Shifting Gender Dynamics in Multinational Ghanaian Mine Jobs
- Narratives on Organizational and Sociocultural Barriers

Rufai Haruna Kilu

Gender and Technology
DOCTORAL THESIS

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Lulea University of Technology
Department of Business Administration, Technology and Social Sciences
Division of Human Work Science
ABSTRACT

Gender is one of the central organizing principles around which social and corporate innovation revolves. The multinational Ghanaian mining is dominated by men and masculinity cultures. To gain adequate understanding of this phenomenon, it is prudent to explore its gendered nature. This thesis reflects consciously upon the pre-entry, organizational and sociocultural barriers affecting effective participation of women in mine jobs. And beyond the barriers, it examines what changes have occurred, occasioning a shift in gender dynamics, leading to an increasing number of women participation in the industry? The current thesis adopts a case study method, deploying a mix of quantitative and qualitative approaches; administered questionnaires, conducted individual interviews, observations, archival documents, and focus group discussions with respondents in four mining companies and a mining and technology university in Ghana. The AMOS–based structural equation modeling approach was used to analyze the quantitative data, while thematic and discourse analysis were employed in analyzing the qualitative narratives of the respondents. Results of the thesis point to the social construction of gender in science, engineering and technology education as a pre-entry barrier. Also a complex web of male-dominance, gender bias, role models and mentorship constraints, coupled with unfriendly family work policies were noted organizational barriers. In furtherance, common prejudices, perceptions and stereotyped notions of gender roles in the mines constituted noted sociocultural factors constraining effective participation of women in mine work. However beyond the barriers the current thesis intuits the dawn of women in mining, towards a gender-driven mining, and the ore-solidarity movement in the mines, witnessing collective efforts from Women in Mining Ghana as well as the mine workers’ organizations and allied institutions adopting gender strategic measures and initiatives aimed at re-engineering or striking a shift in gender dynamics in the mine jobs of Ghana. Consequently, the classic and continuous male-dominance in Ghanaian mines constitute a considerable concern for mine work organizational development, with practical implications for the mine industry, employment and labor relation practices as well as public policy in Ghana. Therefore, affirmative action is recommended for gender deconstruction and promotion of gender democracy. Indeed this move for inclusivity will engender poverty eradication work towards achieving organizational modernization, their global competitiveness and an assurance for gender driven social innovative mining.

Keywords: gender and technology, psychosocial structures, enrolment regimes, organizational barriers, stereotype notions on gender roles, shifting gender dynamics, sustainability, social innovation, multinational Ghanaian mines
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# ABBREVIATIONS

The following abbreviations were used in the thesis:

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<thead>
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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AMOS</td>
<td>Analysis of Moment Structures</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>CSO</td>
<td>Civil Society Organization</td>
</tr>
<tr>
<td>DOVVSU</td>
<td>Domestic Violence Victims Service Unit</td>
</tr>
<tr>
<td>GET FUND</td>
<td>Ghana Education Trust Fund</td>
</tr>
<tr>
<td>GES</td>
<td>Ghana Education Service</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GSGDA</td>
<td>Ghana Shared Growth Development Agenda</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organization</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>LKAB</td>
<td>Luossavaara-Kirunavaara Aktiebolag</td>
</tr>
<tr>
<td>LI</td>
<td>Legislative Instrument</td>
</tr>
<tr>
<td>LTU</td>
<td>Lulea Technology University</td>
</tr>
<tr>
<td>MINCOM</td>
<td>Minerals Commission</td>
</tr>
<tr>
<td>MOGCSP</td>
<td>Ministry of Gender Children and Social Protection</td>
</tr>
<tr>
<td>PMMC</td>
<td>Precious Minerals Marketing Corporation</td>
</tr>
<tr>
<td>PNDC</td>
<td>Provisional National Defense Council</td>
</tr>
<tr>
<td>STEM</td>
<td>Science Technology Engineering and Mathematics</td>
</tr>
<tr>
<td>WiTEC</td>
<td>Women in Technical and Engineering</td>
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</table>
THE SIX APPENDED PAPERS

**Paper A**
Status: published

**Paper B**
Status: published

**Paper C**
Status: accepted & forthcoming

**Paper D**
Status: submitted

**Paper E**
Status: published

**Paper F**
Status: accepted on 28th April 2017 & forthcoming in Journal of Business Research
CHAPTER ONE

1.0 Introduction

This introductory chapter presents the background information on the topic, leads the reader from a general subject area to the more specific issue under investigation. It establishes the context, significance of the research, summarizes current understanding, states the purpose of the work and the research problem, states set of research questions and outlines the structure of the thesis.

1.1 Background to the Study

The current study explores the world of multinational Ghanaian mines, questions their long standing male-dominance and masculinity cultures with consequential effects of women facing the realities of participatory barriers. This phenomenon is critically problematized by the current study. For a scientific comprehension of this circumstance, however, it is prudent to delve into the gendered organizational nature of the mine works. This work, therefore, aims at reflecting consciously upon the pre-entry, organizational and sociocultural barriers affecting effective participation of Ghanaian women in mine jobs. Beyond the barriers, nonetheless, the study unmasks current changes that have occurred, stimulating a shift in background dispositions and gender dynamics, leading to the participation of an increasing number of women in the industry.

Gender shapes and sanctions feminine and masculine behaviors, products, technology, environment and knowledge and that gendered attitudes are changeable and have wide variations both from within and among cultures (West and Zimmerman 1987). Their account of gender is the categorization of 'women' and 'men' that reflect an institutionalized positions of dominations and subordinations within social arrangements. This work operationalized gender as a product of social interactions, neither a set of traits nor a variable or a role, but a social doing or performance of a sort. Gender is an action or inaction of managing one’s conduct in accordance with normative conceptions and constructions, as to whether those actions are appropriate for one’s sex category or not, and as to whether one can perform a particular role or not depends on the person’s sex category.

While gender is fundamentally interactional and institutional in character, gender division of labor has become real across Ghana, and this manifests, inter alia, in women being given primary responsibilities like care giving, emotional management and maintenance of routine orders. However, in the public sphere men are given privileged access to what is described as the locus of true rewards of social life - money, status, power, freedom, opportunities for growth and self-worth (Apusiga, 1987). The Ghanaian society also exhibits several complementarities between men and women’s roles. Men as a group enjoy more rights, power and privileges than women. Ampofo (2014) argued that in many cases in Ghana, women’s rights, power and enjoyment of privileges are tied to men as fathers, husbands and brothers. And certainly, some women in Ghana suffer from greater inequalities than men. This is not by virtue of inherent deficiencies but because society is structured in ways that gave privileges to men over women - an environment of patriarchy. It is, therefore, fair to argue that differences in gender and its implications for socio-economic development exists in the Ghanaian society.
Though many institutional practices and processes may not overtly express discrimination on the basis of gender, they are not gender-neutral, as the case may be in the Ghanaian mining industry. Yakovleva (2007) conducted a study aimed at measuring women’s participation in Ghanaian mine jobs. The results showed sociocultural taboos, domestic and family commitments impose heavy burdens on women, hindering their independence and effectiveness to participate in mine works. Similarly, Alexander, in 2007, compared reasons why in the first three decades of the twentieth century, women worked underground in Indian mines but not in South Africa. Results suggest that there was opposition to the employment of women in South African mines due to Africans’ dependence on women for both production and reproductive functions. Certainly, these are pure illustrations of the influence of gender in the mines, and the knowledge of the fact that gender practices and processes have wider range of variations, both from within and among cultures, and are as well subject to change, motivate counter arguments and propositions for undoing gender.

