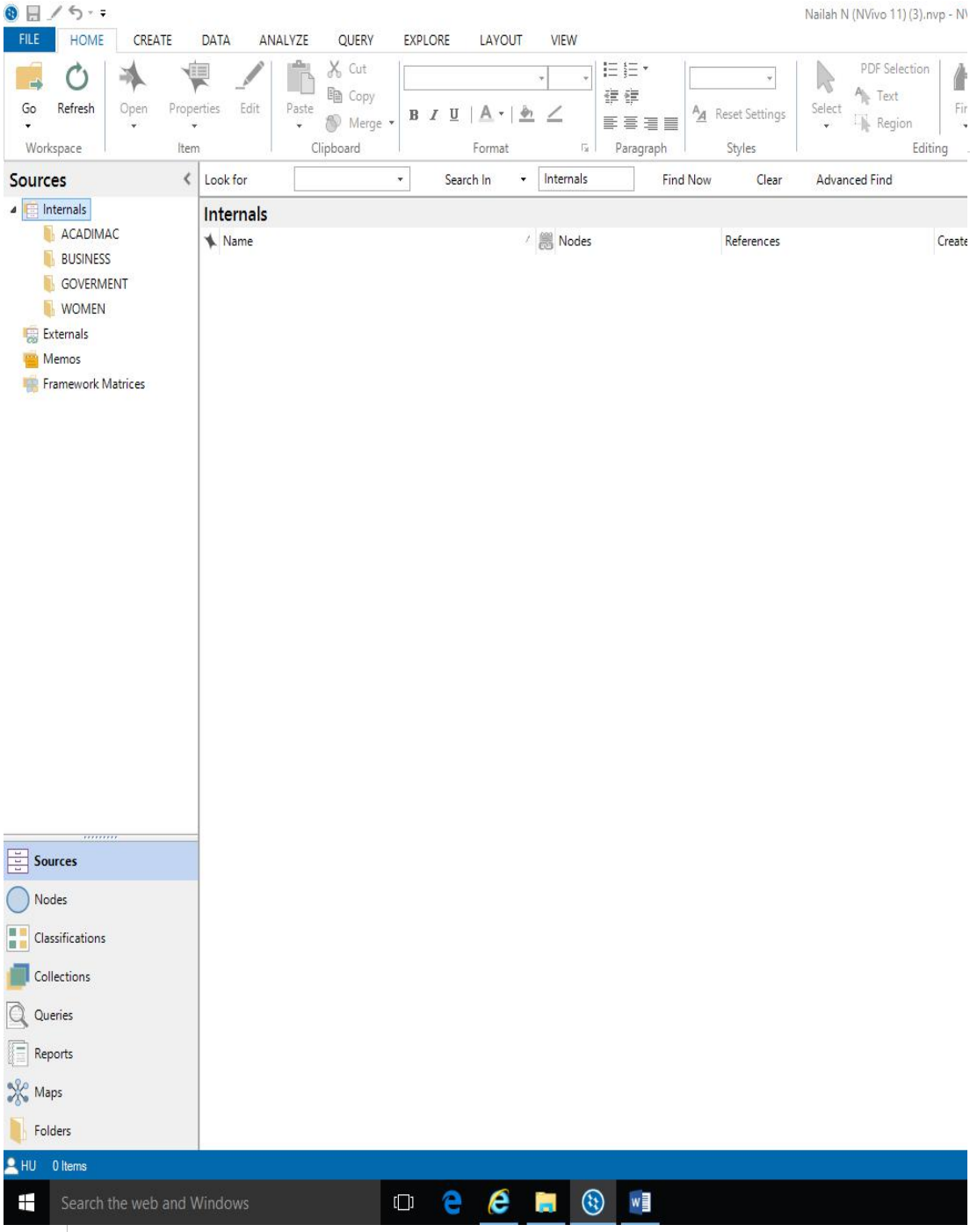
- What is the professional training available for females?

