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Access and Participation: Gender equality in the engineering profession in Ghana

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Master of Science in International Development Studies

Credit

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Declaration

I, Akowuah Gloria Adwoa Sarfoaa, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature.....

Date: 14th March 2018

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Dedication

In loving memory of my nephew: *Francis Kwaku Adusei Antobreh*.

*“You were with me on the 9th of October 2014 as I applied for **this master’s degree**, and we were excited about coming to Norway the following year! Little did I know, two months later, December 2014, you would be gone to be with the Lord!!”*

But, I take solace in the three strong women you left behind: *Gloria, Andrea, and Alfreda*. These women are making giant strides in the sciences!!!, and with them, we **will occupy till you come!!**

...and...

to my mother, *Margaret Akowuah!*

*“maa, you had to cut short your dream of being in the STEM because you had to take care of 5 children. though your educational dream were not fulfilled, you encouraged us to move into the highest level of education we could. Looking back at ALL the sacrifices you’ve done, I can proudly say that...today, not only are you around to witness THIS, but your dream has been fulfilled!” **I AM THAT FULFILLED DREAM!***

Abbreviations

APRM- African Peer Review Mechanism

CEDAW-Convention on the Elimination of All forms of Discrimination against Women

DOVVSU- Domestic Violence and Victims Support Unit

E.E.O- Equal Employment Opportunities

GAD- Gender and Development

GhIE- Ghana Institution of Engineers

GNPC- Ghana National Petroleum Commission

MoGCSP- Ministry of Gender, Children, and Social Protection

MOWAC- Ministry of Women, and Children Affairs

PURC- Public Utilities, and Regulatory Commission

STEM- Science, Technology, Engineering, and Mathematics

UN- United Nations

UNESCO- United Nations Educational Scientific and Cultural Organisation

VRA- Volta River Authority

WAJU- Women and Juvenile Unit

WIE- Women in Engineering

Abstract

The engineering profession which is among one of the fields noted for advancing economic growth continues to illustrate a low number of females amid interventions. The profession, branded as “male dominated field” speaks volumes of inequality not only in the profession itself but has become a growing global concern of gender inequality in the labour market. This study is a qualitative research method based on gender equality in the Ghanaian labour market. It specifically examines what accounts for the low number of female engineers in the Ghanaian labour market. By using a semi-structured interview as a data collection tool, the study interviews sixteen female engineers in Ghana. It also uses a theoretical framework based on the Gender and Development (GAD) approach which takes a broader perspective on gender (in) equality, the disproportionate amount of work performed by women, and yet the under representation of women in the professions denoted as masculine. In its relevance to the study, the GAD, and three key concepts namely gender roles, gender equality, and the labour market are used to guide the analysis of the findings. The findings of the study show that the female reproductive role accounts for the low number of female engineers in the Ghanaian labour market. The female engineers in their response, emphasises the societal perception on the female reproductive role, and in its interpretation in the state’s policy as parental leave, creates an unshared responsibility regarding the role; bias due to the absence of the paternal leave in the state policies; and due to the limited three-month period allocated to the leave constraining their efforts to balance work and domestic duties.

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Chapter one

Introduction

The thesis examines what accounts for the few number of female professional engineers in the context of the Ghanaian labour market. It is made up of five (5) chapters: the introduction, literature review, research methodology, results, and the conclusion.

This chapter covers the background; study area; statement of the problem; research objective and question; the scope, and relevance of the study. The chapter ends with the theoretical framework and definition of key concepts.

1.1 Background

The 11th of February annually is designated as the *International Day of Women and Girls in Science* – and a reminder that today, many women and girls continue to be excluded from participating fully in science education and related careers (UNESCO 2017).

Directing attention of this thesis to the engineering profession, the inverse proportion of females compared to males, shows the male dominance characteristics of this profession (Hill et al. 2010). Again, females admitted into engineering courses in colleges for instance, showed a gradual decline in their number during their school years, and in the labour market (Jagacinski 1983). Hill et al. (2010) similarly discussed the dwindling number of females in the science profession especially in engineering as compared to the social sciences. And in Ghana, this is no exception. Girls' participation in Science, Technology, Engineering, and Mathematics (STEM) subjects in secondary schools is still lower as opposed to their male colleagues (UNESCO 2017). Similarly, the STEM courses and occupations, attracts fewer girls in schools and the labour market (Andam et al. 2005). Likewise, most technical schools in Ghana showed a lower proportion of girls' attendance in science classes- female representations in pure and applied sciences courses in universities ranged from 22% down to 1% in some departments (Andam et al. 2005). In fields requiring technical or science-based vocational or professional training, the proportions of women to men were also low (Amu 2005; Ghana Statistical Service 2014b). Correspondingly, a mass percentage of 93.67 representing professional male engineers with 6.33% being female engineering specialists is recorded at the Ghana Institution of Engineers (Ghana Institution of Engineers 2016). With fair characteristics of the profession in Ghana like these, it presents the dominance of males as

compared to females. It also shows despite almost equal female literacy attainment and labour market participation; the engineering profession continues to be male dominated (Baryeh et al. 2000; Ghana Millenium Development Goals 2015 Report 2015).

There are possible explanatory factors regarding the low number of females in the engineering profession. Both the formal and informal institutions in the society have been mentioned as factors in (King & Mason 2001).

The formal institutions include the state and the workplace. The state serves as an institution which drafts and implements policies regarding gender issues in the labour market. These policies serve as an enforced tool (law) which directs the activities of other institutions in the country (King & Mason 2001). The workplace also serves as the major source of employment in the society (King & Mason 2001). The workplace policies sources are mostly from the state directives which are enforced at the workplace. According to King and Mason (2001), the impact of these formal institutions with regards to the participation of females in the engineering profession, stemmed from the failure of the state and workplace policies in recognising gender difference in terms of roles, and designing policies to address such.

The informal institution are the traditional norms, and the households in the society which served as contributing factors to the presence of female engineers in the profession. Since the public domain is also a setting for behaviours contributing to inequality, gender equality is not only about state policies or the workplace but about the informal institutions also (Anyidoho & Manuh 2010). This is in the form of discriminatory gender roles and stereotypes, parental influence on the choice of professions, personal influence, and nature of the profession as possible explanatory factors for such low female presence (Baryeh et al. 2000; Shapiro & Williams 2012).

In view of the above, various interventions from the household, states, stakeholders, and the international society at large, have come on board in addressing the low number of female engineers. The presentation of a balanced picture of equal number of men and women in the engineering profession appears to be the rationale behind such interventions. For instance, Baryeh et al. (2000) discussed some families motivating their female wards to take up engineering majors in colleges, or some family members who are engineers, served as role models to the girls. This, the writers opined, created a form of enthusiasm for the girls to follow the path of the role models especially when the role models are female engineers. Hill et al. (2010) also added, families encouraging females' participation in the STEMs, created an

environment of encouragement which disrupted negative stereotypes about women's capacity in male dominated fields. Similarly, in Ghana, to address the low number of females in the STEM-related courses, the UNESCO Accra-Ghana office, and partners organised STEM clinics on quarterly basis in some selected districts in Ghana to sensitise girls to various STEM-related careers that girls can pursue (e.g. medicine, laboratory work, or engineering). STEM clinics have a strong potential for increasing girls' interest in science through the interactions with female role models already in the sciences. This programme seeks to boost girls' confidence in participating in STEM-related courses and helps to challenge the negative perceptions they may have about pursuing a career in STEM (UNESCO 2017). According to the literature, in December 2016, UNESCO Accra-Ghana office in collaboration with the Girls' Education Unit of the Ghana Education Service organised their first STEM clinic in the Jasikan District of the Volta Region, considered to be among the lowest performing districts for girls' participation in STEM. At the start of the STEM clinic, very few participants were optimistic about their choice in a science course at Senior High School; however, about 80% of the participants replied in the affirmative in choosing science as a course at the end of the STEM clinic. Though one would admit it was early to measure the impact of this intervention, yet it was encouraging to see the girls' enthusiasm towards the science professions (UNESCO 2017).

Again, international bodies like the Convention on the Elimination of All forms of Discrimination against Women (CEDAW), the United Nations (UN) have added their voice to the inequality with regards to female participation in the labour market and discrimination in terms of employment in general. For instance, the Millennium Development Goals (MDG), and now, the Sustainable Development Goals (SDG), both touched on gender equality and gender disparity in their agenda.

Notwithstanding, the engineering profession which is among one of the fields noted for advancing economic growth, and in the case of Ghana- transforming the state from agrarian to industrialised economy, continues to ironically, illustrate a low number of females amid interventions. (Gill et al. 2008). The engineering profession with its branded name as "male dominated field" speaks volumes of inequality not only in the profession itself, but has become a growing global concern of gender inequality in the labour market (Campion & Shrum 2004; Ceci & Williams 2007; Ramirez & Wotipka 2001). Thus, although the society, the state, and international organisations have intervened, the persistent low number of female engineers, and particularly in Ghana, seeks to draw attention for this study.

It is precisely against this background that the researcher seeks in this study, to *examine what accounts for the few females in the engineering profession in Ghana.*

1.2 Study Area

Ghana was chosen as the study area, because as my home country, I perceive the successful outcome of this thesis as my contribution to the on-going concern on gender inequality in the engineering profession in Ghana. More importantly, Ghana is reputed among class of nations in the era of gender equality. In terms of, for example, being a signatory to several international treaties on gender equality and women empowerment like the CEDAW, and UN. And, projecting the Beijing Platform for Action coming out of the Fourth World Conference on Women held in Beijing, September 1995 (Manuh & Anyidoho 2015).

In 1957, Ghana became the first African state, south of the Sahara to gain independence from British colonial rule. In recognition of the role played by women activists during and after the struggle for independence, women found their place among men in some state positions like legislators, and administrators. Despite early acknowledgement of the women activists, Ghana's development programming efforts lacked the necessary motivation for reversing the situation of unfair social and gender exclusions in the labour market. The post-independence governments continued to draw from the existing patriarchal structures in ways that resulted in the deepening of social and gender divides. For instance, the gender disparity trend continued into the 1980s when the Structural Adjustment Programs (SAPs) were introduced to reverse the economic decline at the time (Ofei-Aboagye 2000).

Nevertheless, the increase in female presence in top state positions, female participation in formal labour, and ratified conventions has extended support to gender work in Ghana (Anyidoho & Manuh 2010). Accordingly, some of the top-notch positions in Ghana have been, and continues to be filled by women. This accomplishment is a hallmark which goes down memory lane of how far Ghana, continues to involve women in national agenda. Examples include the Chief Justices of Ghana from 2007 to 2017 and 2017 to date; The Vice Chancellor of one of the public universities in Ghana in 2008, and the Speaker of Parliament in 2009 who also happened to be the first female in West Africa to fill such position. Quite recent is the first female Brigadier-General of the Ghana Army in 2016, the Chief of Staff, and the first female director of the Ghana Institution of Engineers (GhIE) both in 2017 (Ghana Statistical Service 2014c). The list goes on and in diverse Ministries, agencies, and organisations in both the public and private sectors of the state.

Moreover, Ghana has different legal instruments and policy tools marked for addressing gender issues. These are made of local, and ratified international treaties on gender, and in this context, Ghana has ratified such treaties in accordance with the state's constitution (Appiah 2015).

For example, locally, the *1992 Constitution of Ghana* in Article 17 - Prohibits discrimination of persons based on gender (The Constitution of the Republic of Ghana 1992); and the *Labour Act, 2003 (Act 651)* with specific provisions including section 68 which reiterates the right to equal pay for equal work "without distinction of any kind" (Ghana Labour Act 2003). The *National Gender Policy* also looks specifically to females in the labour market, and seeks to implement activities designed to strengthen women's role in the economic development, and to redress imbalances which arise from existing gender inequalities through policy review etc. (Ghana Statistical Service 2013; Ministry of Gender Children and Social Protection 2015). In recognition of the urgent need to halt and reverse the effects of the marginalization of, and discrimination against women and promote the sustainable development of the country, the *Ministry of Women, and Children Affairs (MOWAC)*, now the *Ministry of Gender, Children, and Social Protection (MoGCSP)* established in 2001, absorbed the bureaucratic institutions on gender issues, and began work to provide a comprehensive Gender Equality law (Appiah 2015).

Some examples of internationally ratified treaties in Ghana; The *Principles of the Universal Declaration of Human Rights* are also found in chapter 5 of the *1992 Constitution* (Appiah 2015). Similarly, the third goal *Millennium Development Goals (MDG)* of the UN was to promote gender equality and empower women. (Appiah 2015). Ghana recently in 2015, submitted the country's report on these goals and specific attention to the third goal is highlighted in this thesis for brief elaboration. The *Convention on the Elimination of all Forms of Discrimination against Women (CEDAW)* was adopted by the Ghana in 1979 and ratified in 1986. CEDAW has in its preamble: "that the full and complete development of a country, the welfare of the world and the cause of peace require the maximum participation of women on equal terms with men in all fields" (Appiah 2015). In its Article 4 (1) and similarly in the 1992 Constitution of Ghana Article 17(4a), CEDAW calls for the 'adoption of temporary extraordinary measures aimed at accelerating de facto equality between men and women', and Article 11 also talks of discrimination against women in employment. As a signatory to CEDAW, the Republic of Ghana is required to present its gender records to the

expert committee every four years as part of the peer review process of the Convention (Appiah 2015).

All these legal instruments, and state policies and agencies have, over the years advanced the call for including women into the development process of the state. The use of the state policies in addressing the gender equality agenda in Ghana reflects the importance placed on this formal institution as compared to the workplace or the informal institutions cited previously. The reason is similar to what is cited in (King & Mason 2001). According to King and Mason (2001), the state is the main regulatory body in the society whose authority supersedes other institutions. In the case of Ghana, the state is the main actor in addressing the issue of gender equality, and through their policies, other institutions like the workplace, are influenced.