Around the year 1850, women constituted about 15-20% of the Swedish mine labour force. However, by 1950 and within a space of one century, the number dropped to about 1% (Blomberg 1995; Karlsson 1997) and by 1978 the number trails within the range of 3% to 4% (Abrahamsson 2006). Olofsson (2010) holds a suspicion that some male mine workers may have viewed new technological inventions such as automation, computerization and robotization as a feminization of their perceived male work, a suspicion breeding a cultural attitude that may manifest a direct male resistance to women and gender equality initiatives. Abrahamsson (2006) expressed concerns that though the mining industry may have gradually evolved over the years in many respects, old beliefs on close relationship between mining and masculinity still exist. Andersson, et al (2013) in a report on ‘breaking ore and gender patterns in Swedish mining sector’ posits that the mine corporate climate and workplace cultures are both very much men and masculinity expressed. They maintain that it is also about idealization of a certain type of miner masculinity, deep rooted in the old manual, heavy and dangerous mining work, characterized with macho masculinity. Indeed, Andersson, et al (2013) never minced words; they described the male-dominance as ‘paradoxical stagnation’ capable of creating problems for companies and individuals regarding workplace practices, efficiency and development. From the same report, Andersson, et al (2013) in passing judgement on the mine work from gender statistical figures sourced from the human resources outfit, concluded that in the large scale Swedish mines, about 80-90% of all employees were men. This suggests that modern mine work still has a long way to go with this issue of a male-centric attitude in the profession. In Asia pacific, between the year 1900 and 2000, the percentage of women employed in Indian coal mines fell from a height of 44% to a low of less than 6% of the mine workforce (Lahiri-Dutt 2012). In her previous work, Lahiri-Dutt (2011) recounted that large-scale mining projects were characterized by physical demands, capital intensive, and production-driven, characteristics mostly associated with masculinity. Her concerns did not only border on an overt visibility of men, but a taken for granted association of men, with institutionalized authority expertise and prestige, institutions, laws, and structures of governance that did not favor gender neutrality bids. Hence the mine job is often viewed as a macho space, where masculinity takes a center stage. In the continent of Africa, Benya (2009) studied the platinum mines near Rustenburg in South Africa to explore the masculine occupational culture in underground work in the mines. The work showed that women were perceived as lazy individuals who slowed down the work processes. In a similar vein, Amutabi and Lutta-Mukhebi (2001) in Kenya examined the role of women in mining compared to that of men. The results showed
women in mining had not been thoroughly researched and documented, and that women’s mine work contribution is often not acknowledged. These South African and Kenyan cases are yet other wild perceptual and stereotype notions against women. Arguably, this universal male-dominance has become phenomenal in the mining sector, presenting a complex situation, which in the view of the author requires a holistic approach, hence the need for this current study.

Relative to the observed global problematic male-dominance in mine works, Ghana’s storyline is generating research interest on grounds of literature and knowledge gaps. Certainly, extant literature and empirical studies do exist on mining, technology and organizational gender perspectives; more especially on women in mining. But the geographical context of such works are mostly limited to Europe, Asia, United States and Australia, among others. Studies on Africa are woefully scarce, and Ghanaian ones very few. This work attempts to set the stage for the contemporary study into the area.

1.2 Research Questions

In order to achieve the aim of the current study, the following specific research questions are to be answered:

i. How does social construction of gender in science, engineering and technology education affect gender differences in enrolment regimes in the University of Mines and Technology, as well as mine work recruitments in Ghana?

ii. What are the organizational barriers affecting effective participation of women in multinational Ghanaian mine jobs?

iii. Which sociocultural beliefs affect effective participation of women in multinational Ghanaian mine jobs?

iv. If indeed, a few women participate in the multinational mine jobs, where are they functionally active?

v. Beyond the barriers, what changes or shifting gender dynamics have occurred, witnessing more women taking up mine jobs within the multinational Ghanaian mines?

1.3 Structure of the Thesis

Chapter one introduces the thesis, presents the background detailing the purpose, the problem under investigation, research questions and structure of the study. Chapter two presents the theoretical framework used to provide the scientific basis, explanations and discussions of the results. Chapter three discusses the context, in terms of the environment, ambience, circumstances and frame of reference, in terms of which a full grasp and comprehension of relevant issues are gained. Chapter four presents the method and material used to provide a step by step account of the process under which data was collected. Chapter five summarizes the six appended papers, elucidates how the papers relate to each other and how they individually and collectively
proffer answers to the respective research questions. Finally, chapter six presents the implications and conclusion.
CHAPTER TWO

2.0 Theoretical Framework

This chapter presents the theoretical framework with its scholarly and scientific research bases, and provides key ideas that organize and shape the scientific line of thinking for the current study. This framework of theories further act like maps, strategically used to map out coherence and consistencies, used for analyses and interpretations of the data so collected from the mining companies studied. Though the six appended papers used sets of different theories, those that in the end seem most important are the ones described. Specifically, the doing gender theory of West and Zimmerman (1987), its antonym theories of undoing gender of Butler (2004) and the new social movement theory of Melucci (1995, 1997) as well as the feminist technoscience theory of Barad (1998) were applied in the final analyses. The doing gender theory is becoming popular in work and organizational gender studies, which demonstrate how gender is constructed through interactions in organizations. Recent studies have also started looking at how gender can be undone. The doing gender approach mostly is drawn upon by organizational researchers to explain the fluidity, and changeable nature of gender, and something that is flourishing in organizational research (Linstead & Pullen 2006; Poggio 2006). While doing gender is an approach regularly drawn upon by organizational researchers, the question of how gender can be undone is equally featuring in organizational researches. It is suggested that if one understands how gender is done at work, it might then be possible to undo it (Pullen 2006). Doing gender approaches have been useful to show that gender is not a property of person but a process that people enact in everyday situations (Linstead & Pullen 2006; Poggio 2006). And once doing gender is understood and undone, the end product is a change; hence the new social movement theory with its change functionality being discussed alongside. This study thereby examines gender, and how gender is done in terms of participatory barriers. The paper beyond the barriers, explores how gender is being undone to illicit change regimes among the multinational mine work organizations in Ghana.