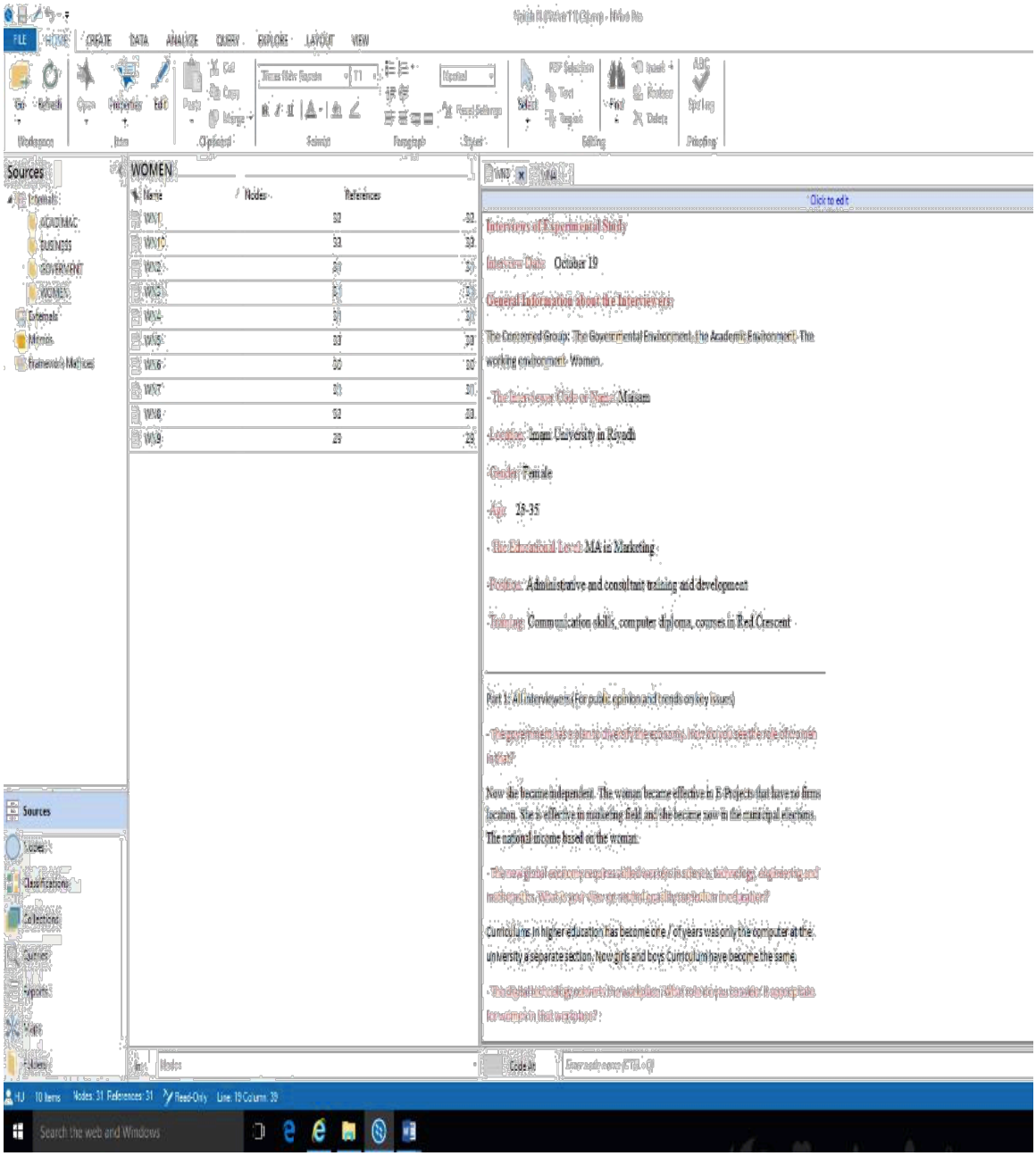
Open question: How did government or Academy programs providing skills