Nonetheless, the transitioning women from the 'home' to the 'office,' making women financially independent and raising the number of female literacy level, the male dominance fields like engineering continues to raise questions regarding the extent to which gender matters have informed the decisions of the state. In 2006 for instance, the African Peer Review Mechanism (APRM) team noted the marginalization of women remains a real problem in Ghana despite constitutional and other legislative provisions made to protect and secure the rights of women, and this marginalisation is evident in the labour market in Ghana (Ghana Statistical Service 2014c). From the Ghana Statistical Service (2014c) women form about 50.2% of Ghanaian total human population, and for such an inequality in terms of the 'majority' becoming 'minority' in the labour market participation especially in the engineering profession is a matter of concern. Clearly therefore, from the foregoing, the choice of Ghana as the study area is justified not only to address the *how*-situation (how to address this phenomenon), but also the *why*-factors accounting for the low number of females in the engineering profession in Ghana.

1.3 Research objective

The research objective of this study is: *To examine what accounts for the low presence of female in the engineering profession in Ghana.*

1.4 Research question

From the research objective, the study has one main research question to explore:

What factor(s) accounts for the low presence of female professional engineers in Ghana?

1.5 Scope of the study

The scope of the study covers (sixteen)16 professional female engineers in diverse engineering fields in Accra-Ghana, including; civil; mechanical; telecommunication; chemical; electrical, and biomedical engineering. In this study, I draw on 16 semi-structured interview responses conducted mainly at the workplace of the respondents. Out of the sixteen respondents, ten were available for the face-to-face interview, with the remaining six answered and returned the interview questionnaires. The interview response represented a snapshot of what these women experience. It is not a study that assesses change over time. Yet it discusses how things have changed over some time, based on the reflections of the interviewees. It is thus a limited sample material that provides a basis for analysing what explanations these women offer and how their reasoning on the issue of low female presence in the engineering profession in Ghana reflects on or does not reflect on the formal and informal institutions that according to the theory explain this phenomenon.

1.6 Theoretical framework

It is the purpose of this study to take a broader perspective at a theory on which this research is based. Thus, the **feminist theories on development**, precisely **Gender and Development (GAD)** approach will be used. Feminist theories on development looks at the origins, characteristics, and forms of gender inequality. The theories also centre on increasing women's participation, improving their access to employment and increasing their economic conditions; putting them into a full force towards the development process (Peet & Hartwick 2015). The basic about **GAD** was first stated by Ann Whitehead, in 1978: *"no study of women and development can start from the viewpoint that the problem is women, but rather men and women, and more specifically the relationship between them."*(Hedman et al. 1996). The **Gender and Development approach** emerged in the 1980s, and its perspectives fall in line with analysing women's subordination within the development process from the vantage point of gender relations between men and women with regards to division of labour (Peet & Hartwick 2015; Rathgeber 1990).

First, the GAD approach mentioned women's involvement in the development activities in the society was mainly focused on their economic rights or productive roles which addressed their economic challenges. The GAD approach however viewed that this focus rather in adding value to the women's economic role, somewhat also increased their dependence and subordination with regards to men in the labour market. This was because, the allocation of roles did not give recognition to their social or reproductive role but only

their economic role, hence the approach called for a change in the way tasks were divided to include the reproductive role as well. By such, the GAD approach analysed the nature of women's contribution within the context of work done both inside and outside the household, including non-commodity production, and rejected the public/private dichotomy which commonly has been used as a mechanism to undervalue family and household maintenance work performed by women (Rathgeber 1990). According to Peet and Hartwick (2015), the GAD approach moved away from the sole emphasis on how to increase women's participation in development activities only, and added emphasis on looking at factors behind the disproportionate amount of work performed by women, and yet the under representation of women in some professions denoted as masculine (Peet & Hartwick 2015).

Secondly, *gender relations* rather than 'women' became the main analytical category in the GAD approach. It also addressed the likelihood of not presenting women only, per se but looked into the relationship between men and women regarding social expectations of roles and responsibilities (Rathgeber 1990). For example, GAD argued, women were not a homogenous group but rather were divided by class, race, and creed. Women's roles in society could not be autonomous from gender relations. And this perspective became a way of looking at the structures and processes giving rise to women's disadvantaged position, a function of the global ideology of male superiority—men had power and control over women. GAD was a holistic approach in which culturally specific forms of inequality and divisions occurred, and gender became interrelated with this overall socially created hierarchy. By acknowledging the use of gender or the influence of GAD at the state's level, the urge in involving not only 'women' related issues but 'gender' in recognition of women's disadvantaged status in development, gave cause to diverse applications.

The GAD approach cited the state, as an important actor promoting women's emancipation. The call for an all-inclusive concern on gender issues at the state level was to ensure a more equitable development for both women and men (Hedman et al. 1996). In Ghana for instance, the promotion of a GAD approach at the state level, was based on the understanding of gender roles and social relations between men and women. Hitherto, the idea of 'gender' was synonymous to 'women only' issues. The introduction of the Ministry of Women and Children Affairs (MOWAC), the Women and Juvenile Unit (WAJU), and the campaign on mainly the girl-child education reflected the image of the state placement of all 'women' in a category of disadvantage- victims of violence, neglect, or illiteracy. The gradual analyses of women's issues in recognition of gender relations, saw the change of the MOWAC to the

Ministry of Gender, Children, and Social Protection (MOGCSP), and WAJU to Domestic Violence and Victims Support Unit (DOVVSU) (Ghana News Agency 2013; Minsitry of Gender Children and Social Protection 2015). Ghana however continues to acknowledge women-specific matters in their programs but the awareness of *women* not a homogenous group has informed the state in using the GAD approach in combination with other approaches (Minsitry of Gender Children and Social Protection 2015)

Furthermore, in talking of state policies or projects designed to address the perspective of GAD, it could be arguably challenging to cite specific examples which discusses gender relations. This is because, in the wake of policy making and planning tools of the states, the targeting of women-only programs, and activities funded to look at specific areas of women issues persists (Razavi & Miller 1995). It is not to say, the focus on gender relations have been neglected, but, the general notion of focusing on women separate from men in at least some projects has been accepted by a considerable number of Third World governments, national and international development agencies, and in many non-governmental organizations (Rathgeber 1990). However, to some extent this reflects political practicality and less likely be interpreted as a sign of fundamental commitment to the liberation of women. Programs looking at female illiteracy, reproductive role of women, women's access to resources, and health matters for instance confirms the tendency of addressing 'the how' instead of acknowledging 'the why' as earlier stated. It does not seem to question the social construction of gender which has relegated women into the domestic realm in terms of labour participation. Neither has it acknowledged the obvious male dominance in some professions (Rathgeber 1990).

A GAD perspective leads not only to the design of intervention and affirmative action strategies which will ensure that women are better integrated into ongoing development efforts. It leads, inevitably, to a fundamental re-examination of social structures and institutions and, ultimately, to the loss of power control, which inevitably will affect some women as well as men. Not to say the least, while the initial rhetoric of "integrating women into development" has been accepted by many institutions, and states including Ghana, the actual process of ensuring equality for women even within those same institutions is still far from complete, and evidence is the persistent low number of females in the engineering profession, to say the least.

The relevance of the approach to this study is based on its emphasis of moving females beyond their access and participation in the labour market. By that, it meant adding

more value to her other roles especially the reproductive role. In the introduction of this study, I cited the state of Ghana as achieving gender equality in the labour market based on the efforts the state has put in bringing females into the formal labour market, and gender segregated professions like engineering. The emphasis on moving females beyond their confines as referred in the GAD is similarly found in the example of Ghana.

Again, the reference made in the approach with emphasis on the state addressing one role over the other in terms of the females' roles brought to my attention, the focus of this study. The approach noted that, when the state addresses the productive role of the female and ignores the reproductive role of the female, the results of gender equality in the state is ineffective. This is because, the females continue to feel constrained with regards to their unaddressed roles. In this study, the question touches on why the few female engineers despite the state of Ghana's effort in moving the females beyond the confines of their domestic roles. Pondering over this question and finding similarity in the GAD approach, I attempt to use this approach in addressing the research question of this study.

1.7 Definition of key concepts

The GAD approach highlighted some key concepts in the discussion of female participation in the labour market. The key concepts include gender roles, gender equality, and labour market.

1.7.1 Gender roles

The definition of gender roles in this study takes credence from the discourse on *triple roles* as discussed in Moser (2012) and Moser (1989). The triple roles shows the reinforcement of the household division of labour into the state's interpretation of labour market participation of individuals and the domination of particular gender in some professions like engineering (Moser 2012).

1.7.1.1 Reproductive role

The reproductive role comprises the childbearing/rearing responsibilities and domestic tasks undertaken by women, required to guarantee the maintenance and reproduction of the labour force. It includes not only biological reproduction but also the care and maintenance of the workforce (husband and working children) and the future workforce (infants and school-going-children). Assigning this role to women, it is perceived as a 'natural' work and not a 'real' work therefore 'invisible' to monetary value. Men, however, do not have clearly a defined reproductive role. Put differently, the reproductive role is termed as the expressive

role assigned to females because of the emotional and nurturing support females are considered to have and provide (Lindsey 2005).

1.7.1.2 Productive role

The productive role defines females as secondary earners as compared to males being primary earners¹. This specific role is illustrated in both the rural and urban areas. In the rural areas, females are noted in the small-scale farming or subsistence occupation. The income generated from these jobs are meagre and enough to support the working spouse, but not as a main source of financial resource. In the urban areas, females also thrive in the part time or casual works as compared to their male partners. The notion of earning “something” to serve as a secondary source, drives most females into these categories of jobs. Similarly, are the females who find themselves in well-paying professions. Despite a female being the breadwinner, or the major wage earner in a home, the persistent ideology of male breadwinner does not wane away completely the man’s primary responsibility of the breadwinner. With that, Lindsey (2005) again, terms this role as the instrumental role of men, in providing for the family. The value therefore, placed on the productive role of genders reflects how the male’s role is perceived as more valuable than women; that females’ roles are considered “natural of them” to be supportive and not take the main role of the males (Reeves & Baden 2000).

1.7.1.3 Community role

The *community managing role* comprises activities undertaken primarily by women at the community level, as an extension of their reproductive role. This is to ensure the provision and maintenance of scarce resources of collective consumption, such as water, health care and education. It is voluntary unpaid work, undertaken in ‘free time.’ The *community politics role* in contrast comprises activities undertaken by men at the community level organizing at the formal political level. It is usually paid work, either directly or indirectly, through wages or increases in status and power.

The gender roles translate into the labour market and the state activities. It is evident in state policies which are silent on paternal leave (sharing of reproductive responsibilities), wage disparities inherently influenced by value placed on female productive work and the breadwinner ideology, and the glass ceiling which is the re-enactment of the community role. These roles have imparted on how far several women, can make it, and stay in fields segregated by gender due to policies and activities which limits their participation.

¹ Breadwinner

1.7.2 Gender equality

Gender equality is described as the female engineer's ability to move beyond access and participation in the labour market² with regards to equal rights, responsibilities, and opportunities. In terms of rights, gender equality summarises the female engineers basic human rights, her participatory, and economic rights accorded in the labour market (Hernes 1987; The World Bank 2012). It gives credence also to her equal share of her responsibilities regarding her reproductive role. With opportunities, the female engineer's ability to access equality in terms of development of her skills, and 'breaking of the glass ceiling,'. (Kabeer 2012; Naami 2015).

1.7.3 Labour market

The labour market refers the public and formal private sector which offers employment opportunities to the female engineer. It is also in the labour market where the state's law, policies and Acts as well as workplace interventions, influence the participation of the female engineers.

² The author's discourse on disabled and minorities with regards to employment, formed the contextual basis in this definition, of an illustration of how (in)equality can be an influence in moving beyond (Naami 2015).

Chapter two

Literature review

2.1 Introduction

One of the essential preliminary tasks in undertaking this study was to go through relevant existing literature to acquaint myself with the available body of knowledge in interest. The literature review is an entire part of the research process and makes a valuable contribution to every operation step (Kumar 2005). It encouraged me to attempt to build upon the works that have already been done in the field I was focusing. Additionally, it helped in assisting me with insight into the methods, measures, subjects, and approaches used by other research workers in their study, thus led to significant improvement in my research methodology, and analysis approach for instance. These brief elaborations on literature review is a summary of this chapter. I have organised it under the following sub-headings: gender equality in the labour market; the male dominated field: the case of the Ghanaian female engineer; and the explanatory factors accounting for the low number of females in the engineering profession in Ghana.

2.2 Gender equality in the labour market

In the literature of King and Mason (2001), the labour market creates avenue for employment, makes policies regarding labour relations, and is one of the entry point for public and civic actions for promoting issues relating to gender equality. Gender equality in the labour market, according to Cornwall and Rivas (2015) has received global attention, and this attention in the views of Eriksson-Zetterquist and Renemark (2016) has become a reoccurring theme in projects, and policies which aims at improving equality both at the workplace, and in states' activities.

Orloff (2002), postulates, global focus on gender equality in the labour market has caused female employment to be a central point in social policies. Smyth (2007) also opines, the global attention on gender equality shows a sign of victory in terms of conveying the presence of certain concerns in the field of development. Cornwall and Rivas (2015) again explains these concerns as being able to identify gaps in areas of employment which likely leads to relevant corrections. Contributing to these discussions above, Frome et al. (2006) are of the view, the labour market has experienced the increase in female access and participation not only in the informal sector, or secondary jobs previously, but into specialised professions which were perceived as the reserve of men.

The increase in females' access and participation is referred to as economic power in the Economic Commission for Africa (2011). The economic power encompasses the equal access to employment and income as compared to men, and power to be financially independent. Thus from the rise in globalisation, international trade and the rapid growth of export markets, to the increase in female literacy levels, brings to the examples accounting for females' increase in the labour market (Cook & Razavi 2012; Razavi et al. 2012). Both Ackah et al. (2009), and Won (2016) also cite the gradual changes in ideologies regarding traditional gender roles such as the introduction of planned parenthood programs and child care support programs to address work-life balance issues. They also assert that the increased participation of females in the labour market did not only hinge on their economic rights as individuals but catered for their social rights as well.

Notwithstanding, the image of male dominance in some professions lingers, despite equal access and participation in the labour market.