2.1 The Doing Gender Theory

Doing Gender involves a set of complex structures of socially guided perceptual, stereotyped, interactional and micro political activities that cast particular pursuits as expressions of masculine or feminine (West & Zimmerman 1989). They further elucidated the theory as a ‘distinctively sociological understanding of routines, methodical and recurring accomplishments undertaken by both men and women, whose competences as members of society is hostage to its production and reproduction; and that ‘virtually any activity can be assessed as to its womanly or manly nature’ (1989 p333). They assert that doing gender is an accomplishment, achieved property of a situated conduct of a sort, and an emergent feature of a social situation, capable of triggering attentional shift from internal matters of the individual to focus on interactional and ultimately on institutional arenas. They maintain that, in one sense, it is individuals who do gender, but a situated doing gender type, carried out in a virtual or real presence of others who are presumed to be oriented towards its production and reproduction, constituting a practical means of legitimizing the fundamental divisions of society. West and Zimmerman’s expositions of doing gender may be interpreted as art of creating differences, maintaining binary oppositions (male/female, masculine/feminine, man/woman, boy/girl) and sustaining hierarchical privileges of the
over the latter binary. This, in the view of the current work, sets the tone for doing gender and consequential systemic organizational and sociocultural barriers. Indeed, they are differences that are not natural, essential or biological but socioculturally constructed and managed. ‘So far as some societies are partitioned on the basis of gender and role placements made in conscious of sex categories, and held in high relevance and enforced, doing gender become unavoidable’ (West & Zimmerman 1989).

2.2 The Undoing Gender Theory

In common parlance, undoing gender evokes collective resistance instead of conformity to acts of doing gender. It connotes unconscious defense mechanisms where an attempt is made to annul and reverse the psychological and socioculturally unaccepted gendered constructions, by acting or doing their opposite, usually repetitiously in order to relieve anxiety. The phrase ‘undoing gender’ could also imply a set of social interactions aimed at reducing gender differences or behavior patterns in opposition to gender stereotypes (Deutsch 2007).

For Butler (2004), the individuals’ agency is bound to social critiques and social transformations, hence one’s gender is determined by social norms. She argues that it is important to resist the violence imposed by the idea of gender norms, especially against those who are gender different and non-performing in the gender presentations. She recommends the possibilities of viewing grief as a collective responsibility for the physical lives of one another, rather than the usual alternative of gender violence. Butler (2004) holds that doing gender produces series of effects on individuals. As individuals, we talk, walk and act in ways that consolidate impressions of being a man or a woman. According to Butler ‘the terms by which we are recognized as humans are socially articulated and changeable; and that the very terms that confer humanness on some individuals turn to deprive other individuals of the possibility of achieving same human status’ (2004 p2).

Butler believes that ‘it is crucial to understand gender from global contexts, in transnational formations, and not only to see what problems are posed to the term gender, but to combat false forms of universalisms that service a tacit or explicit cultural imperialism (2004 p 9). She believes we do not have to limit ourselves to being either male or female; and that despite an almost universal concurrence, femaleness does not automatically produce femininity and maleness does not produce masculinity. Butler in a chapter on ‘End of Sexual Differences’ gave a rendition that ‘feminists everywhere seek more substantial equality for women and as well making demands for a more just arrangement of social and political institutions’ (2004 p 175).

From the above and many previous discussions, gender is seen as formed and performed within the context of subjectivities. Whichever way the variations of difference may be understood, individuals and collective differences in relation to gender may be intersectional, resulting in views that can solidify differences, contest the differences, or deconstruct the differences (McCall 2005). In recognizing that, language and words usage shape what our minds are drawn to, Deutsch (2007) posits that we need a paradigm shift from talks on doing gender to illuminating talks on how we can undo gender. Deutsch’s assumptions dovetail with those of other feminist theorists who articulate hopeful visions of change and the possibility of gender equality. For instance, Lorber’s (2000) notion of “degendering” and Risman’s (1998) conception of “gender vertigo” both speak to the need for the dismantling of gender through emphasis on putting in place policies, systems, structures and programmes to deconstruct gender. Of course, it may take a lot more than changing
terms to understand how to eliminate the structural gender systems. But at least paying attention
to how we can undo gender, may keep us focused on how we can dismantle the gender system to
create real equilibrium between men and women in work organizations. Abrahamsson (2014)
believes ‘undoing gender’ is not new, though actually a growing field within gender research. She
contemplated that it may be easier said than done, because not doing gender is not synonymous to
undoing gender. According to her, in most institutions where gender is rendered irrelevant, other
hierarchical systems can take over. Certainly this statement of skepticism as expressed by
Abrahamsson (2014) suggests a holistic call to approaching gender equality initiatives to prevent
people paying lip services to this clarion call.

2.3 The Feminist Technoscience Theory

The Undoing Gender Theory bears a functional synonym with the epistemology of the Feminist
Technoscience of Barad (1998). These theoretical strands complement and resonate well in
achieving the undoing gender objectives. Barad ventures into interesting terrains by imagining
future possibilities and speaks to ongoing debates on feminist technoscience approaches to the
world of work, specifically the science, technology, engineering and mathematics related fields.
The assumptions on Barad's theory of agential realism holds that the world is composed of
phenomena which are "the ontological inseparability of intra-acting agencies". For Barad, things
or objects do not precede their interaction, rather, 'objects' emerge through particular intra-actions.
Barad's agential realism is at once an epistemology (theory of knowing), an ontology (theory of
being) and ethics. Specific practices of mattering have ethical consequences, excluding other kinds
of mattering, onto-epistemological practices are always in turn onto-ethico-epistemological. Per
this argument of Barad, it may be inferred that there shall not be any point of justification to
exclude women from science, technology, engineering and mathematics related fields like the
mine jobs.

Barad argues that the pervasive motivation to social construction and conceptualization of gender
in science, engineering, technology and work settings is the product of dualisms and dichotomies
such as female/male, woman/man and feminine/masculine in society. Her focus extends from
binary technology, objects, and non-human agency to the material, affective and embodied
dimensions of work and feminist readings of the biological body. The deeply connected way that
everything is entangled with everything else means that any act of observation makes a "cut"
between what is included and excluded from what is being considered.

This view of knowledge provides a framework for thinking about how culture and habits of thought
can make some things visible and other things easier to ignore. Therefore, Barad’s agential realism
has become useful for feminist analysis, even where the connection to science is not apparent.
Barad’s theoretical formulation works towards the elimination of categorizations and wiping away
of discrimination and marginality in society and the world of work as it may be the case in mine
works of Ghana. This suggest a frown at discriminatory practices common in gender unequal work
contexts like mine jobs. Nothing is inherently separate from anything else.
2.4 The New Social Movement Theory

The current work equally brought to bear epistemology of the European-inspired New Social Movement Theory or the identity-oriented approach associated with Touraine and Melucci (1995, 1997). This is applied on the grounds of its potential influences on organizational change processes, and in this instance the shifting gender dynamics in Ghanaian mine jobs. The theory focuses on the experiences, values, affiliations, actions and inactions of women’s involvement in non-violent social movements and collective self-organizations that aim at achieving their goals. The theory argues that any attempt to understand social change hugely depends on key assumptions about the notion of change itself: that change must necessarily emanate from above; and also change can best be understood when viewed at specific moments in time. In this case, the individuals, groups and organizations involved do not carry movement membership cards, but they do act collectively as well as separately towards their goal. The members, of course, unanimously share common beliefs, orientations and values that oppose the status quo, thereby making a claim for negotiations (Melucci 1995, 1997). From this vantage point, the values and affiliations of movement supporters become significant, providing an impulse for the repositioning of those involved and a subsequent change effected (Barry, Berg & Chandler 2007).