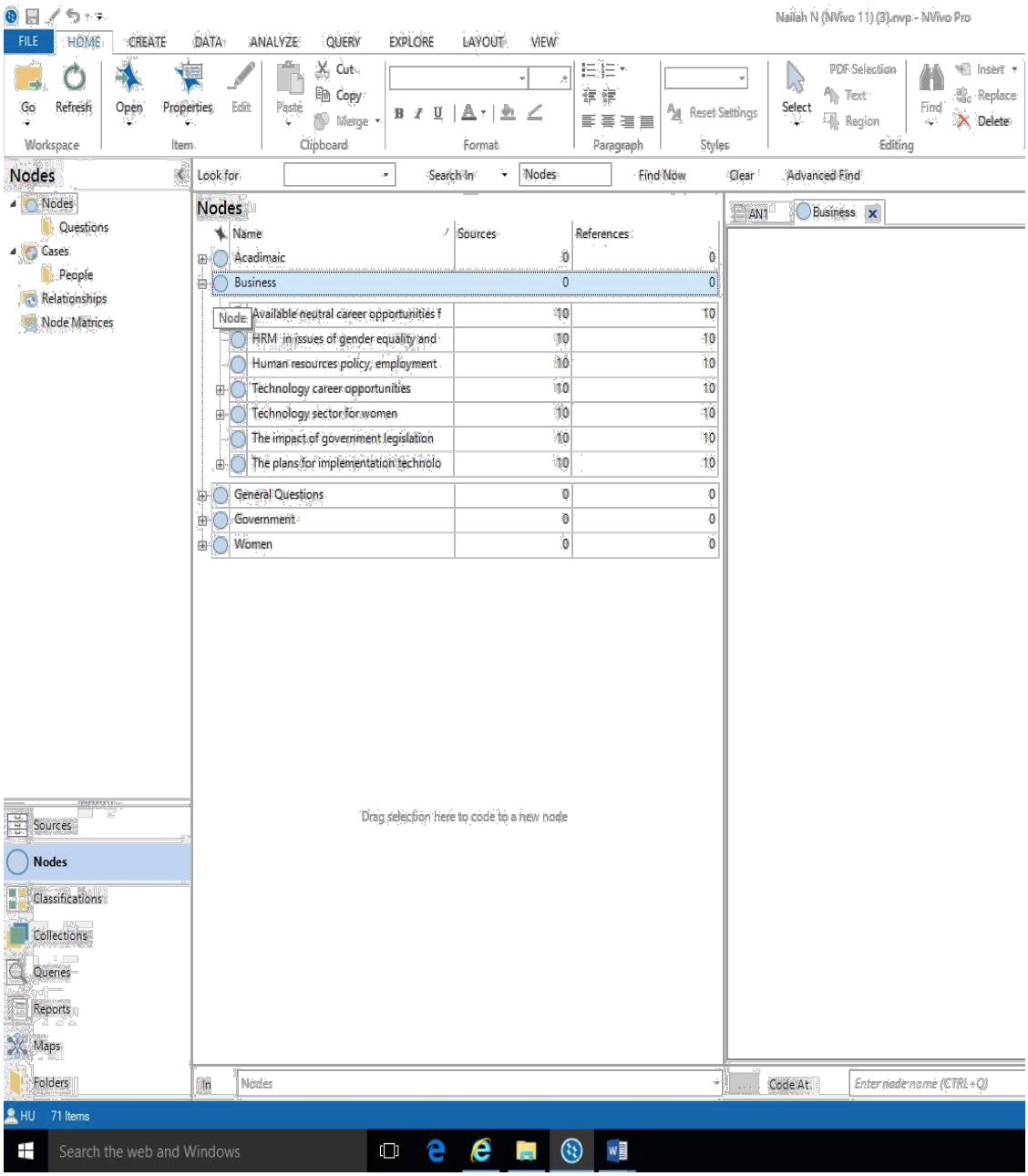
training for women with examples please?

Open question: how about robot devices, for example, surgical instruments?

Appendix (3): NVivo Exemples




WOMEN
Name
Nodes
References
Interviews of Experimental Study
Interview Date: October 19
General Information about the Interviewee:
The Concerned Group: The Governmental Environment, the Academic Environment, The working environment- Women.
- The Interviewee Circle or Name: Maisam
-Location: Imam University in Riyadh
-Gender: Female
-Age: 25-35
- The Educational Level: MA in Marketing
-Position: Administrative and consultant training and development
-Training: Communication skills, computer diploma, courses in Red Crescent
Part 1: All interviewees (For public opinion and trends on key issues)
Now she became independent. The woman became effective in E-Projects that have no firms location. She is effective in marketing field, and she became now in the municipal elections. The national income based on the woman.
Curriculums in higher education has become one / of years was only the computer at the university a separate section. Now girls and boys Curriculum have become the same.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FILE
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Look for:
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HRM in issues of gender equality and
Human resources policy, employment
Technology career opportunities
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The impact of government legislation
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General Questions
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