Regardless of equality in the labour market, females continue to be less represented in some professions despite having the same educational or work qualifications as compared to their male colleagues. Although more women are now in paid professions across the world, few find themselves in some jobs as compared to their dominance in other jobs. Therefore, though females participate in the labour market, and are in fields hitherto ascribed as masculine, their few numbers reflect the covert limit the society has placed on the development of the female worker. According to King and Mason (2001), the society's customs, norms or implicit conducts define development in terms of economic power. The society places emphasis on the economic power of women, and thus have moved them into paid professions, but have paid less attention to their numbers in segregated professions. Malik (2013) also stresses, development does not have to only focus on economic power given to women, but an expansion of individuals' capabilities and a broader human progress which transitions more females into male dominated professions. It allows females to exercise the basic civil right of *moving*, by being financially independent and venturing into male dominated fields: *'literally to decide with their feet'* (Kabeer et al. 2008).

2.3. The male dominated field: The case of the Ghanaian female engineer

The engineering profession is one of the fields associated with societal development. This assertion is based on the diverse disciplines like electrical, computer, and mechanical engineering (Gill et al. 2008). Ghana's economy has been advancing towards industrialisation

from an agrarian background post-independence (Ghana Statistical Service 2014c). The natural resources and mining industries³ together with the influx of telecommunication organisations, has set the grounds for the increased need for diversity in skills in terms of the engineering profession in Ghana. As such, the Kwame Nkrumah University of Science and Technology (KNUST)⁴, and other educational institutions in the country offer diverse specialisations in the engineering programs to train individuals, and to prepare them for the labour market.

However, Baryeh et al. (2000) cited that the engineering profession in Ghana depicts a low proportion of females despite the state's effort in promoting gender equality in the labour market and encouraging everyone to pursue the career of their choice. The writers mentioned, the disparity between men and women is more pronounced in the engineering colleges at the KNUST, where the ratio is 8:1. They thus, concluded that the professional engineering courses in Ghana depicts the characteristics of male domination. Regarding the labour market, the proportion of females in engineering were similarly lower than the males in same fields (Amu 2005). For example, data from the GhIE shows that female engineers constitute about 6.33%⁵ as compared to 93.67% males who are registered engineers in Ghana (Ghana Institution of Engineers 2016). This wide margin between the male and female engineers in basically depicts the very characteristics of the profession earlier mentioned in Baryeh et al. (2000), and in (Frome et al. 2006). According to Frome et al. (2006), a profession which is characterised by having more percentage of males approximately over 70% is referred to as a male dominated field.

In response to the reasons behind the low number of female engineers, Agogino (2007) cited the two formal institutions mentioned earlier; the state in terms of their policies, and the workplace policies. Specifically, King and Mason (2001), referred to workplace policies on career advancement, and parental leave as contributing to the low number of females in the profession especially when these females end up in dead-end positions, making them stagnant in their career. Andam et al. (2005) mentioned the Ghanaian state policies addressing labour issues did not focus on the low intake of females into the STEM courses in

³ Gold, diamond, bauxite, and oil industries in both the formal and informal sectors of Ghana.

⁴ A state university

⁵ This statistics from GhIE illustrates only professional engineers who have registered with the institution as members, therefore there could be a possibility of an increase in either of the genders due to other unregistered members not being considered here.

schools, which, in turn reflected their low number in the labour market. The writers added that, since the state has failed to look at the low intake of females into the STEM courses in schools, labour policies aiming at increasing female engineers at the workplace were less effective hence the low number of female engineers (Andam et al. 2005).

Again, Baryeh et al. (2000) similarly cited these two formal institutions but the writers held strongly to the view that, the informal institution especially, the society's gender stereotype, was the main factor. The traditional Ghanaian society has tagged the profession as masculine, and risky of which the females are not inclined to perform such job. The extent to which these stereotypes about the engineering profession has become naturalised, can be seen with the dominance of men in the job. Additionally, Hill et al. (2010) referred to the households perception on females pursuing engineering. The females' choice of the profession is likely to be influenced by her family due to the traditional beliefs about the characteristics ascribed to the profession-masculine, and risky.

Yet, Baryeh et al. (2000), and Andam et al. (2005) were of the view, the formal institutions in Ghana-the state, and the workplace, have more impact on the access and participation of females in the engineering profession than the informal institutions. Baryeh et al. (2000) in their conclusion, admitted the informal institutions like the family, influenced the number of female engineers but, the state particularly was the main institution identified as making laws for other state bodies to implement and emulate. Again, they admitted some employers were influenced in their preference of male engineers over female engineers based on the traditional belief of the reproductive role of women- women were perceived as more likely to go on leave more times as compared to the men due to their domestic roles. But, the state policies' inefficiency in making necessary or effective laws to address equality at the labour market and share of responsibilities to address such preference of gender at the workplace, amounted to the low presence of females in the engineering profession (Andam et al. 2005; Baryeh et al. 2000). Furthermore, Wong (2012) mentioned that informal institutions shaped social behaviour through their rules and norms however, these rules and norms did not pertain to the functioning of the state, rather the state served as the main regulatory mechanism in the society especially in terms of laws, policies, and interventions of which are passed unto other regulatory bodies like the state ministries, and into workplace for implementation (Wong 2012). In view of that, the **workplace** and the **state** which defines the formal institution in this study, shall be discussed in the next sections of this chapter, as the possible explanatory factors accounting for the low number of females in the engineering profession.

2.4 The workplace

The workplace serves as a formal institution which implements policies on employment (King & Mason 2001). In terms of employment, the engineering profession is identified as one of the highly paid and well-regarded job; the prestige and status accorded this profession makes it one of the sought-after professions by both male and females (Gill et al. 2008). And to ensure equality in terms of employment in the profession, gender has become one of the legitimate and relevant factor in the activities and policies at the workplace in terms of equal employment opportunities in recruitment and selection, career advancement, and employee leave etc.(Cook & Razavi 2012). Despite the relevance the workplace has placed on gender equality and employment opportunities in its policies and practices, King and Mason (2001) cited workplace activities and policies on career advancement influenced the number of female engineers. Also, Agogino (2007) mentioned, the workplace, in its efforts to create gender equality, also created constraints through the type of policies it had on work-life and flexible hours, and caused fewer women to move into the profession.

The discussion therefore on the workplace as an explanatory factor will focus on the following: *career advancement, and work-life balance*.

2.4.1 Career advancement

Career advancement simply is the movement from one level of a career ‘ladder’ to the next. This movement is usually towards upper management or moving sideways to head departments or units. It is also employed to describe promotions, supervisory roles and acting in a temporal vacancy. But, advancing in a career like engineering does not entirely hinge on only positions literally, but in the advancement or development in capabilities, skills, and knowledge (Kabeer et al. 2008). Career advancement places the female a step ahead in terms of her traditional community role. Because, not only does she organise meetings (per her community role), she becomes a part in the strategic and decision-making role in the profession as well.

Nonetheless, career advancement in the profession becomes a constraint through what is termed as the *glass ceiling or glass wall* (King & Mason 2001). King and Mason (2001) mention the term, *glass ceiling* to depict constraints in females’ career advancement towards *top managerial positions and improving their managerial skills*. The authors also used *glass wall* to show challenges in advancing to *supervise departments* and to *lead other units* in the profession. Similarly, Kabeer et al. (2008) referred to *vertical segregation* to demonstrate

constraints similar to the glass ceiling, and *horizontal/lateral segregation* comparable to the glass wall. The use of *competence-based criteria, educational background/qualification, and tenure of office* are examples of the basis of moving or developing an engineer from one level to the other (Long 2001). These bases have formed a *glass wall, or segregation* to the females' advancement due to its characteristics, although employers claim these formal criteria are not biased towards any gender.

The first example which is the competence-based criteria, focuses on the use of capability (skills, and consistent work attendance) of an individual with relation to their position or work as opposed to using gender difference. The employers focus on what each candidate is likely to have as an advantage over the other. Using this criterion, it includes the learnt skills, attitude, and ability of the engineer to handle situations in a role of an elevated position. Hence, how the engineers would act, present themselves, and contribute to decision making is noted with regards to the profession. For instance, fair entry for vacant positions is given to all in the profession. In Ghana, the constitution under Articles 17 (1) and 27(1) acknowledges no discrimination based on gender and this finds expression in fair selection of possible candidates at the workplace for promotion (The Constitution of the Republic of Ghana 1992). Jagacinski (1983) also places emphasis on the era of women entering the engineering profession and writes that the belief of equality has been presumably achieved hence no plain reason to discriminate based on gender (right to access and participate). The key item in advancement falls on competence such that preferential treatment is rarely given anyone in response to vacancies. The main point considered is whether the person (male or female) is competent enough to move into a higher rank. Yet, the use of competence is not entirely the case when as evidence, some companies have few or no females in the higher ranks especially, the STEM organisations in Ghana. For instance, the Energy Commission of Ghana, Public Utilities, and Regulatory Commission (PURC) had no female as part of its board members as at 2012. The Ghana National Petroleum Commission (GNPC) and the Volta River Authority (VRA) had only one female (CEDAW 2012)⁶. This example in Ghana bears credence to what Kabeer et al. (2008) observed also in the Nordic states where men dominated in the top positions with females less likely noted at such positions in the STEM. By this, there is the implication of implicit biased characteristics attached to the assertion of a

⁶ All these organisations are related to issues concerning hydroelectrical energy, energy consumption and other technical related matters in Ghana. It is apparent females were not included in more numbers in these boards as compared to boards that were concerned with social issues like disability and welfare, where females were more.

solely competence-based criteria in career advancement. Again, a further analysis of the use of reliability and consistency (regular attendance and presence at work excluding leaves) regarding competence creates bias between male and female workers, since females are perceived as being less consistent with their work attendance due to their roles at home as compared to men (King & Mason 2001). As mentioned earlier, the implicit preference of one person over the other, although based on competence, is also influenced by their reliability at most times of the working calendar. Some employers would therefore prefer men over women because of the perceived absence women have when it came to their maternal leave or domestic responsibilities at home (Baryeh et al. 2000). The citing of pregnant women in Articles 55 and 56 of the labour Act for instance, shows pregnant women being excluded from night duties and overtime in the Ghanaian industries (Ghana Labour Act 2003). These reference in the Labour Act also extends to female engineers who are not pregnant, thus the workplace perception of females having domestic duties, have excluded all categories of women from overtime or night duties and considered the male workers over the females. So, despite the use of a non-gender biased clause (competence, reliability or consistency), when the perception of the female domestic needs is highlighted and implicitly considered, the preference of males over the female engineers is obvious at the workplace. This restricts their movement and advancement in the profession. The “glass” gets thicker to break, and this presents a reason for some to leave the profession, thus affecting the numbers. For those aspiring to enter the profession, such characteristics of challenges in career advancement, deters them from pursuing the profession entirely.

The second point under career advancement and its relation to female engineers’ presence focused on educational qualification or background. Ayogyam et al. (2014) explains further. Further training to enhance one’s qualification and skills relating to the profession has a higher tendency of moving the individual further levels in the career ladder. The laws of Ghana require every employer to train and retrain their employees to increase in their skills needed for the profession. In Article 27(3) for instance, the Ghanaian law states that females are entitled to training and promotion without discrimination of any form (The Constitution of the Republic of Ghana 1992). However, the presumably longer period taken to achieve specialisation in engineering takes a toll on female engineers especially regarding their responsibilities at work, and at home as mothers, partners, and domestic home makers (Ayogyam et al. 2014). The statistics presented by the GhIE (6.33% females), shows that although some females can pull through in the STEM courses, most fall short in the event of

family or social roles. This restricts their ability to pursue further skills needed for the profession, limiting their chances of advancing; others eventually leave the profession when they realise they have a stagnant rank or role with regards to career advancement (Andam et al. 2005). Long (2001), however, shares a contrasting view on an illustration on educational background and career advancement as positively related. Giving an instance in academia, Long (2001) cited the fact about individuals' receipt of post-doctoral degree in engineering did not necessitate a promotion. On the other hand, he maintained, equal opportunities are accorded to both male and female workers to apply for a promotion, but most employers preferred male workers simply because the males were mostly available for work as compared to women who either were on maternal leave or attending to domestic needs.

The first two basis for career advancement; competency and educational qualification both showed a challenged when male engineers are preferred over the females due to the perceived domestic roles she performs at home. Aside these two, the number of years she has spent in the profession also serves as a basis for career advancement and is discussed below.

The tenure of office refers to the number of years spent after graduation, by working, and time taken off (non-work related) whiles in the profession (Long 2001). Using the first and second examples regarding career advancement, the impact is felt on most females as compared to males in this case on tenure also (Lyng 2010). The author explains by using an example in some Norwegian Law firms. Some employers exclude the leave of absence from the tenure of office. And in using this for promotion, workers who happen to go off duty due to sickness, child care or non-work-related reasons, are affected especially those who go for leave most times. Hence, a female engineer in this case, who goes on maternity leave stands the tendency of having less tenure as compared to colleagues who do not go. Worst scenario is the mother who goes on leave more than once. This seems biased on the females' part especially when there are limited or no additional criteria to boost her chances of advancement. So, for the working mothers, the chances appear limited despite competence and educational qualifications in this context.

In conclusion, the career advancement of a female engineer is not merely fixed on moving higher in terms of positions or with increased responsibilities but to be able to do so without constraints. With three examples focusing on competence (reliability and consistency at work and in attendance), educational qualifications, and tenure of office, the workplace has rather shown bias towards females when preference is given to the males based on the perception of

the females' domestic duties interfering with their work roles. These constraints are what King and Mason (2001) and Kabeer et al. (2008) referred to as glass ceiling or wall or vertical or horizontal segregation respectfully. These workplace practices challenge the number of the female engineers in the profession. Apart from career advancement forming part of the workplace practice affecting the number of females in the engineering profession, the challenge with work-life balance in the profession is another example.

2.4.2 Work- Life balance

Work-life balance is also referred as *parental hours at work and home* (Berg et al. 2003). According to Berg et al. (2003), an increase in working hours at the expense of dedication to social life, or an imbalance between work and home duties, influences the female engineer in her profession. This is because, the effort to balance the two becomes a challenge of which one aspect often gains more than the other. To explain further, Agogino (2007) uses the term, "*family penalty*" to depict the dedication to work which accounts for less attention towards family life especially, considering her reproductive role and the "loss" of attention to the family duties. Specifically, the probability of having a win-win situation in terms of a balance for the two, is what serves as one of the constraint to the female engineer (Ackah et al. 2009). Again, Frome et al. (2006) coins the phrase, "*an incompatible duo*" to refer to the challenge of the female engineer in maintaining a family role and a successful engineering career at the same time.