Advocates of the New Social Movement Approach, according to Barry, Berg and Chandler (2012) focus on examining the ‘why’ of a change based on observable organizational characteristics, and submerged networks, affiliations and symbolic challenges to the dominant order or the status quo. And, of course, the common purpose and ultimate goal of this theory centers on the processes of action towards bringing about a change, or some degree of reforms, suggesting that action and change take place along a continuum and attract a broad base of appeal as a result. The apparent characteristics of the new social movement theory are: first, the members act collectively as well as separately, sharing values and orientations that are oppositional to the status quo. Secondly, the manner in which the members emerge is so spontaneous, instinctive and free spirited, suggesting a right time to step forth into brave and gallant new world of solidarity. And, thirdly, members’ collective values and orientations permeate the fabric of social institutions through a complex web of social interactions (Touraine & Melucci 1997). This New Social Movement Theory, though originated from Europe in the 1960s by 1980s, spread to the third world countries, making women’s voices and experiences part of feminist knowledge production with a spreadsheet across Africa by the mid-1980s.
CHAPTER THREE

3.0 The Research Context

This chapter presents a description of the environment, ambience, circumstances and frame of reference that informs the setting or context and ideas in terms of which the study presented in this thesis need be understood. Contexts, in all respects, play a very important role in social research analysis. A research subject and its context are in close relationship: the ‘subject under study’ elaborates its ‘context’ and the context helps interpret the meaning of the subject. Therefore knowledge of the context of the current study is a premise of the analysis of the subject matter.

3.1 Some Demographic Characteristics of Ghana

Ghana is located on the west coast of Africa, formally and historically known and called the Gold Coast due to its mineral endowments, especially her rich gold deposits. The country attained independence in 1957 and gained a republican status in 1960. The country has land borders that measure about 2,094 km to the north, east and west, and a coastline washed by the Gulf of Guinea to the south. Ghana’s three neighboring countries are the Ivory Coast in the west, Burkina Faso to the north and Togo to the east. The country is about 238,533 square kilometers in area, roughly the size of Great Britain. Ghana is divided into ten administrative regions. The other regions are Volta, Eastern, Upper East, Upper West, and the Western Region. And certainly for the purpose of the current study, Western Region is the focus.
According to the Ghana Statistical Service, the total population of the country as of 2010 was about 25 million people aged 5 years and older. Females constituted about 51 percent of the population while the male constituted 49 percent. Ghana is a multi-ethnic country, with the Akan ethnic group dominating by 47.5 percent of the population, followed by Mole-Dagbon 16.6 percent, Ewe 13.9 percent, Ga-Dangme 7.4 percent, Gurma 5.7 percent, Grusi 2.5 percent, Mande-Busanga 1.1 percent and others 1.6 percent. The report further acknowledges Ghana’s multi-lingual status, and languages spoken are Asante, Ewe, Fante, Bono (Brong), Dagomba, Gonja, Dangme, Dagarte (Dagaba), Akyem, Ga, Akuapem and others including English as the official language being spoken by about 36.1 percent of the population. The literacy rate is about 71.5 percent of the total population, Male: 78.3 percent and Female: 65.3 percent.

According to the Population and Housing Census Report (2010) about 54.2 percent of the population is economically active while the economically non-active population constitutes 45.8 percent. Of the economically active population, 95.0 percent are employed while the unemployed
(that is, those without work but are seeking and available for work) make up 5.0 percent. Of those who are unemployed, a majority of them are first time job seekers. The proportion of males who are economically active is slightly higher than females. Females, on the other hand, are more likely to be unemployed than males. Agriculture, forestry and fishery works remain the dominant occupations for both males and females. However, a much higher proportion of females than males engaged in service and sales work. The private sector, including the mines are the largest employer in the country, accounting for 93.1 percent of the economically active persons, while the public sector engages the remaining 6.9 percent.

3.2 National Response to Gender Equality and Women’s Empowerment

Ghana, in the 1980s, joined the new world order, and witnessed the formation of some feminist social movements of local and international orientations. The 31st December Women’s Movement, for example, was formed in 1982. It was a local women’s movement with branches across all the ten regions of Ghana. This movement, developmental oriented, founded with the goal of mobilizing women both from rural and urban Ghana, aimed at sensitizing them to understanding the governance of the country and wanted them to be part of the new participatory democratic system, since women form the majority of Ghana’s population. The movement supported and promoted activities of women through education and capacity-building. The movement also mentored some women into mainstream political activities and many of them are now ministers, party functionaries, district chief executives and constituency executives. The movement equally confronted family poverty issues, social exclusion, women’s empowerment initiatives and championed the promulgation of several laws to protect women and children’s rights in Ghana. For example, they spearheaded and got the Intestate Succession Bill passed into PNDC Law 111 in 1985 and the Marriage and Divorce Registration Bill passed into PNDC Law 112, which benefited many Ghanaiian women. The movement also established day-care centers and nurseries, bakeries, fishing cooperatives, food-processing factories and a host of socioeconomic programs aimed at women’s empowerment. In the light of this, the current work argues that Ghana has long been familiar with and adopted initiatives similar to the New Social Movement Theory to fight issues of social inequalities at the micro-individual, mezzo-organizational and macro-political levels of the Ghanaian society.

The Science, Technology and Mathematics Education (STME) clinics were also instituted by Ghana Education Service (GES) in 1987 to promote the interest of girls in science, technology and mathematics education. The clinics worked to popularize science among girls and maximize the potentials of Ghanaian women with the specific aim of increasing and sustaining female participation in science, technology and mathematics. The STME clinics covered all the ten regions and districts of Ghana. The program is termed a clinic because it is analogous to a hospital situation, where a problem is solved or a disease is treated through diagnosis and therapy. According to the Girls’ Education Unit of the GES, the identified “disease or problem” in this situation is the low participation of girls in Science, Technology and Mathematics at the higher levels of education. The diagnosis of the causes involved research on girls, workshops, conferences of stakeholders in education, heads of institutions, teachers, parents and policy makers (GES, 1998). This concept of STME clinics, further linked to introduction of mentorship programs,
whereby female pupils get the chance of meeting and interacting with female role models who have made it in the science and technology professions. They were given leadership training and the opportunity to visit industries to acquaint themselves with the industrial processes of production, through scientific applications. This serves as motivation to improve upon the number of girls pursuing science, technology and engineering-related courses in Ghanaian schools. In addition, the Girl Child Scholarship program began in the year 2001 by the Ghana Education Service. With the appointment of a Minister of State for Primary, Secondary and Girl-Child Education, the GES stepped up awareness and sensitization of parents on the need to educate their girl-child.