These definitions regarding work-life balance presumes that, the female social role is fixed on the premise of her domestic or family role only, without acknowledging other social roles like hobbies, religious commitments, and voluntary programs. Based on that, Jones et al. (2006) in "*Work-life balance: key issues*" looked beyond the family role and included other social roles as cited above. Work-life balance therefore describes the interplay of both work, and social life, and the conflicting call for attention between the two. It extends to social life like hobbies, religious roles, and commitments which are outside the work or family scope.

In addressing how work-life balance influences the number of females in the engineering profession, Mehra and Gammage (1999) and Won (2016) cited that the type of sector and its flexible working time and demands, had an impact on how the female engineer balances her profession and her social life and to an extent, influenced her stay in the field. Similarly, Berg et al. (2003) cited, the implementation of a workplace policy on work-life balance like the parental leave, seeks to address the social life of the female engineer and the interpretation of

this policy also influenced her presence in the profession. The discussion on work-life balance in this context will consequently focus on *the type of sector, and the workplace policies regarding work-life balance*.

First, with regards to the type of sector, the public sector is perceived as the preference of female engineers as compared to the private sector (Mehra & Gammage 1999). This is because of the flexible working hours which enables them to balance their work, and social life. As Mehra and Gammage (1999) further cites, the presence of females in the public sector shows the improved policies on work-life in this sector which provides flexible hours of working. And to add, most of their policies are regulated and in compliance with the state on employee protection (Won 2016). In Ghana for instance, the rate of women being 4.1% (in diverse disciplines) in the public sector is a bit higher than the formal private sector which has about 3.4% of women. This percentage of females in the public sector is due to the early closing time and less time-demand attached to the job (CEDAW 2006). Similarly, is the case of Sweden. Females are mostly prefer the public sector because of the less stress and time-demand related to their work therefore enabling them manage to balance their home responsibilities, and work duties (Hernes 1987). However, using these limited reasons of flexibility in time-demand and compliance with state regulations with regards to the public sector, the notion from these writers presents the private sector as not being women-friendly or not compliant with state directives regarding employee protection. But then, the private sector also complies with state labour regulations, and goes beyond when compared to the public sector, to introduce day care for their employees especially females. This apparent introduction of day care for instance is seen in the Ghanaian constitution for example, in Article 27(2) which points out the provision of day care services for younger children, so their mothers have full working concentration (The Constitution of the Republic of Ghana 1992). What then has the type of sector got to do with the number of females in the profession?

According to Ayogyam et al. (2014), they explained that the sector in the labour market does not necessarily give cause to fewer females in the profession per say. But, the duties assigned to the females when they advance to a higher career level rather constraints their ability to balance her work and social life despite her preference in a sector. So, despite most female engineers would prefer the public sector over the private sector due to flexible working time, the instance of more responsibilities associated with a rise in career level, constraints their efforts to address work-life balance. The higher one's level, the more the responsibilities assigned, and the challenges in balancing the work and social life of the female (Ayogyam et

al. 2014). Again, the reference given by Mehra and Gammage (1999) on females' choice of the public sector over the private sector based on time- flexibility is not coherent here considering the presence of some female engineers in the private sector. As cited earlier, some private sector companies provide the females with day care services which affords the females also some time flexibility at work. The main issue here however, as cited in both Ayogyam et al. (2014) and Duxbury and Higgins (2001) is how the workplace has contributed to addressing the challenge of the female engineer in balancing work and social life, and to enhance her participation in the profession. According to Duxbury and Higgins (2001), the perception of more time for social role is pronounced in the above elaborations on the choice of a sector. Because, as they argued, Duxbury and Higgins (2001) the salient reason the females cited in their choice of sector was the time to balance between work and social life. Most female engineers are aware of the high time-demand of the job, and like any other jobs, they are prepared to embrace (Baryeh et al. 2000). However, their struggle to balance the job to their unaddressed social role is what constraints them. If their social life were to be satisfied or addressed to a degree, the reference given by Mehra and Gammage (1999) for instance about more women in the public sector possibly would less likely be the case. However, since women move into a specific sector, it possibly means there is still the imbalance in terms of the profession addressing work-life balance which has caused not only women switching sectors but reduction in their number as such.

These discussions above on having time for work and social life, leads to the second point on the work-place policy addressing work-life balance: parental leave.

Parental leave also termed as family-oriented leave or family-friendly policies, aims at supporting workers by allowing them time off from work to attend to their roles like nursing a baby, taking care of sick children etc (Berg et al. 2003). In Ghana, the parental leave is also called the maternal leave or maternity. It is an enforced labour policy at the workplace found in Article 27(1) of the constitution and Article 57 of the labour law (Ghana Labour Act 2003; The Constitution of the Republic of Ghana 1992). The maternal leave policy in Ghana offers the woman time-off (three months) from her work to take care of domestic issues especially when they give birth. Most females are also paid by the company they work for whiles on leave and are provided with further support in the form of extended leave due to one reason or

the other⁷. Thus, this policy helps in reducing the overload of responsibilities from work and family interference when the months allocated to her is solely for her social role (Duxbury & Higgins 2001).

Despite the role the parental leave has played in addressing the work-life balance of the female engineer, it has challenged the female of which has affected her participation in the profession. These challenges in the leave includes the bias against women with regards to unshared reproductive role, and to the period given for the parental leave.

For example, the term parental leave is synonymous maternity or maternal leave in Ghana, and this assumes that the female worker is the main and sole person responsible for such leave. Also, the policy gives interpretation that, unlike other workplace policies on career advancement which covers both the male and female, the maternal leave literally suggests the bias against women and leaves men out regarding the share of the reproductive responsibilities. In looking at the Ghanaian laws for example, paternal leave is either absent in the state directives or not clear in the Labour Act. While countries like Norway includes paternal leave in their workplace policies to address an equal share in reproductive responsibilities per say, similar case is not said regarding Ghana. The absence of state workplace policies acknowledging males' share of the parental leave drives home the point, the bias against females in solely performing domestic duties. The relevance of this point here suggests, the state of Ghana has translated the belief of females as being solely responsible for domestic duties, into the formal state policies of which its interpretation is seen in the term maternal leave. In the case of the female engineers, the high demand of time in the job as stated earlier, challenges their dedication to their work and their domestic roles. The inability of the state and workplace policies to include males in the equal share of responsibilities has given them the cause to mostly move out of the profession briefly or to switch to a different profession altogether. In the case of a brief absence in the profession, majority of female workers who are challenged in balancing their work with their unshared responsibilities, take time to stay at home and nurse their children till they are off-age or get someone to cater for them (Lyng 2010). According to Hill et al. (2010), majority of female engineers who leave the profession and switch professions, are mostly due to the challenges the workplace policies have created in terms of not highlighting the equal share of their reproductive roles with their

⁷ In the Ghana Labour Act, an extension is necessitated when the baby is ill, the mother attending to the baby is ill or both are. It falls on mostly health reasons (Ghana Labour Act 2003).

partners. The writers added, the parental leave has constrained the female engineers to the extent, for the few who continue to stay in the profession, or for the young aspiring female engineers, their choice of the area of specialisation is affected. For illustration, the writers cited that, when comparing the number of hours spent at work in the electrical or the computer engineering specialisation for instance, as compared to the biomedical engineering fields, most female engineers would rather choose the latter of the specialisations. The basic reason being, since the parental leave has become biased against them, and they bear the sole responsibility in terms of the reproductive role, their choice of specialisation stood the chance of being affected especially when it demanded more working time. So, by choosing an area in engineering which demands less of their time at work, at least, they could afford time for their domestic chores and remain in the profession (Hill et al. 2010).

Additionally, the period of parental leave tends to limit the extent to which the female engineer can stay at home and attend to domestic duties for which they went on leave for. According to Ray et al. (2011), at least six weeks to twelve weeks are allocated for working mothers in terms of maternal leave especially in the USA. Similarly, about twelve to twenty weeks or more than ten months are allowed for working mothers to proceed on maternal or sick leave in the cause of their employment (Ruhm 2000; Waldfogel 2001). As already said, the maternal leave is mostly three months in Ghana. In observing these periods, the question that runs through these writers' opinions focused on whether the period was enough for the female worker, and in this case the female engineer. This is because, there has been calls for an increase in the period allocated for maternal leave, for the mother to have ample time for the baby, saying the minimum six weeks is not enough (Berger & Waldfogel 2004). Nonetheless, Berger and Waldfogel (2004) cited, it would not be a matter of the period being enough or not since the policy on parental leave is not meant for a very long period. But, the main matter rather, was to address the point on shared responsibilities by including the paternal leave in cases where workplace policies did not include that. The writers were of the view, female workers generally left the labour market when their work were interfered by their domestic responsibilities to the extent they had to sacrifice their profession to cater for their domestic responsibilities. Similarly, Frueh (2014) cited that female engineers likely did not stay in a kind of working environment which did not consider a balance between the work and their social life.

In summary, the challenges the female engineer faced with regards to work-life balance are not being addressed either by her preference of a sector in the labour market or by workplace

policies on parental leave. Rather, the female engineer is challenged based on the interpretation assigned to her role in the society which is found in the workplace policies. By assigning the sole duty of the parental leave to her, the policies have constrained the female engineer's effort to balance her work and social life. What the female engineer is being constrained with is the perception of constantly being pulled away from her job because of her social roles of which the workplace has not been able to address to a considerable extent.

Both the career advancement and work-life balance policy at the workplace contributes to the few number of female engineers in the profession. As discussed so far, the workplace efforts in ensuring equality in terms of equal employment opportunities in its activities like training and developing their employees and addressing the family life and social needs of the workers, yet the female engineer remains challenged. The main challenged drawn from the workplace is by the translation and interpretation of the female reproductive role as solely her duty, which excludes the males from the parental leave for example. Again, the preference some employers have for male engineers over the female engineers in terms of career advancement is implied as their inability to be consistent at work due to the belief of their domestic or reproductive role. As a result, the challenged female engineer opts to either take a break from her job to cater for her child, which the probability of returning is less like likely, or the aspiring female engineers would switch their professions and pursue a different field altogether.

The next section in this chapter focuses on the state as the other formal institution in this study, which has been identified as a possible explanatory factor accounting for the low number of female engineers in the labour market.

2.5 The state

The state is a formal institution which has functions that serves as regulatory mechanisms. (Wong 2012). One of its functions is making of laws, and policies which focus on gender equality in the form of female employment in the economy. In Hernes (1987), gender is now a relevant factor in determining policies on various levels; a central field of inquiry and a political view. Gender has become a central field of enquiry which determines the growth of a state; increased inclusion in both male and females' participation translates into the probability of a diverse economy leading to increased economic gains. A political

view⁸ in the sense of being part of different governmental agenda and activities to address gender and its related issues. In this regard, the economy and the state policies are discussed with respect to influencing the number of females in the engineering profession.

First, the economy of a state influences the labour population. An economic development for instance in terms of international trade, export and imports brings opportunities which breaks down entrenched gender roles. Because, as more jobs occurs, it calls for an all-inclusive participation of which both male and female are involved (King & Mason 2001). For instance, the industrialisation period in Ghana around the 1970's, led to the increased demand for employers, gradually witnessing females moving into several electronic assembly plants and other technical areas (Ghana Statistical Service 2014a). Again, the state-owned-enterprises, serve as a major employer due to diverse opportunities available, and other characteristics like job security, wage equity, less subjectivity to profit constraints (Voinea & Mihaescu 2012). And similarly, through international trade, private businesses also bring job opportunities. According to Bhattacharya and Rahman (1999), the gradual economic growth in Bangladesh encouraged more participation of females into the export industries, and the rate of men to women working were almost the same. These related instances, encouraged females to enter the labour market and assisted in the sharing of financial responsibilities in the homes. The perception of an advancement of the traditional productive role of women has been moved from menial jobs into formal and well-paying jobs which therefore places value on their labour. However, the above conclusion appeared too soon in this context. Despite the economy encouraging all-inclusive participation and encouraging more females, the state presents a situation that constraints the female worker.

Both individuals (male and female) enter the labour market but with unequal access to resources- support from workplace policies, or credit facilities etc. (Cook & Razavi 2012). Hence, although there is a change in the economy even in a spate of a developed one, the female could still be constrained. This is because, resources shared on the bases of gendered stereotypes on roles, could affect those involved even if the state could afford more. In the same example above regarding Ghana, the females were employed based on their traditional role as secondary workers and not necessarily as specialised and highly skilled workers. As such, the females lost their jobs, and their numbers reduced due to the collapse of these state-run-enterprises years later (Ghana Statistical Service 2014a). The case of Bangladesh as

⁸ Ghanaian political campaigns are mostly infused with the term 'all-inclusive government' to denote equality.

presented in Bhattacharya and Rahman (1999) also narrowed down on the female industrial workers being employed. They were placed into less skilled areas and with less wages based on the purpose of the dominant export industries built on cheap labour of women. So, though each female in the cases above were employed in male dominated professions, they were placed in less skills areas, and not accorded with the opportunity to advance, or the responsibilities to resources like training facilities to increase their skills (Moser 2012). The notion of the right to participate was achieved because they were employed. But both the responsibilities and opportunities attributed to a continual 'journey' of equality, fell short, depicting a 'break' in the chain towards a realisation of gender equality in male-dominated fields. The characteristics of the jobs assigned to women depicted the values associated to their productive roles: less-skilled, less-paid, and secondary earners summarising cheap labour (Moser 1989). Such instances, limits the number of females in male dominated fields because of the general perceptions the state attached to their form of labour- secondary, and though moving them into paid jobs, the jobs were less-skilled and with lower pay as compared to their male colleagues.

Secondly, state laws, and policies on labour are related to the representation of men and women in the labour market (Squires 2007b). According to Baah-Boateng (2004), the Ghanaian state's deliberate actions through policies to improve access, is pushed onwards to encourage participation in not only at the entry level of employment but at top management level, and in gender segregated fields. Ghana for that matter, has the National Gender Policy, and the Labour Act that addresses the participation of men and women in the economy (Ghana Labour Act 2003; Minsitry of Gender Children and Social Protection 2015). Likewise, Hernes (1987) narrows her example to success of the Nordic countries' policies on gender. Their policies not only '*pulled*' (access) women into the public sphere, but the women began to '*push*' (participate) development in accordance with their own interests.

Although labour and gender related laws, and policies were designed to achieve equality, its relevance towards equality fell short after females' entry into segregated fields. These laws, and policies did well in enhancing the rights to access and participation by females. However, Hernes (1987), was of the view, the above laws, and policies for women did not necessarily result in equality but: reduced gender gaps in the labour market. It also improved the economic status of women. So, the matter of gender equality was limited to a reduced gap, and an increase in the economic rights of the woman but then, not her reproductive rights as discussed in the earlier part of this chapter. What then causes the limitations of states' labour

laws, and policies which are meant to address under representation of females in the engineering profession?

Molyneux (1998) cited the focus of *gender* in state laws, and policies, and priorities attached to gender issues in projects. Viterna and Fallon (2008) mentioned limited resources to gender-related projects. These reasons give awareness to the instances which amount to the state failure or limitations in addressing the dominance of males in the engineering profession. Whiles the use of ‘failure’ is such an absolute conclusion, the apparent under-representation of females gives cause for such conclusion despite efforts made.

The first instance shows states’ failure in recognizing what the state’s gender policies addresses. This leads to the policies failing to address equality as it is intended (Hernes 1987). Because, these labour policies are likely to either look at the economic lives of women and leave out their social lives, or create the implicit illusion of catering for both but leaving one aspect redundant (Peet & Hartwick 2015). Such presents the case of work-life balance as examined earlier. Therefore, whiles the women are allowed into the labour market, their social lives are affected; whiles they get equal access to education, their numbers in certain fields are still low. Whiles economic equality is reduced, the social equality is increased through policies like maternal or holiday leaves. A clear illustration is found in Article 55-57 of Ghana Labour Act (2003) which addresses the protection of working women only with relation to their reproductive role (pregnancy) whiles the rest of the Act was silent about the “other” women who were not pregnant. Accordingly, this state instrument purported to assist pregnant women but excluded another category of women- those who were not pregnant and lumped their needs with that of their male colleagues. This clause, Article 55-57, has rather been translated to all women despite their status as being pregnant or not. Female engineers in the mining industries in Ghana stand the probability of not being included in night shifts or working extra shifts as compared to their male colleagues. This limits their economic roles as workers, in terms of earning more and gaining more competence at the work. These examples show policies acknowledging the reproductive role of the woman without further making provisions for other class of women- un married, not pregnant etc. (Peet & Hartwick 2015). It also presents the transformed interpretation of societal construction into this formal institution. The influx of traditional stereotype into the state affairs and aligning the direction of the policy to such area of state action- policies (King & Mason 2001). Having such section in a state policy which does not entirely look at the needs of women but at an aspect, makes it one-sided and biased towards another group (Peet & Hartwick 2015).

The second instance is on resources associated with gender policies and their influence on policies' effectiveness (Viterna & Fallon 2008). To observe how effective policies are, there need not be only thorough analyses of necessary factors but proper allocation of resources (financial and material resources). Therefore, if there continues to be low women in the engineering field despite the state's effort in policies to increase the number/ quota of women, then the policy needs to be re-examined (Squires 2007a). When a state's project on gender issues is limited financially, the priorities of various agencies and programs are realigned to suit the current demand. Molyneux (1998) observed governments naturally varied in the support given to gender equality and women's projects, and the extent of their support were affected mainly by funding from the state and other corporate bodies. This directly led to the conclusion of Molyneux (1998) again in priorities aligned to gender issues in state policies. Decisions made at the state level and their institutions rested on control and access to resources.

In fact, the Ministry of Gender, Children, and Social Protection (MoGCSP) in Ghana was termed as a *consuming machinery*. Because, it was perceived as taking much resources which could have been directed to other areas of the state (Minsitry of Gender Children and Social Protection 2015). Hence, the state redirected its focus on pertinent issues like health and literacy which appeared to be top priorities as opposed to gender matters. This, often leads to the deviation from the initial plan of policy makers (Hernes 1987). Two thought-provoking observations were noticed in these prioritised areas with the example from Ghana. One, the state failed to realise gender issues could not be excluded in these prioritised areas of health or literacy. Take for instance, health which includes maternal mortality rates, and literacy, female literacy rates. The second observation falls on the underachieved goals attached to these prioritised areas. Both the health and literacy rates with relation to the MDG goals in Ghana were still not achieved per the report. As a matter of fact, the female rates in waged employment also was affected (National Development Planning Commission 2015). Another instance in the Latin American ministries on poverty programs vaguely reflected gender issues in their policy designs and implementation. These programs eventually did not achieve the desired results because the factor of gender was not highlighted as a priority.

From the above, the state has influenced in the increase of female participation in the labour market. The limitations found in the state policies regarding gender issues have restricted the extent to which females can progress and increase in number in male dominated professions.

Thus, despite state policies, the issue of male domination in professions like engineering is still paramount.

The formal institutions in the society, that is the state and the workplace, through their policies have influenced the numbers of females in the engineering profession. The workplace policies on career advancement, and work-life balance, as well as the state's economic and labour policies have contributed to the low number of females in the engineering profession.

Chapter three

Research Methodology

This chapter describes the stages of the study, and methods employed. These include research design; population; sample size and sampling technique; research instruments; data collection procedure. It finally looks at data analysis and ethical issues of the research.

3.1 Research Design

The research design is my plan on how to implement the research in practice; it fundamentally describes how, when, and where data are to be collected and how the data will be analysed. In short, it constitutes the blue print for the collection and analysis of the data.

I employed the qualitative research method in this study because:

- a. I began the study with a general research question and not hypothesis as generally seen in quantitative methods;
- b. I chose a rather small purposive sample (not random) which may not be representative of the larger population.
- c. I also intended to use a semi-structured interview for data collection.
- d. And I planned to present results of the study exclusively in words rather than statistics or numbers as seen in quantitative methods.

Summarily, the in-depth and descriptive nature of this study, provoked my choice of a qualitative data which shares characteristics of using words to explain phenomenon as opposed to numbers.

3.2 Population

The population of the study consisted of *forty (40)* professional female engineers in diverse disciplines⁹ in the labour market in Ghana.

3.3 Sample size

The sample represents a fraction of the population in a study (Berg & Lune 2012). The number of respondents in a research investigation, according to Bell (2014), will necessarily

⁹ See Appendix A3

depend on the amount of time one has. In this study, it was not only time that was of an essence, but the characteristics of the respondents.

I obtained *sixteen (16)* respondents out of the forty (40) female engineers due to the preference I relayed in my introductory letter¹⁰ to my informant. All the respondents were in Accra, which is the capital of Ghana and harbours majority of the engineering companies. Time was of an essence since I had only four weeks, to gather data and return. So, the choice of location also, influenced my purpose of choosing sixteen (16) respondents in Accra only where I was based. Secondly, with reference to tenure and professionalism, I focused on females who have worked more than 5 years in the profession. Since, I was of the view, they had more experience regarding females in this male dominated fields. Also, their professionalism regarding taking up certification to be professional engineers; something which requires more than being a graduate engineer, but writing of examinations, projects, and passing challenging case studies to become a certified engineer. Therefore, using these two reasons: location and characteristics of the respondents, directed my attention in arriving finally at the sixteen (16) respondents.

The sixteen (16) respondents summarily were:

- a. Professional female engineers who have worked for more than five years and are corporate members (fellow or class member) of the Ghana Institute of Engineers (GhIE)¹¹.
- b. Ten (10) of the sixteen (16) had face-to-face interview while six (6) received the interview questions to respond to, because it was not possible to meet them face-to-face to interview them as planned.
- c. My sample size did not include self-employed female engineers. This was because of the focus of the study on the institutions that influenced the presence of females in the profession, as such a focus on the workplace policies for instance.

In addition to sixteen (16) respondents, I relied on two main state documents; the 1992 Ghana constitution, and the Ghana Labour Act 651, 2003 because, they added further explanation in terms of legality regarding the topic under study. I referred to some articles and sections in them, to examine what laws are in place regarding female participation in the labour market. When I analysed the data from the respondents, I used these documents as reference points to

¹⁰ See Appendix A1 for introductory letter sample

¹¹ (<https://constructionreviewonline.com/2017/03/registering-with-the-ghana-institution-of-engineering/>)

check legal issues regarding points raised by these respondents. For instance, when citing of paternal leave was mentioned in the interviews, I checked in both documents to see what the law says about such leave, and related legal provisions on that. One (1) other state document I briefly used, was from the Ghana Statistical Service (GSS). This state document provided statistics on male-to-female differentials with regards to the labour market.

3.4 Sampling method

I used both the purposive and snowball technique concurrently. The main idea of selecting a sample size of sixteen (16) respondents was due to the foreknowledge I had about where to go, what group I want to choose from and who to contact. In purposive sampling, having a fair idea of the target group, reduces the tendency of choosing respondents at random or for convenience sake (Bryman 2012). Since, I knew I needed data from respondents bearing characteristics like I mentioned above, I contacted the GhIE; institution for professional engineers. So, the first step in getting female engineers was solved. However, because this institution also had members who were also in the informal sector, less than five years in service, and in other parts of Ghana (outside my scope), I then employed the assistant of an informant. Therefore, alongside the purposive sampling, the idea of an informant further produced the results of the snowballing technique, which is also known as the chain referral technique in (Berg & Lune 2012).

Before the field work, I contacted an engineer in Ghana through an official email with an introduction letter regarding my intent, and the summary of the thesis. This engineer serving as a key informant, forwarded the email to other female members who accepted to be participants of the research. I contacted her because she is a long serving member and a board executive of GhIE, and recently, the first female to head the institution. I specifically wanted a group which could provide answers based on their experiences in the profession and linking to the objective of the study. These reasons informed the use of the snowballing technique which led to a sampling of network of professional female engineers (Berg & Lune 2012). For other members who due to some reasons did not receive the emails, their colleague members also referred me to them where I presented a hard copy of the introduction letter. As Neuman (2005) cited, a sample of network usually occurs when participants in the same group keep referring others with similar characteristics to the researcher for participation. Sixteen (16) female engineers became my respondents for the study after I contacted them through a formal email which was attached with a brief description of the thesis (see appendix).

3.5 Research Instruments

The research instruments used in this study for data collection were; semi-structured interview, and questionnaire.

3.6.1 Semi-structured Interview

I mainly employed the semi-structured interview. Because, in comparing the semi-structure interview to structured interviews which I have used in some term papers in school, I recognised the semi-structured type was preferably flexible since further questions were asked outside the scope of the set questions. The face-to-face part of the interview also used to study non-verbal cues like the facial expressions which were relevant aside listening to the respondents. One setback though was the time limit each interview lasted, thirty (30) minutes; mindful of the fact that the interviews were conducted within official working hours and could not have gone further than that.

3.6.2 Questionnaire

The idea of a questionnaire was originally not included in this thesis. I employed it as a form of a second method due to the six (6) respondents cited earlier in this chapter. This approach was taken based on two reasons: two (2) of the participants were at a conference outside Ghana as at the time of the field work, and the method of teleconference although possible on their part was challenging to me. This was due to the technical constraints of frequent disruption of internet services. The other four (4) respondents declined to the face-to-face interview because of a situation at their workplace. These respondents could not grant the face-to-face interview because of some form of workers' agitation that took place at the premises of the company and that it was difficult for me to be granted entrance to meet with the respondents. Although the 6 respondents were limited to the main interview questions, I had the opportunity to make follow up phone calls to three (3) of these respondents for further clarifications to their responses. I however, faced no challenge in this form of collection method since the responses addressed the focus of the study, and the follow-up calls clarified their responses further.

3.6 Data Collection Procedure

I scheduled different appointments for the face-to-face interview with the ten respondents based on the time and day they were available for the interview. The face-to-face interviews with the ten (10) were held on separate days in their respective offices or conference room.

Altogether, both the interview and questionnaire responses took one and half weeks to be completed.

I began the interview by asking about the respondent's area of specialisation, why that choice of such area, the profession, and organisation. I did that to build rapport with the respondents before the main questions. For example, the length of tenure and specialisation in the field showed the diverse experiences each respondent had based on their long years of stay and diversity in specialisation. Neuman (2005) termed these questions as "throw away" questions because although they are not relevant or form part of the main questions, they help in building understanding and providing some useful information to the researcher.

For ethical reasons, I sought the consent of the respondents to use mainly a recording device to capture on tape the interview as aside the note pad. And explaining to the respondents, where I was unable to put words together well, the recordings on the device would be used to fill in the gaps. More of the voice recorder was used because I paid close attention to what the participant was saying and at the same time observed non-verbal cues. The ethical consideration of informed consent with regards to the use of these recording materials, impacted positively in the interview because it gave for instance, one participant the liberty to politely ask for a pause in the recording. This was because she was uncomfortable of an example she cited that she felt could be traced back to her if the research got published¹². I also recorded the chit chats (informal chat after the schedule interviews) after the interviews, as it was equally beneficial to the main sessions since some participants were still commenting on their responses. However, based on my assumption that the rule of informed consent applied in the instance of recording the main interview sessions and to the chit chats, the participants in the first two days' sessions were not aware of being recorded after the interview. Nonetheless, after those days, both the main and informal conversations were recorded with the remaining participants' consents.

3.7 Data Analysis

I analysed both the audio and written notes from the interview and the questionnaires by transcribing, putting them into themes, and categorising the themes into sub themes.

Transcribing simply means changing one form of data into texts, and in this case, the audio notes into a text form to be compared with the ones I wrote alongside in the interview (Berg & Lune 2012). There were two reasons I focused on in transcribing my data and I found these

¹² Their names have been changed in this study due to anonymity reasons

reasons also related to what Bryman (2012) and Berg and Lune (2012) similarly cited with regards to transcribing data in research work- thoroughness, subjective and trustworthy. My first reason was based on my focus on producing a detailed work with regards to addressing the research objective. Therefore, as I transcribed daily after every interview session, I observed whether the responses were detailed in terms of response and addressing the objective. The second reason was based on trustworthy as mentioned in Berg and Lune (2012), and subjective in (Bryman 2012). I looked at both subjective, and trustworthy in these instances. I almost added my personal assumptions regarding the responses I obtained. By comparing both the transcribed texts, and the field notes, I noticed either the transcripts or the notes gave a reinforced meaning to what was obtained without my assumptions. For instance, when the first three (3) respondents cited “traditional stereotypes” as a constraint, I noted it down without further clarifying remarks against the questions, although the respondents kept elaborating on that point. After that session, I read the notes and quickly concluded that was the final and main theme and probably that would run through the remaining interviews since the respondents shared similar characteristics¹³. However, upon transcribing, I realised they further concluded on the *state*, rather than the *traditional stereotypes*.