The World Development Report 2012 placed emphasis on Gender Equality and Development. That gender equality is a core development objective in its own right. It is also a smart economic initiative and gender equality can enhance productivity, improve development outcomes for the next generation, and make institutions more representative. The Africa Gender Equality Index (2014), placed Ghana 15th position out of 52 countries. Ghana, in 2015, attained the Millennium Development Goals (MDGs) targets of achieving universal primary education (MDG 2) and achieving gender parity in primary schools (MDG 3). These gains towards achieving gender parity has been due to government initiatives, such as the capitation grant, school-feeding, and free school uniforms. The ‘Take Home Ration’ initiative by the Ghana Education Service (GES) and the World Food Program (WFP) since 1988/89 in the northern parts of the country has also helped to bridge the gender disparity in education in deprived communities. This implies the Ghanaian society is becoming more gender equal, and culminating into its organizational gender perspectives. This stems from the knowledge of the fact that sustainable societal development and economic growth demands that gender equality be addressed at the individual, organizational and societal levels (Andersson, Faltholm, Abrahamsson & Lindberg, 2013).

Also, the government of Ghana recognizes that Gender Equality and Women Empowerment is critical to the attainment of Sustainable National Development, the country in 2015 launched a national gender policy with the theme ‘Mainstreaming Gender Equality and Women’s Empowerment into Ghana’s Development Efforts.’ The National Gender Policy aims at mainstreaming gender, women’s empowerment and social protection concerns into national development processes for equitable livelihood for women and men, boys and girls.

The National Gender Policy provides broad objectives and policy commitments, as well as a detailed institutional framework for the operationalization of government’s commitments to achieve gender equality and women’s empowerment in its national vision of investing in people for better social and economic growth. The broad policy objectives [rendered as policy commitments] are: commitment to women’s empowerment and livelihoods, commitment to women’s rights and access to justice, commitment to women’s leadership and accountable governance, commitment to economic opportunities for women, and commitment to gender roles and relations. These five areas of commitment form the conceptual framework upon which the overall goal of the policy is delivered. They consist of sectoral and crosscutting gender equality issues for policy response; resource allocation; program development and accountability actions for achieving gender equality targets; and social safeguards for women’s empowerment. These five policy commitments developed from lessons and challenges in the sector and from the implementation of the 2004 policy, were firmed up at several consultative meetings held regionally and nationally to ensure ownership of the process and the policy. The policy articulates issues from
gender perspectives, ensuring that women and men, girls and boys as well as the vulnerable, the marginalized and persons living with disability participate and have a voice and decision-making power in governance processes. Ghana views gender equality and women’s empowerment as strategies for reducing poverty levels, social injustices among women and men, improving health standards and enhancing efficiency of public and private sector investments and domestic finance. Thus, achieving gender equality is regarded as the attainment of human rights and a pre-requisite for sustainable development.

Ghana’s goals towards achieving gender equality targets are also guided by its commitment to both national and international instruments. The 1992 Constitution of Ghana (Article 17) prohibits discrimination on the basis of gender. For example, Female Genital Mutilation was criminalized by an amendment to the Criminal Code Amendment Act 1998 (Act 554) which prohibits female circumcision and further makes enforcement more effective. Also, there was the passing of the Domestic Violence Act, 2007, Act 732 and the establishment of the Domestic Violence Victims Services Unit (DOVVSU) to respond to situations of violence against women. In addition, there was the passing of the Human Trafficking Act 2005 (Act 694) and the establishment of the Human Trafficking Management Board. Furthermore, there was a repeal of Section 42(g) of the Criminal Offences Act, 1960, Act 29 which had permitted non-consensual sex within marriage. Finally, the Labor Act 2003, Act 651, Section 68 reiterates the right to equal pay for equal work without distinction of any kind.

Ghana has equally ratified all the important international conventions, treaties and plans of actions on Gender Equality and Women’s Empowerment. Critical among them are the universal declaration of human rights, the Convention on the Elimination of All Forms of Discrimination Against Women, the Optional Protocol to the Convention on the Elimination of All Forms of Discrimination against Women, International Covenant on Economic, Social and Cultural Rights, the Covenant on Economic, Social and Cultural Rights, the 1985 Nairobi forward looking strategies for the advancement of women, and the Vienna Declaration on Human Rights of 1993.

Appointments of women to key national decision-making positions and the integration of queen-mothers into the Traditional Councils, Regional and National Houses of Chiefs. Incorporation of gender concerns and the Millennium Development Goals into Ghana’s Poverty Reduction Strategies I & II and the Ghana Shared Growth and Development Agenda (GSGDA) aim at economic empowerment of women through micro-credit schemes, skills development, capacity building and supply of appropriate technologies. Measures were also put in place to enhance the reproductive health and rights of women to ensure safe motherhood and address issues of maternal mortality such as the Obstetric fistula repairs and re-integration project and the launch of a task force to ensure prevention, tracking treatment and elimination of Obstetric Fistula in Ghana. There were also elections and appointments of women to highest decision-making levels, such as the Legislature, the Judiciary and the local government levels (Ofir-Aboagye 2004). In addition, there was general improvement in the systematic compilation of sex-disaggregated data, and expansion of gender responsive budgeting to ensure resource allocation for gender equality programs.

Clear policy level roles and responsibilities are suggested to be played by identified state and non-state actors, including Civil Society Organizations (CSOs), the media, the private sector,
Traditional Authorities, and Local Communities for efficiency and effectiveness in achieving results. The country has resorted to the application of Information and communication Technology (ICT) tools, skill development, advocacy, lobbying, negotiation, mobilization, transformational leadership, research, monitoring and evaluation as key strategies listed for action towards achieving the goal, objectives and commitments of the 2015 gender policy. The Ministry of Gender, Children and Social Protection is the main machinery to drive all the policy actions towards actualization of the policy objectives.

Ghana equally has a culture of work-life, a long-standing national work culture that provides initiatives designed to create a more flexible, supportive work environment, enabling employees to focus on work tasks while at work. It includes making the culture more supportive, adding programs to meet life event needs, ensuring that policies give employees as much control as possible over their lives, and using flexible work practices as a strategy to meet the dual agenda-the needs of both business and employees aim at enhancing productivity (Aryeetey, Yeboa & Sanda 2012). Work-life effectiveness is a specific set of organizational practices, policies, programs and a philosophy that recommends aggressive support for the efforts of everyone who works to achieve success both at work and at home (Alliance for Work-Life Progress, 2004). Further, contemporary Ghanaian human resource managers deploy strategic approaches to manage employment relations with emphasis on leveraging people’s capabilities. This aims at achieving sustainable competitive advantage through a distinctive set of integrated employment policies, programs and practices, working towards more flexible and supportive work environments. Also, legislations on maternity leave do exist under leave regulations of Ghana, and contained in various collective bargaining agreements in the country. It stated that, among others, on submission of a medical certificate signed by the company’s medical officer, or where circumstances demand, by a registered medical officer or a registered midwife, a woman who becomes pregnant shall be granted maternity leave with pay as follows: six (6) weeks before confinement, and six (6) weeks after confinement. In addition, a further four weeks unpaid leave may be taken. On resumption of duty, a nursing mother shall be granted a forty-five (45) minutes, twice a day to nurse her child for a period of one year, and close from work at 3:00 p.m. instead of 5:00 p.m.