Nonetheless, the transcribing of data in this study, enabled me to form themes mostly out of the descriptive phrases from the texts. Since most of the main interview questions¹⁴ were related to the female engineers’ experiences in the engineering profession in Ghana, I looked for main words or phrases that described possible explanatory factors to their number in the profession. Having said that, because I reviewed relevant literature¹⁵ regarding this topic, I was guided by such to recognise similar instances that could be found in the Ghanaian examples, or any other new observation, different from the reviewed literature. For illustration, some literature made mention of workplace policies influencing female participation in the labour market in general. What I was looking for was whether this same applied in the case of Ghana, and in the engineering profession. When I found a similarity like such, I themed them as *workplace*. At another instance, when the literature did not bear semblance to my data, a case where gender discrimination was not cited as one of the main reasons for their choice of sector, it reflected the theme, *equal employment opportunities* and

¹³ I in fact, emailed my supervisor regarding this observation, and quick conclusion. She, however, advised me to finish with the data collection and analysis in order not to make a presumption too soon.

¹⁴ Both the interview guide and questions were formulated based on reviewed literature, and in line with the research objective and question.

so on. Although I presumed it was not entirely necessary that the data found some semblance or not with the reviewed literature, the idea of finding an additional information, something different regarding already existing literature was what the study was also about: to add to existing knowledge.

Furthermore, I categorised the themes further, into sub themes by placing them in a tabular form and under headings. These were grouped under related categories. In Berg and Lune (2012), the writers termed this as tabular coding, where texts or themes are placed in tables under headings which describes them. The aim of this process, is to further reduce the numerous transcribed texts and to observe emerging and relevant themes related to the objective of the study. In my analysis therefore, the categorisation or coding of the themes brought out the possible explanatory factors. So, as I explained earlier, as some texts from transcriptions appeared to have similarity in terms of descriptions with reviewed literature for example, I placed them further under their appropriate and relating headings. For instance, when all respondents had family or social life interfering in their work, this response was initially placed under the main theme *workplace*, then to, *work-life balance*. When some went further and elaborated, their social life bordered around their role as mothers, I further grouped them under the sub theme, *reproductive role*. With various other descriptions reflecting more on work-related constraints especially regarding work-life balance, the sub theme, *reproductive role* served as the main descriptive theme on which the results of this study revolved. And this theme in the analysis of the interview, gave cause to referring to specific parts of the state documents I mentioned earlier as a form of legal reference in this study as well. Because, I wanted to check for the legal provisions regarding females and work-life balance especially in view of their challenging “reproductive role.”

Accordingly, the dominance of work related issues and the Ghanaian female engineer, coupled with the emerging theme of work-life balance, directed my attention to the specific aspect of the state’s constitution and Labour Act with regards to this. For, in some of the recordings, the respondents kept referring to either one of these mentioned state documents, with regards to the constraints the female engineers faced in the Ghanaian Labour market. Therefore, I briefly analysed the following examples in both the Labour Act and the state’s constitution: *Chapter 5 of the 1992 Constitution of Ghana on the Fundamental Human Rights and Freedom*, and *Part VI of the Ghana Labour Act 651 on employment and protection of women*. These two parts of the documents, provided legal provision and explanations towards the emerging theme found in the interview transcripts.

3.8 Ethical consideration

- a. Informed consent: I informed the respondents beforehand with the use of recording materials, and the liberty to refrain from answering questions they feel uncomfortable with. Also, the introductory letter explained the purpose of the interview to respondents and assured them their responses would be used for academic purpose only, and that the researcher takes personal responsibility for any shortcomings that may arise¹⁶.
- b. Privacy and confidentiality: In the use of data and its analysis, I, in reporting the research, ensured confidentiality and anonymity of the respondents. In the case of using names in the results section of this study, their identity has been changed. The only specific citing of a possible identity is the informant whom I mentioned as the first female head of the GhIE. However, it was for the acknowledgment of her historical role as the first female head, and not to cite her specific responses in the study.

¹⁶ Appendix A1

Chapter four

Results

This chapter explains the results of the study. A descriptive approach was adopted to interpret or describe the responses made by the respondents to the interviews and the questionnaire in relation to the research objective and question. The chapter is divided into two parts; *findings*, and *discussions*. The findings are based on the females' response regarding their views on equal employment opportunities, and experiences in the profession, which in turn, gives further credence to what has accounted for their low number in the profession, and who to address such issue. The second part of this chapter is the in-depth discussion of the findings. The concepts and theoretical framework in this study are regarded to add further explanation in the discussion. Also, as cited in chapter three (3) in this thesis, the legal provisions in the two Ghanaian legal documents used as references, is included in the discussion

4.1 Findings

4.1.1 The Female Engineers' Experience in Ghana

This section focuses on the female engineers' experience in the profession. It first presents the findings on their experience about equal employment opportunities in the profession, then the reason for the choice of sector they work in. These two questions were basically used to find out the respondents' knowledge regarding gender equality in the profession, and what their experience could possibly be used to address the research question.

To begin, majority of the respondents were asked about their experience on equal employment opportunities in terms of recruitment, career advancement etc. as compared to their male colleagues. They stated, the engineering profession in Ghana offers equal employment opportunities to all workers. Some female engineers added instances where females were even preferred, over the male colleagues; to debunk the perception of male preference in the profession. *"in my company, female engineers have been encouraged to have training and specialisation opportunities because it is a company policy to empower more women."* (Interview with Belinda Asare, 13/02/17). The respondents again cited the notion of bias in the choice of gender, on their part, was not obvious in the recruitment into the job. As an example, some referred to diverse means by which they entered the profession: recommendations, networking, walk-in, or by appointment. In all these means among others, these female engineers added there was fairness in recruitment and no sense of gender

discrimination. One female electrical engineer noted, her organisation is keen on employing more women into the field, to balance the number of men in there (Interview with Ama Ampomah, 14/02/2017). Another recounted, *“an organisation applied through my institution, and requested for female engineers specifically.”* (Interview with Araba Sam, 13/02/2017). She explained the recruiters mentioned aside embracing equality in their employment processes, the female engineers’ retention rates were lower as compared to their male colleagues.

Yet, the few respondents who cited a hint of inequality in terms of employment opportunities, directed it at the perceived frequent absence of females due to maternal leave especially. This is because, the Ghanaian male engineers do not frequent such leave therefore the choice for the males in employment is likely to be higher as compared to women. This statement is comparable to what was cited in (King & Mason 2001). According to these writers, women are perceived as being less consistent with their work attendance due to their roles at home as compared to men. One respondent, Araba Sam gave an instance from her first job. She recounted how she could spend more time at home because her first child was often ill. This situation at home affected her attendance at work to the extent that her position was reassigned to her junior male colleague. She also *“lost the chance of being promoted”*. Her supervisor told her, he preferred someone who was always at the job. (Interview with Araba Sam, 13/02/2017). Another respondent shared her experience when she entered motherhood; *“my days at work reduced since I had to take care of my son, even after the three months leave period...I had to work three days and exclude the weekend shifts as well* (Interview with Grace Asare, 13/02/2017). Also, citing her interview for her present job, Clara Baiden mentioned her boss continuously asked her if she would be able to work consistently since *“...women are known to take off anytime and look after the children and leave the work for others (sic)”*. The respondent said, this statement made her understand why that company was known for hiring more men than women or women who were, presumably *“done with child birth” (sic.)*, because these two groups of people do not go on maternal leave as compared to the new mothers (Interview with Clara Baiden, 01/03/2017).

The finding above shows the respondents were aware and have experienced equality in the profession. By citing these instances, the respondents mentioned, gender equality has been achieved simply by their mere presence in a hitherto, male segregated field. Notwithstanding, they viewed the implicit preference of male colleagues over them in situations which considered their consistency at work; being regular at work was a sign of inequality. They

said that, by some employers using the female engineers period of motherhood to assess their consistency at work and further, to choose their male colleagues over them, showed the limitations the equal employment opportunity in the labour market has.

Apart from their experience with regards to equality in the workplace, I focused another interview question on why they chose a sector over the other, to see whether it had any reason to do with gender equality in the profession as they previously elaborated on. From the findings related to this question, majority of the respondents worked in the public sector as compared to the private sector. The choice of sector was informed based on some instances they mentioned as part of their work experience. In their statements, the *high demand of time*, and *career advancement* were the paramount instances that informed their choice of either the public or private sector. For example, Clara Baiden mentioned she has been in the public sector for close to seven years, and the flexible working hours influenced such choice (Interview with Clara Baiden, 01/03/2017). Also, Ama Ampomah was attracted to the career advancement opportunities in the private company she applied for, hence her decision to move into the private sector (Interview with Ama Ampomah, 14/02/2017). Moreover, Andrea Mensah cited, she moved from the private sector to the public sector after five years since she wanted flexible time for her family which she was not experiencing in the private sector (Interview with Andrea Mensah, 01/03/2017). The respondents stressed however that their work experiences were not influenced because of their gender, but a general characteristic of the profession which is seen in Ghana as tedious and time demanding, but with a good career progression.

Referring to most respondents in the public sector, and about time spent at work, their choice was informed by the flexible hours in this sector. The same reason of flexible time in the public sector holds for a report in the CEDAW (2006) from Ghana showing 4.1% females in diverse professions in the public sector as compared to a close gap of 3.4% in the private sector. In the report, it was cited that, female workers in the formal labour market preferred the public sector due to the flexible working hours. These respondents having spent about five (5) to ten (10) years as practising engineers with their respective public-sector organisations, cited, the flexibility in time afforded them some period towards their social responsibilities. One respondent mentioned, she had a small business that she ran after working hours and on weekends. She was able to open this business after she switched from the private to the public sector. In the private sector, it was quite challenging to have time for herself and for other social activities like her new business now (Interview with Andrea Mensah, 01/03/2017).

Linda Asante cited that the flexible working hours and less stress in the public sector encouraged her to take up evening classes related to her field of study; *“ I observed that, if I had enough time at my disposal, I had to improve upon my skills, so I took advantage of the less demand of time at work to attend classes ”* (Interview with Linda Asante, 15/02/2017). Notwithstanding, the respondents added that the flexibility at work changes with the female engineer advancing on the career ladder in this sector. They shared their views that when one gets promoted, the assigned responsibilities increases their working hours and reduces the flexible hours they were used to. Therefore, in their view, the more the responsibilities, the more the time demanded. *“my weekend-off was now filled with Saturday afternoon-shifts at the computer room in the office because I was promoted as head of that unit, and a mentor to entry level workers ”* (Interview with Clara Baiden, (01/02/2017). On the whole, the main reason of flexible hours influenced these respondents into the public sector, and despite the change in the flexible hours when advancing in their career, the respondents maintained it was better as compared to the private sector where some of them used to be; *“at least, it is better than my experience in the private sector...”* (Interview with Andrea Mensah, 01/03/2017).

The respondents in the private sector including those who used to in it but left to the public sector, cited they chose this sector based on the higher opportunity of career progression regardless of the high demand for time attributed to this sector. They cited, the private sector in comparison to the public sector, afforded them diverse training and development opportunities which enhanced their skills, hence inclined to advancing their career faster. Andrea Mensah recounted, in her first two years in the private sector, her company funded her courses she was taking to become a certified biomedical engineer. Apart from that, she was promoted to a higher level within the five years she was in the private sector (Interview with Andrea Mensah, 01/03/2017). Another respondent, Efua Yawson said, despite her challenge in having time for her domestic duties, her career progression was what made her choose and stay in the private sector for close to eight years, of which she is now among the few women heading various departments in her firm (Interview with Efua Yawson, 02/03/2018). Some respondents also were of the view, moving from the private sector to the public sector after some reasonable years of relevant working experience in their respective fields of specialization, helped them. Since their years of work experience enhanced their market value in the public sector, and the public sector places much emphasis on relevant work experience in recruiting engineers of which those from the private sector had advantage of. For instance, two respondents, Andrea Mensah, and Nana Ama Akraasi mentioned, their

career level, and expertise they acquired while in the private sector, enhanced their chances in getting a job easily in the public sector when they planned a switch in the sectors they were working in (Interview with Andrea Mensah, and Nana Ama Akraasi).

The choice of sector, per the findings were not mainly hinged on the belief of inequality but general characteristics of the job based on career advancement, and time at work. While those in the public sector were influenced by the flexibility in that sector, the others in the private sector were attracted to the career advancement in that sector.

4.1.2 Low number of females in the Engineering Profession in Ghana

This part of the chapter focuses on the interview question which addressed the research question in this study. The question was based on their perception of the engineering profession as male dominated in Ghana. By perceptions, the responses were based on their personal experience and observations in the profession. The respondents gave a unanimous response subscribing to the view that, the engineering profession had a low number of females in it and was indeed a male dominated field in Ghana. *“we see more male engineers graduate from college every year as compared to females”* (Interview with Yaa Amoah, 16/02/2017). Another respondent cited that she has seen statistics from her institution- GhIE which suggests the male domination of the profession. She added that, in her class at college, she was the only female student till they graduated, and in other engineering departments, just one or two females were present in the engineering program (Interview with Abigail Osei, 16/02/2017). The respondents gave explanatory factors influencing the low female presence in the engineering profession in Ghana.

The first factor was about the belief on the “nature” of the engineering profession in the Ghanaian society as male reserved or masculine. They explained that, in talking about engineering, it revolves around dealing and working with heavy equipment and tools; considerable risks of danger and hazards and in some cases, injuries that are not known of women to withstand. One of the respondents cited a recent experience in Ghana to buttress this kind of perception. According to her in 2016, the state transport system in Ghana i.e. the Metro Mass Transit, recruited both male and female drivers and trained them to drive the buses. She revealed that the male drivers and a section of the public did not understand why females should be entrusted to drive heavy buses carrying large number of passengers on the road. In her words, some members of the public hesitated in travelling on the buses seen to be driven by women (Interview with Abigail Osei, 16/02/2017). Her response goes to heighten

the belief that certain professions that portray or involve applying some ‘strength’ are the preserve of males.