Ghana is also witnessing a shift in gender dynamics in areas of education, politics and, more especially, in the world of mine works. The likes of Goldfields Ghana Ltd., Anglo Gold Ashanti Ltd and the Golden Star Resources Ltd. are implementing several ambitious gender equality initiatives within the companies, in collaboration with the local communities and universities for research and development. Their gender equality programs include wage mapping systems, women’s networks, gender awareness training, and recruitment efforts for female executives. Also, there is support for high school programs with girls in mind, backed with a strategic communication that women are a very important part of the new mining industry. In addition, women’s network groups are springing up within the mines, and skills development programs targeting women in the host communities are being organized.

In spite of these major achievements, some key challenges still exist. These challenges include low representation of women in decision-making positions. Also, Ghana is yet to attain the 30% representation threshold, usually interpreted as fulfilling the ‘critical mass of women’ participation in private, political, non-governmental, inter-governmental and other sectors (Allah-Mensah
In addition, there exists negative cultural perceptions of women. Furthermore, there is inequality in gaining access to social protection by the marginalized, vulnerable and the poor. There are also inequalities in the burden of extreme poverty, education, skilled training gaps and excess maternal mortality. Other inequalities include unequal access to social, economic power and justice, inadequate protection and promotion of human rights of women; inequalities between women and men in sharing of power and decision-making at all levels and in dealing with all kinds of conflicts and insecurities and threats on women; and inequality in macro-economic issues including trade, industry structures and productive resources. Stereotyping and persistent discrimination against women that manifest in negative gender relations, and value for gender roles and responsibilities with severe implication for maternal health and mortality still exist. There is also a gross misappropriated burden of care giving and household responsibilities on women by society, couple with difficulties, in law enforcement, in addressing challenges women face, in accessing the justice system (Akosah-Sarpong 2007) and, more especially, the low representation of women in mine jobs of Ghana.

3.3 Traditional World View of Gold Mining in Ghana

This part of the thesis presents the world view or fundamental cognitive orientation of Ghanaians, encompassing the traditional, individual or society’s knowledge and point of view on mine jobs. This is certainly the way that Ghanaians have looked at the world of mining since the beginning, a constitution of a framework of ideas and beliefs forming critical national narratives through which the Ghanaian people elucidate and interpret the world of mining. And by presenting this section, a context is provided explaining how views on mining and gender has changed over the years.

Ghana has a very long and significant history of mining and play host to a variety of the world’s mineral rich resources. Gold discovery and mining in Ghana predated the year 1471 because before the Portuguese arrival in the Gold Coast in 1471, the people were already mining gold (Ofosu-Mensah 2010). The storyline explaining Ghana’s discovery of gold centered on a woman on her way to draw water from the river after a violent rain. The woman found such shining and sparkling ornament material, which was picked and brought home, and upon close interpretations and analysis, it appeared to be a gold nugget, discovered in the southern part of Ghana (Ofosu-Mensah 2010). In a typical Ghanaian society, drawing water is synonymous to womanhood, and of course a fundamental domestic role of women. This explains the gendered dimension of the historical and incidental discovery of the ore in Ghana.

The traditional Ghanaian world view held that all the gold that lay under the earth and in rivers were under the custody and guardianship of the deities, hence before a mine was dug, it was customary for a traditional priest to sacrifice a hen or a cock and pour libation to appease the ancestors (Ofosu-Mensah 2010). It was also a common belief that a lot of gold could be extracted from the earth by sacrificing to the ancestors who were the owners of the land. Custom further demanded that the indigenous miners abstained from sex the night before they went to the mines; menstruating women were forbidden to approach the mine and could not take part in gold mining, the reason being that, in that state, they were considered unclean and bearers of bad luck (Arhin 1991). In addition, the miners had to refrain from evil thoughts while digging the pit lest they lost concentration and injured themselves (Ofosu-Mensah 2011). Similarly, gold was not allowed to
be panned from river banks on sacred days set aside for the worship of river spirits. For instance, in some Wassu sub-states, panning for gold was restricted to Tuesdays, Thursdays and Sundays (Dumett, 1998). Also the death of a traditional chief and when a diviner’s revelations pointed to a desecration or violations of the sanctity of the earth, these were followed by a temporary ban on mining for a prescribed period, until a sheep was slaughtered for purification and pacification purposes (Ofosu-Mensah 2010). Also, the Earth goddess was promised further sacrifices in exchange for bountiful discovery of gold. Infractions of the custom of restrictive mining has the consequences of the violator being buried alive by the Earth goddess. These beliefs about traditional gold mining certainly prompted Barbot to remark that, blacks, either through ignorance or policy regarded the gold mines as sacred and kept all persons in fear (Barbot 1723).

The discoveries of auriferous sites suspected to contain gold were revealed in dreams. Also the earth of blue-black or grey appearance along river beds and banks provided clues for the auriferous strata containing the gold ore. According to oral tradition from Fomena areas, more gold finds were recorded during the April rains when pebbles gleaming with gold grains were washed out (Arhin 1991).

The methods of production of gold were kept a closely-guarded secret and never revealed to strangers and foreigners. Villault de Bellefond remarked in 1697 that “if you talk about it to a hundred of them, they will all tell you different things, not because they do not know, but because they hide the truth in perpetual defiance of the whites.” Bosman (1698) states that the gold was obtained in or between certain hills and in river gravels where the streams enter the sea, and that women flocked to the seashore after heavy rains to pan for gold. Sand carried down from the interior deposited at the sides of river estuaries were said to be a lucrative source of placer gold on the coast. Bosman (1698) stated the collection and washing of beach gravels and sand at Elmina and Axim areas were done by women after violent rains. According to him, women used large troughs and trays, which they filled with sand and gravels and washed repeatedly with fresh water till all the lighter materials were removed. And the concentrates containing the gold was washed again and again in a small tray until all the dross was removed. Early explorers reported that almost the whole of the sandy gravel beneath the surface soil was auriferous. This is confirmed by Meredith (1812) when he explained that women of Cape Coast conveyed the earth to the sea side, where with much ingenuity and perseverance, they examined it and put the earth into a wooden bowl, where it underwent frequent ablutions by a circular motion until the lighter parts were washed away. It then underwent a careful elimination and frequent washings; and the gold at length was perceived at the bottom of the bowl, where it was allowed to remain until the whole earth was washed away.
The second, and probably the most important form of mining in terms of the numbers of workers involved and returns of gold, was shallow-pit surface mining on either the crests or sides of hills or in the sedimented valleys of ancient river beds.
The third type was deep-shaft mining for reef gold. Gold mining was largely a seasonal activity. Some placer mining and shallow pit mining took place all year-round; but panning for river gold tended to be best in the early rainy season. Deep shaft mining was mainly a dry season activity – occupying the time of men after harvesting in December and reaching a peak just before planting in April, when the water table was low (Dumett 1987). It is known that special days were set aside for communal digging, during which men and women had to produce gold for the kings in their respective states.
Figure 4: Traditional gold mine pit in Ghana

Source: Adapted from Ofosu-Mensah, 2010
In spite of the then unconventional methods of mining, characterized with the use of crude tools and implements, coupled with the danger and general high risks involved, women remained resilient and participated alongside the men in traditional gold mining in Ghana (Ofosu-Mensah 2011). Thus, mining became quite a normal work for both men and women. However, by 1900 there was a sudden turn of events. Women working in the mines, especially underground were perceived incompetent mothers and wives. Also, the value for Ghanaian women in food production and their natural reproductive functions worked against their participation. And in the early 1900s, Article 2 of the International Labor Organization (ILO) convention 45 of 1935 came into play, forbidding women from underground mining and night work (Dumet 1998); a protective legislation of a sort, and Ghana as a member of ILO complied.