Another respondent, Sandra Obeng, shared her real-life work experience and stated that a client had approached her company to install a heavy-duty transformer to replace a damaged one. She said, she was assigned to join her male colleague engineers to visit the site, take some measurements, among other things. On arrival at the site, she could hear some of the workers at the company they were to install the transformer, commenting “...*what can that woman do...this is no child job for a woman to do...*”. In her work experience, she tends to receive fewer clients when they become aware it is a woman coming to render service, which affects her wages since her wages were linked to the number of jobs she does in a given period. The gendered nature of the profession has caused some of her colleagues to eventually leave the profession to pursue “a feminine” job (Interview with Sandra Obeng, 10/02/2017). Maame Abokomah also recounted how she must constantly explain to clients that, she is a software engineer and the head of the department who can fix their software issues. She says, most times, clients either assume she is the secretary, or they will rather wait for her other male colleagues to attend to them (Interview with Maame Abokomah, 10/02/2017).

The other factor attributed to the low number of females was the gender stereotypes in the society. “*I think social and cultural norms and generally, how we girls were socialised to think this role is for boys and that is for girls has created this issue...*” (Interview with Maame Abokomah, 10/02/2017). She believed, these stereotypes have found strong expression and reinforcement in the mind-set of many Ghanaians in their interpretation and understanding of gender roles. According to Andra Mensah, “*the main subjects in engineering involves mathematics, physics and technical skills which we the girls have been made to believe we aren’t good at.*” (Interview with Andrea Mensah, 01/03/2017). The impact from the society regarding gender stereotype was explained this way. If society accepts and holds on unswervingly to the practice that, certain professions are meant for men, and others are reserved rigidly for women, there will be the continuous use of biological features to direct the choice of occupations. The “soft” females, will not be assigned to engineering tasks because of the supposedly “hard” masculine nature of the work. For instance, a respondent recounted that when she was in the primary school, there were common utterances by both female and male pupils to the effect that mathematics and science were subjects for male, while subjects like cooking; sewing and needle-work were meant for females. According to her, this made several of the female students shy away from

mathematics and science. She said that this societal gender stereotype became serious when she got to the high school, where fewer females who ventured into mathematics and science were branded as “iron ladies”; they were teased by the male students and even some of the females to the effect that majority of the female students opted to choose subjects outside science. She explained the term ‘iron ladies’ to describe women who compete against male counterparts in activities that require exerting more energy and generally perceived as “natural” for males only and did not reflect the “soft” female characteristics (Interview with Rose Quaye, 01/03/2017). With reference to Reeves and Baden (2000), the use of biological features of men and women mostly directs their career path. By using these features, it influences them to assume who they are and where they ought to be in terms of profession.

But, majority of the respondents were strongly fortified in their view that the **female reproductive role** was the main factor accounting for low number of females in the engineering profession. From the findings, the realisation of this response was from their description of their domestic roles, e.g. “*the job the society has given to the women...the one we do, that the men don't (sic) do...*” (Interview with Araba Sam, 13/02/2017). Another respondent described the reproductive role as “*what their mothers have been doing at home*”, “*the cleaning of the house and looking after the children*” (Interview with Rose Quaye, 01/03/2017). Based on these descriptions among others, it bore similarity to the concept on reproductive roles in this study as a ‘natural’ work assigned to women (Moser 2012; Moser 1989). In explaining how this role has contributed to their low numbers, majority of the respondents cited the state policy on the parental leave. In fact, they mentioned, the parental leave creates the impression that their reproductive role was still a natural role for only the females in the profession. Ama Ampomah said, her male colleagues normally refer to the parental leave as “*that leave for you girls...*” denoting the state’s intervention regarding parental leave as a biased impression the parental leave has created on the minds of her male workers as solely for females (Interview with Ama Ampomah, 14/02/2017). Additionally, one respondent particularly cited that aside the bias in the state’s intervention in the leave as being for females only, the females feel burdened due to the notion of an unshared responsibility about the reproductive role. By referring mainly to the interpretation of this leave in her workplace policies, most of her male colleagues do not go on leave neither do they share this role with their spouses “*...if the leave is also known as maternal or maternity leave, what do you expect, in fact, there is none for the men*” (Interview with Shirley Addo, 14/02/2017). More so, two (2) other respondents were of the view that they have accepted the sole

responsibility of the domestic role. They, in fact, applaud the state in having concerns about their reproductive role and as such, instituting the parental leave in the labour market. Yet, in their view, the three-months period for post-natal care was minimum considering who they would employ to take care of their child after the leave period (Interview with Ama Ampomah and Rose Quaye). Adwoa Boakye said that she had to look for a nanny, and at times, rely on her younger siblings to take care of her three months baby after the period of her leave. She said, it affected her concentration at work when she had to constantly be calling to check on her child (Interview with Adwoa Boakye, 15/02/2017).

The respondents opined, the state policy on parental leave had to some extent, ignored the aspect of female reproductive role in the legal instruments when it came to shared responsibilities especially (Interview with Adwoa Boakye, 15/02/2017). They mentioned that, though the Labour act for instance recognised parental leave and given a three-month period for such, the mere exclusion of males in terms of no paternal leave in the Labour Act has given cause to the unshared responsibility of their role (Interview with Shirley Addo, 14/02/2017). *“I understand the efforts the state policies have put in place to address our reproductive role by implementing parental leave...but the men are left out, making us bear all the responsibilities at home”* (Interview with Ama Ampomah, 14/02/2017).

The above response shows that regardless of the respondents citing the masculine nature of the profession, and the gender stereotypes in the society as possible factors accounting for their low number, their main response was based on the reproductive role. In explaining, the respondents pointed out that, the state, in its efforts to encourage females into the STEMs, has rather constrained them through the introduction of the parental leave. Though the parental leave gives them time to attend to their post-natal needs for instance, the leave is biased, has created the impression of unshared responsibilities, and a constraint in terms of a limited leave period.

4.1.3 State policies and female presence in the engineering profession

Based on the explanatory factors the respondents gave regarding the question on the low number of female engineers, another interview question focusing on whose responsibility it was to address such issue was asked. There was no singular answer as to whose responsibility it was. Whiles some cited the state and the workplace, others cited the state and the educational institutions whiles few cited the workplace together with the educational institutions. For example, on educational institutions, Gladys Appiah mentioned that the

educational institutions needed to enforce regulations on a better practical approach to the teaching of science subjects from the basic schools. She said, if this is done, the passion for the STEM courses will be instilled in the girls at an early stage which will eventually direct them into the STEM fields (Interview with Gladys Appiah, 02/03/2017). Ivy Koduah also shared her view regarding the workplace. She said that, the workplace should make flexible policies regarding leave and include paternal leave which will create and ease in the post-natal care of women. She added, “...*the workplace is where the female engineer would put her skills into practice therefore that place should make her feel at ease*” (Interview with Ivy Koduah, 02/03/2017)

But, the major actor which the respondents pointed out was the state. In their view, Abigail Osei, and Ama Ampomah mentioned that despite their examples on the workplace, and schools as actors, the state served as the main institution responsible for addressing such issue. Abigail Osei added that, the state makes the laws which the workplace or the schools follow, so the state must also begin an initiative to increase the female engineers’ numbers, to be followed by these two other institutions (Interview with Abigail Osei, 16/02/2017).

Another of the respondents said further, the state must put in significant efforts in what the state has already began regarding gender equality “...*involving women in the sciences, and now we are even engineers, but we need more of us in here...*” (Interview with Aba Amoah, 14/02/2017). One also was of the view, the dominance of equal employment opportunities in the profession speaks highly of the state’s efforts in terms of gender equality for example. She recognized some specific areas in the constitution and the Labour Act which focused on female workers in general. For instance, her knowledge of the Labour Act focusing on maternity, sick, and annual leave for women gave credence to the efforts the state put into female participation in the profession (Interview with Ama Ampomah, 14/02/2017). Abigail Osei also shared that, the state directed the affairs of other institutions in the country so, addressing the issue to increase their numbers would be emulated by their workplace also. She was also of the view; “*the state has made a lot of lip service or unfulfilled promises regarding increasing females in STEM.*” And the low number of females’ engineers in the profession shows how the state’s policies fail at achieving the full aim of gender equality (Interview with Abigail Osei, 16/02/2017).

From the above, the respondents identified various actors in the society- the state, the workplace, and educational institutions in addressing the low number of female engineers in the profession. The state was cited as the main actor to address the such issue. The

respondents also cited that, since the state has encouraged equal employment opportunities and has made it enforceable in other state institutions, an effort to increase the number of female engineers would also be enforced and emulated by other institutions.

In conclusion, the findings have showed there are equal employment opportunities in the engineering profession in Ghana based on the female engineers' experience. Also, their choice of sector in the labour market was informed by the general characteristics of the profession in terms of flexible working time, and career advancement. In response to their low number in the profession, the female engineers cited the perceived nature of the profession being masculine thus not encouraging females to pursue the profession. Another reason referred to the gender stereotype regarding roles for men and women and this affected their choice of profession. The last factor, which was cited by majority of the respondents mentioned the female reproductive role as what accounted for their low number in the engineering profession. In elaboration, the state in the parental policy at work had constrained the female engineers with this policy. The findings showed that, the state's intervention in bringing the parental policy was biased against the females, resulted in unshared responsibilities due to the absence of paternal leave, and the period allocated for the leave being minimum. These three examples, summing up the parental leave reflected how the respondents cited the reproductive role as the main factor.

Adding to that, the findings showed that although the workplace, and educational institutions were cited as actors responsible for addressing the low number of female engineers, most of the responses directed attention to the state. The views from the respondents suggested that, the state served as the main source of authority from whom all other state institutions derived authority from.

4.2 Discussion: What accounts for the low number?

The state, through successive governments of Ghana labour policies, has encouraged females to move beyond their domestic role as home makers to formal workers in the labour market. Although state legal instruments are directly not designed for female engineers only, its implementation have influenced these female engineers' access and participation in the profession. For instance, according to a respondent, the number of females in the STEM of late is a bit higher than her time. She cited the numerous science workshops organised by the state in girls' schools nationwide appears to be one of the reasons (Interview with Adwoa Yeboah, 01/03/2017). Also, the state through the help of some female role models encourage

female science students to continue their desire in the STEMS in the higher institutions. And in referring to one respondent, she and other female engineers have served as mentors to upcoming female engineers, “...to stir in them, the passion to pursue this profession and to break the norm of more males in the field...” (Interview with Aba Amoah, 14/02/2017). From the respondents’ awareness of the state’s efforts, they also mentioned the state for ignoring how the laws protecting them also has served as a hindrance in their increase. They viewed, the interpretation of the female reproductive role by the state’s law on parental leave has given cause to influence their numbers in the engineering profession. In citing specifically, the bias in the sharing of responsibilities regarding the reproductive role, the absence of the paternal leave in policies, and the period allocated for the parental leave; they mentioned these accounted for their low number in the profession. These instances will be discussed below.

First and foremost, the female engineers recognised the parental leave policy was informed by the societal expectations of them being the sole individuals responsible for the reproductive role. Although the respondents showed this leave as a form of assistance in balancing their work, and social life, they added that the mere name of the policy; *maternal or maternity leave*, reflected the influence society’s gendered expectations had on this policy. In her words, Araba Sam stated that the society perceived and expected them to be: mothers and responsible for domestic work, and she presumes this informed the drafting of the leave policies; “naming a policy as maternal should give you the idea the state has about we career women...supposedly as mothers” (Interview with Araba Sam, 13/02/2017). The Ghanaian society, according to another respondent, has always assumed females to be solely responsible for nurturing and caring for the home, and this normalised belief regarding their responsibility, was obvious in the name, maternal leave. “the name itself is what every Ghanaian see women as...we are home makers no matter what profession we are in” (Interview with Ama Ampomah, 14/02/2017). With reference to Moser (2012), the perception of females being “naturalised” homemakers and solely responsible for the reproductive role, has created a normalised behaviour where even in state policies, they are obvious. And in this case, the reference to the maternal leave by the respondents coheres with what is stated in (Moser 2012).

Of interest is the specific reference one respondent cited with regards to Sections 55, 56, and 57 in the Ghana Labour Act (2003), and 27(1) in (The Constitution of the Republic of Ghana 1992). Both state legal instruments particularly kept citing ‘*working mothers, maternity leave,*

*special care for mothers*¹⁷ to depict a class of women it apparently protects: mothers. The interpretation this respondent gave to this illustration in the state legal instruments was that, they summarised the expectations of the female engineer to be automatically or expected to be mothers or enter motherhood (Interview with Clara Baiden, (01/02/2017). She further cited, it was as if the legal instruments limited its protection to only one class of women: mothers, which she pointed out that it showed how limited the state's laws protected all class of women (Interview with Clara Baiden, (01/02/2017). Another respondent similarly pointed out, she always wondered how the "others" like her, who were neither mothers nor planned on entering motherhood would be protected at the workplace since the policy even in its interpretation in the above state legal instruments, placed women under one category. She said, the mere thought of that made her know the state has failed to address all groups of women and have been driven with the assumption that all women are going to be mothers (Interview with Efua Yawson, 02/03/2018). According to the GAD approach in this study, placing females in a homogenous group like motherhood, in this case, and not considering the possibility of "others", caused an ineffective outcome of a state's aim at gender equality. In the Ghanaian state's policy reflecting the name: maternal leave and interpreting it in the laws to reflect the gendered expectations from the female workers, the result of the low number of female engineers shows a failed outcome of the state's attempt in equality in this profession.