Ghana is not also spared the global web of complex myths or tradition, ostensibly historical stories, though often supernatural and prevailing notions associating mining with masculinity. This mythology of sacred stories among some Ghanaians, involved narratives that suggest that the presence of women in mines causes accidents, deaths, or causes the ore to sink deep down the earth. In this context, gold is not only next to ‘God and glory’ but also considered a ‘spiritual entity’ considered sacred, subject to sink deep down the earth upon any encounter with impurities (Ofosu-Mensah 2011). This means avoidance of sexual intercourse a night to mining expedition and preventing women in their monthly period of menstruation from visiting the mines was obvious. A similar storyline exists in Sweden. Andersson (2012) gave a narrative from LKAB, where a group of miners during a workshop described an old tale: that the rock is a whimsical woman, who does not accept competition of other women, and this jealousy causes rock falls and
accidents in the mines. Though such stories, perhaps told with playful seriousness, keep this myth alive (Abrahamson 2006). So related to these tales is a prejudice that all miners are ‘macho-men’ and that women do not belong to the mine profession.

The gold nugget or dust was used in the barter trade with the European merchants. Barter trade is the then system of exchange where goods or services were directly exchanged for other goods or services without using a medium of exchange, such as money. The gold nugget was also used in marriage ceremonies (Dumett 1998). An amount of gold was offered as payment by the groom or his family to the bride’s parents, ostensibly for the bride on the occasion of their marriage. This gold payment continues to be expected and demanded as a condition to accept a marriage proposal. Gold was equally used extensively as a symbol of wealth, power and status in the then Ghanaian society. For centuries, the people of Ghana worked and mined gold, and their goldfields were one source of supply of enormous quantities of gold to the Trans Saharan traders and to the European markets before and during colonial administration of the Gold Coast.

3.4 Gold Mining in Contemporary Ghanaian Society

Ghana is a major player in the gold mining industry. The country places second as the leading gold producer in the sub-Saharan region after South Africa, and places tenth in the global gold ranking table. It is the 8th leading African producer of aluminum metal and manganese ore, and a significant producer of bauxite, diamond, natural gas and petroleum. In addition, Ghana produces a number of industrial minerals, which included clay (kaolin), dimension stone, limestone, salt, sand and gravel, and silica sand on a small scale (Akabzaa, Armah and Baneong-Yakubu 2007).

Currently mining is carried out in commercial quantities across seven out of Ghana’s ten administrative regions. The gold mining industry in Ghana is characterized by a hybrid of practices, policies and procedures aim at maximizing production and ensuring sustainable mining. The gold mining industry of Ghana has both economic and socio-structural ramifications in areas of job creation, GDP growth, royalties and revenue mobilization to the state. The mines employ over 28,000 people, directly contributing about 38.3 percent of total corporate tax earnings, 27.6 percent government revenue and 6 percent GDP as at 2011 (Aryee 2012; Kilu, Andersson, Sanda and Uden 2016). The industry also contributes significantly to sustainable development through the implementation of Corporate Social Responsibility (CSR) programs for host communities and the general Ghanaian public.

Within the context of legal frameworks, the State is the owner of all minerals found in their natural state within Ghana’s land and sea territory, including its exclusive economic zones per the Minerals Act and the Constitution of Ghana. Section 1 of the Minerals and Mining Act, 2006 (Act703) and Article 257 (6) of the Constitution of Ghana, 1992 provide that ‘every mineral in its natural state in, under or upon land in Ghana...is the property of the Republic and is vested in the President in trust for the people of Ghana.’ Thus, regardless of who owns the land upon or under which minerals are situated, the exercise of any mineral right requires by law, a license to be granted by the Minister for Lands and Mineral Resources, who acts as an agent of the state for the exercise of powers relating to minerals. Mineral rights are legally defined to include the rights to explore and to mine minerals. The sector Minister is also authorized to exercise, within defined limits, powers relating to the transfer, amendment, renewal, cancellation and surrender of mineral rights. The powers conferred upon the Minister must be exercised contingent upon the advice of the Minerals
Commission (MINCOM), which has the authority under the constitution to regulate and manage the utilization of mineral resources and co-ordinate policies in relation to minerals. The Minerals Law 153 specifies the forms of mineral rights that the sector minister is empowered to grant, the duration of the grant, the size of the concessions, and eligibility criteria for the grantee, as well as the procedure for application for mineral rights. The Law also spells out, in broad terms, the rights and obligations of a holder of a mineral right and the terms and conditions upon which each mineral right grant should be made. A mineral right granted is not transferable or tradable in any form except with the prior written consent of the sector Minister (Akabzaa and Darimani 2001).

Relevant and appropriate legal and legislative instruments as well as governmental agencies, departments and institutional frame works have been established in Ghana to assist in shaping the landscape of prospecting, monitoring and regulating as well as conducting environmental audits for the mining companies. For instance, the legislative framework for mining in Ghana is laid down in the Minerals and Mining Law, 1986, PNDCL 153 as amended by the Minerals and Mining Amendment Act 1993, Act 475 and modified by the provisions of the Constitution of 1992, the Additional Profits Tax Law 1985 (PNDCL 122), Gold Mining Products Protection Ordinance (Cap 149), Minerals and Mining Law 1986 (PNDCL 153), Minerals and Mining Amendment Act 1994 (Act 475), and Precious Minerals Marketing Corporation Law 1989 (PNDCL 219). Others include the Rivers Ordinance (Cap 226), Small-Scale Gold Mining Law 1989 (PNDCL 218) and State Gold Mining Corporation (Acquisition of Assets Amendment) Decree 1968 (NLCD 218). Subsidiary Legislations include the Diamond Mining Industry Protection Regulations 1927, Minerals (Offshore) Regulations 1963 (L.I. 257), Minerals Regulations 1937, Minerals Regulations 1962 (L.I. 231), Minerals Regulations 1963 (L.I. 253), Mining Regulations 1970 (L.I. 665), Mineral (Royalties) Regulations 1987 (L.I. 1349), Prospecting and Digging License Regulations 1950, and Transactions in Gold Regulations 1947.
Table 1: Relevant regulatory mining institutions of Ghana