Secondly, the respondents cited the bias in the parental policy. Referring to Yaa Amoah's response, she cited the mere absence of paternal leave in Ghana's state labour policies reflected gender bias, which she said did not show any form of equality the state kept on citing it has achieved in the country (Interview with Yaa Amoah, 16/02/2017). Similarly, one respondent mentioned the state failed in catering for all the needs of the female worker. She cited that, most of her female colleagues always see the state as not achieving gender equality simply because, the paternal leave continues to be absent in the labour policies (Interview with Abigail Osei, 16/02/2017). The absence of the paternal leave not only created a burden for the females who had to bear the responsibilities regarding the reproductive role, the perception of the men having more decision-making power over whether they would want to help in this role or not, made the females more constrained. Attempting to explain this, Sandra Obeng gave an example. She recounted how she perceives her male colleagues being at liberty to decide whether to help with the reproductive role or assist in post-natal care

¹⁷Articles 55, 56, and 57 in the (Ghana Labour Act 2003), and 27(1) in (The Constitution of the Republic of Ghana 1992)

because the law does not require them to. She said, at times, she observed the form of power the state has given to men to choose what to do in terms of this role, and opined, females do not have that power. *“we are confined to perform such role because, the law has given it to us, and it is expected of us. a woman can’t decide if she wants to take care of her baby?”* (Interview with Sandra Obeng, 10/02/2017). According to Maame Abokomah, she views the absence of the paternal leave to mean, the males will always be at work, learning and gaining new experience and standing the chance of promotion. On the other hand, she has witnessed more times where due to their sole responsibility regarding the reproductive role, her colleagues including herself, had to miss training and potential promotion (Interview with Maame Abokomah, 10/02/2017). In the GAD approach in this study, I found that the writers cited, when value is placed on an individual’s role over another individual’s role, power is placed in the hands of the person whose role has more value. In the case that these respondents have cited regarding no paternal leave in the state’s policies, the men feel they have the power to decide whether to help. The females on the other hand, feel constraint with no choice to decide due to bearing the sole responsibility of the reproductive role.

Furthermore, the third point addresses the period of the parental leave in the state’s policy. The minimum period is three months in Ghana, and can be extended based on the health of the mother or child or both (Ghana Labour Act 2003)¹⁸. Most of the respondents were of the view, the period was short because, the child is still young and in need of constant attention. For instance, Rose Quaye mentioned that, a three-month-old baby required more than the presence of the mother; she needed to be breast-fed and cared for till they are old enough (Interview with Rose Quaye, 01/03/2017).

“...this period is short, considering how I am going to get someone to take care of my three-month-old baby because the law does not require our spouses to take over this role” (Interview with Nana Adwoa Ohene, 01/03/2017). Another respondent cited, she was mostly on conference call during her maternity leave, so she could address series of problems in the office. The limited three (3) months period was frequently interrupted by her workplace. Upon resuming, her unit head told her it was part of the job. *“he told me straight into my face that I signed up for such characteristics of the job and I shouldn’t expect any special treatment. It was an irony for me considering the men were rather experiencing special treatment of being excluded from this role...”* (Interview with Adwoa William-Mensah,

¹⁸ Section 57 of the (Ghana Labour Act 2003) on extended leave

10/02/2017). Despite the Ghana Labour Act (2003)¹⁹ requiring working mothers to report to authorities when their leave rights are contravened, the above respondent did not report. Her simple reason: it was not necessary. The state policy on maternal leave allows a three-month period for female workers but these responses, showed the period given did next to nothing in assisting them in their work-life balance. As a matter of fact, one respondent said she could not bear the thought of a nanny taking care of her three-month-old baby, so she had to take a year off without pay, to stay home and raise her child. (Interview with Clara Aikins, 09/02/2017).

In view of the above, some groups in Ghana have brought divergent views concerning the period of maternity leave (Bedu-Addo 2017). Whiles one group cites the increase of the three (3) months to six (6), other groups advocate for the maintenance of the three (3) months. The first group looking at an increase held their reason based on the health of both the mother and the baby. It specifically cited the '*exclusive-breastfeeding campaign*' in Ghana that urges mothers to breastfeed their babies for a maximum period of 6 months. The second group focused on maintaining the three (3) months but a share in responsibility with their partners. Also, the female engineers mentioned, through their respective unions they continuously petitioned regarding the parental leave in general and touched on a possible extension as well. Their petitions through the unions they believed, did not yield any fruitful results since there continues to be no sight of a paternal leave or the potential of such. Perhaps, issues like wages and salaries are of main importance to the union in general, and gender matters are of less priority in this case (Interview with Akua Amponsah, 09/02/2017).

The respondents said their reproductive role addressed as the maternal leave, constrained rather than helping them. In terms of the ability to advance in their career for example, the respondents mentioned, the difficulties in achieving a career advancement considering the responsibility at home and at work. The unshared responsibility meant they had to bear much load of office work and house roles of which most times, they sacrificed one over the other. Recounting why some of her friends left the profession, Sandra Obeng said her friends could not combine the high-demand of time in the profession with their roles as mothers. She added, despite her workplace having day care services for their children, the stress in caring for the children, and managing their jobs made them quit eventually (Interview with Sandra Obeng, 10/02/2017). Another respondent, Clara Aikins, who worked

¹⁹ Section 55(2) on nightwork and overtime for pregnant women

as a lecturer cited her leave period extending into the school's vacation hence more time to have for her child. Yet, she fell short in terms of training and development at the workplace. Her longer absence from the workplace caused her missing two employee training and development seminars at the faculty level. She cited that she missed two different possibility of getting promoted because of a limited record of training and development. More so, some of her female engineering colleagues left the profession when they felt, their career path was stagnant from not being promoted. They also could not give equal attention to their family and the job demand (Interview with Clara Aikins, 09/02/2017).

What the female engineers expect from the state goes beyond encouraging young female science students as Clara Aikins cited. She mentioned, the state needs to understand why Ghana decided to embrace gender equality in the first place. This is because, she was of the view, if the state observed from other countries, especially those who have paternal leave, Ghana will notice that the issue of equality does not bother only on moving females into the labour market but rather, embracing every role including the reproductive role (Interview with Clara Aikins, 09/02/2017). Adding to that, another respondent simply said that, the state should be serious in implementing the paternal leave and ensuring that workplaces adhere to such leave. She was of the view; the state cannot discuss equality when men are excluded from the very role that prevented females from moving into the formal labour market some years back (Interview with Adwoa William-Mensah, 10/02/2017). Similarly, Ivy Koduah mentioned that, it is about time the reference to the reproductive role by female workers as a challenge be changed. She noted, most of her colleagues who left the profession used this role as an excuse to leave. In her words, what is lacking is the share in this responsibility regarding the reproductive role. Female engineers cannot be confined and constrained in their profession because of the absence of the paternal leave which the state can implement like any other policy (Interview with Ivy Koduah, 02/03/2017).

Chapter five

Conclusion

This study researched into: **Access and Participation: Gender Equality in the Engineering Profession in Ghana**. The research question looked to address what accounted for the low number of female engineers in the Ghanaian labour market. To address the research question, various relevant literature on gender studies, and the theory on Gender and Development were used to discuss females' participation in male dominated occupations. These literatures also contributed in explaining the findings in the study. Additionally, the study used qualitative research method, specifically the semi-structured interview to gather data from a sample size of sixteen female engineers from the GhIE. These sixteen female engineers' responses were based on the interview questions that focused on their work experience considering gender equality. Per the results, the study concluded that what accounts for the low presence of females in the engineering profession in Ghana did not arise only from societal stereotypes, or the nature of the profession but mainly, the societal expectations regarding the female reproductive role. The findings also pointed out the limitation in the study. I concentrated on only the formal institutions in this study without addressing the informal institutions into details as well though they were cited as possible explanatory factors also. In the respondents' examples, it was found that, not only did the formal institution give credence to their low number but these institutions were influenced by informal institutions. Nonetheless, the limitation gives room for future research to be done in view of informal institutions.

Appendix

A1 Introductory Letter

This is a supervised research work centred on gender equality in *Ghana's labour market with emphasis on females in the male dominated profession of engineering*. It seeks to discuss the government's role in promoting gender equality in the labour market, and the factors that have contributed to the low presence of Ghanaian females in the engineering profession.

With regards to the above, the Ghana Institution of Engineers- GhIE which is the formal body of professional engineers in Ghana have been formally informed of this intended research through an email requesting for a formal interview with its female members. With their help, the respondents are female professional engineers in Ghana in various areas of the sector in the labour market. They constitute about 6% of the total number of professional engineers in Ghana, per the data obtained from GhIE.

The interview of the respondents shall be conducted as such in Ghana. The use of a recorder and note-taking by the researcher shall be employed. However, before the interview, the respondents shall be informed about the use of a recording material to make them aware of the right to prevent being recorded or not. The data collected from these interviews are going to be strictly for academic purposes and used to address the research objectives summarized above.

Finally, although most respondents have given the affirmative of being a participant, this interview is voluntary, and the respondent can withdraw at any time.

The researcher; Akowuah Gloria Adwoa Sarfoaa is a final year Master of Science student in International Development Studies at the Norwegian University of Life Sciences- Norway.

The research supervisor; Kirsti Stuvoy- PhD is also an Associate professor and head of education at the department of International Development and Environmental Studies at the same University.

A2 Interview Guide and Questions

This interview is strictly for academic purpose; for my master's degree which is focused on gender equality in the labour market. I have chosen the engineering field in Ghana and female engineers as my case study. This interview response will be based on your experience as a female in a male dominated field of which will inform my research of findings related to the thesis focus.

Guide to questions:

- Ask throw-off questions related to their background or specialisations; tenure, and choice of profession. (This should take about 2-5 minutes depending on each person)
- Ask of their experiences; and possibly other colleagues' experiences they have witnessed in line of their profession. This would start the tone for their experiences and linking to their numbers.
- The experiences could possibly be during their school days till the work environment. Focus on how they narrate their experience and observe possible explanatory themes that will link to their challenges in the workplace.
- Narrow down to their positions and responsibility at the work place, and draft a question to determine challenges regarding workplace structures and policies? state laws and policies?
- If possible, are they aware of legal provisions on gender equality? Equal employment opportunities? Experience with discrimination? Other examples to the above point

Draft of interview questions:

- a. You as an engineer, Madam...? May I please ask, what specialisation of the engineering profession you are practising?
- b. Could you tell me, in what sector of the economy are you working; the Private or Public Sector? (*Depending on the response she gives, ask a probing question to know whether that is the Sector she has worked all this while*)
- c. There are several professions you could have trained in. What really motivated you to opt to read or pursue engineering as a career?
- d. If you were to enter the tertiary institution today, would you still love to pursue engineering for your profession? What is the reason behind your answer?
- e. There is a perception among Ghanaians that, the engineering profession is a male dominated profession. Madam, how do you, as a female engineer, respond to this?

- f. Every profession has its own challenges and constraints. What do you as a female engineer, consider as constraints facing Ghanaian female engineers in the Ghanaian labour market?
- g. In your career as a female engineer, can you share with me, your experiences with the engineering profession in Ghana?
- h. In your candid opinion, Madam, what do you think are the factors influencing low female presence in the engineering profession in Ghana? (*If she gives more than one factor, ask probing question to rank them in the order of: **Very strong; strong; fairly strong; weak; very weak***)
- i. Respectfully, how do you think the issue of low female presence in the engineering profession in Ghana can be addressed?
- j. In your opinion do Ghanaian female professional engineers have equal job opportunity with their male counterparts in the labour market in Ghana?
- k. Madam, is/are there any comment(s) or additional information you want to make or offer in respect of this interview? (*Wait for a while, after she has made her comments, appreciate her for granting you time to interview her, after which you politely ask to take leave of her.*)

A3 Questionnaire for the six (6) respondents

Dear valued Respondent,

I am Akowuah Gloria Adwoa Sarfoaa

I am a final year student studying for masters degree in International Development studies at the Norwegian University of Life Sciences, Aa-Norway. I am researching on the topic: "ACCESS AND PARTICIPATION: GENDER EQUALITY IN THE ENGINEERING PROFESSION IN GHANA."

I should be extremely glad and grateful to have you accept to serve as a respondent to the questionnaire I have attached to this letter. I must be quick to indicate that this is meant for purely academic exercise ,with the assurance that I will maintain the highest confidentiality and anonymity for the responses.

Please, I respectfully request you e-mail the completed questionnnaire back to me through my e-mail address below. It will be appreciated if you could do me a favour to let me have the completed form in a week's time.

Thank you very much.

Yours faithfully

Akowuah Gloria Adwoa Sarfoaa

gloriaakowuah@gmail.com; +23324032881

Questions

- a. As an engineer, may I please know the branch of the engineering profession you are in and the reason behind such choice?
- b. Could you please tell me where you work and your position in the company?
- c. There are several professions you could have trained to be in. What really motivated you to opt to read or pursue engineering as a program and as a career?
- d. If you were to enter the tertiary institution today, would you still consider or opt to pursue engineering for your profession? What is the reason behind your answer?
- e. Do you share the view that in Ghana, the engineering field is male dominated based on the statistics that shows about 6% are females? What are your opinions on the reasons for that?
- f. Every profession has its own challenges and constraints. What do you as a female engineer, consider as constraints facing Ghanaian female engineers in the Ghanaian labour market?
- g. In your professional opinion, who should address it/whose responsibility is it? Is it a state's responsibility? Or something only to be regulated by market forces?
- h. There are means through which one can get access to being employed; networking, advertisement, direct contact with employers etc. In your case, how did you secure your job placement in the labour market? Could you tell reasons why you left your previous job if you had?
- i. Do Ghanaian female engineers have equal job opportunity with their male counterparts in the work place? If no, what in your opinion accounts for that, and how can it be addressed? If yes, could you elaborate on that answer, and what you think to be the reason?
- j. Please is there any comment you would like to share with me regarding female engineers' equal opportunity in the Ghanaian labour market?

Table 1: Respondents' specialisation

Specialisation	Number
Electrical Engineering	6
Civil Engineering	5
Telecommunication Engineering	3
Biomedical Engineering	1
Chemical Engineering	1
Total	16

Source: Fieldwork, 2017

Table 2: Main Occupation of Employed Population of 15 yrs. and above and by Sex in Ghana

Main occupation	Male	Female
Managers / Legislators	1.8	1.1
Professionals	6.6	3.4
Technicians and Associate Professionals	3.0	0.7
Clerical support	1.4	1.2
Service / sales	10.8	37.2
Skilled agricultural / fisheries workers	47.5	41.4
Craft and related trade workers	14.4	11.2

Source: (Ghana Statistical Service 2014a)

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