<table>
<thead>
<tr>
<th>Institution</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Lands and Natural Resources</td>
<td>Overall responsibility for the mining industry</td>
</tr>
<tr>
<td>Minerals Commission</td>
<td>The first contact for prospective investors and recommends mineral policies</td>
</tr>
<tr>
<td>Geological Survey Department</td>
<td>Conducts geological studies; including map production and maintenance of geological records</td>
</tr>
<tr>
<td>Mines Department</td>
<td>Responsible for health and safety inspections and maintenance of mining records</td>
</tr>
<tr>
<td>Lands Commission</td>
<td>Responsible for legal records of licenses and legal examination of new applications</td>
</tr>
<tr>
<td>Ghana Chamber of Mines</td>
<td>A private association of operating mining companies, provides information on Ghana’s mining laws to the public and negotiates with the mine labor unions on behalf of its member companies</td>
</tr>
<tr>
<td>Environmental Protection Agency</td>
<td>Responsible for environmental issues related to mining</td>
</tr>
<tr>
<td>Precious Minerals Marketing Corporation (PMMC)</td>
<td>A government entity responsible for promoting the development of small-scale gold and diamond mining in Ghana and purchasing the output of such mining, either directly or through licensed buyers</td>
</tr>
</tbody>
</table>

Source: Fieldwork 2014
CHAPTER FOUR

4.0 Methods and Materials

This chapter presents information by which the scientific basis of the thesis is judged. It provides a description of where and how the study was done, the rationale for specific research methods and procedures chosen. The chapter further describes what was done to answer the research questions, justifies the study design, and explains how the results were analyzed.

4.1 The Study Area

The current study reports findings on the fieldwork from four mining companies and a mining and technology university in and around Tarkwa in the Western Region of Ghana (see Fig. 1). Tarkwa is the capital of Tarkwa-Nsuaem Municipality which forms part of the 22 Metropolitan, Municipal and Districts in the region. A well-noted mining town, hosting several mining companies and mining activities. The municipality has an annual rainfall and temperatures averaging about 1,874 mm and 26 degrees Celsius, respectively. The area is part of the extensive Ankobra River Basin and its mosaic of tributaries collectively receive mine-impacted drainage and stir up mining activities from both large and small-scale mining operations. Geologically, the area is located at the south westernmost extension of the well-studied Ashanti Gold Belt that accounts for over 90% of gold production in Ghana (Akabzaa, Armah and Baneong-Yakubo 2007). There exist six large gold mining and one manganese company in the area, along with these are about 30 registered small scale mines and over 20,000 unregistered artisanal mining operations. The metamorphosed sedimentary and volcanic rocks of the Birimian system and much smaller scattered shallow water sediments of Tarkwa system underlie the area. Hence the choice of this study area, which has inarguably stirred up lots of mining interest, and is becoming the ‘Mecca’ of gold mining in Ghana. This choice is further scientifically guided by Bent Flyvberg’s (2006) subjective information oriented case selection strategy, justified on grounds of maximizing the utilization of abundant mining information in the area. According to Flyvberg, cases are selected on the basis of expectations about their information content, and that information is obtained on the significance of various circumstances for case process and outcome.
4.2 Study Design

The current study adopts the case study design to investigate the phenomenon of women in mining Ghana. According to Yin (2014) the case study method is particularly valid and appropriate when the research targets work organizations, studying subjects in real life situations, and working to answer research questions in the form of ‘how,’ ‘why’ and ‘what’ – similar to the questions this study seeks to answer. Yin (2014) also justified utilization of case study in works where there is little control over behavioral events for the investigator; when the study focuses on contemporary phenomena (the case) in a real-life / world context, equally in line with the current study on women in mining Ghana. In the perspectives of Yin, the case study design provides rich description of the social scene, deep description of the study context, to further enable a deeper understanding and interpretation of the unique, typical experiences and circumstances of the subjects, and in this case the women miners. Yin (2014) reiterated that the case study method is multi-purpose in nature, global in outlook and used in many situations, both simple and complex to contribute to knowledge and deeper insight into individuals, groups, organizations and society, while still retaining a holistic and real-world perspectives. The examination of data is done within the context of its use or within the situation in which the activity takes place. Also Yin argued that inherent variations, influential factors and differential collective approaches to case studies create room for both quantitative and qualitative analysis of data. The real-life nature of the current study, and its strive for deep understanding of mine work organizational gender perspectives, justifies the adoption of the case study approach. In view of this, it is clear to me that, to understand a complex issue such as this, the case study research is necessary.

The thesis equally opted the multiple-case study approach over the single case. In this regard, as mentioned earlier, four multinational large scale Ghanaian mining companies and a university of mines and technology were understudied. This option draw into Eisenhardt’s (1989) argument in
favor of multiple cases. Eisenhardt stated that between 4 and 10 cases usually work better. Eisenhardt (1989) emphasizes the use of contrasting observations from multiple cases to create and highlight theoretical constructs. Moreover, by using multiple cases, it’s possible to generate testable and generalizable theory. As Eisenhardt stated, multiple case studies “are a powerful means to create theory because they permit replication and extension among individual cases. Eisenhardt (1989) argues that, by using multiple cases, the researcher gets a wider view of the context, making it possible to generate testable and generalizable theory. That to build theory one must have in-depth understanding of the concerned phenomena in a “real-life” setting. The proponents for single-case studies however hold contrary views that, the more cases a researcher investigates, the less contextual insights he or she can communicate (Dyer & Wilkins 1991; Yin 2014).

The case units of analysis for the current study include Gold Fields Ghana Limited, Tarkwa branch. It is a South African owned company, incorporated in 1993 as a legal entity, in which the Government of Ghana holds a 10 percent free carried interest, as required under the mining law of Ghana. Next is Anglo Gold Ashanti-Iduapriem mines, another South African owned company operating on a 110 km square concession. Then comes the Golden Star Resources Limited in Bogoso, near Tarkwa. This is a Canadian-owned company, incorporated in 1992. The Company holds 90% interest in both Wassa, Prestea and Bogoso gold mines in Ghana. Next is the Gold Fields Damang Limited, which was established in 1997 and been since mining the tailings of the Abosso Gold Mines. The university studied was established in 1952 as Tarkwa Technical Institute. It was affiliated to the Kwame Nkrumah University of Science and Technology as the Tarkwa School of Mines in 1976. Subsequently, it assumed a full-fledged university status in 2007, and is now known as and called University of Mines and Technology (UMaT). This university was established with the aim of producing world-class professionals in the field of mining, technology and related disciplines. It has the mission to promote knowledge through effective teaching, learning, active research and dissemination of information; and to provide professional services through extension activities to the mining and allied industries.

Data Collection

For the current study, the researcher visited the study area (mining worksites and the mining and technology university) on four different occasions. The first and introductory visit was in August 2014, which lasted for seven days. The second visit spanned a period of three days and took place in September 2014. The third visit was in December 2014, and it was for a period of 14 days. The fourth and follow up visit lasted two days in March / April 2016.

The work, accordingly, utilized a mix of qualitative and quantitative sets of data collection approaches; aimed at understanding a complex phenomenon of male-dominance machinery or few women representation in mine jobs of Ghana. This choice paved the way for utilization of a multiple source of data collection including surveys, individual interviews, and focus group discussions, study of documents, field observations and archival records. Yin (2014) posits that the multiple sources permit researchers to address more complicated research issues, and makes the researcher capable of collecting richer and stronger array of evidence than can be accomplished
by any single method. Other views hold that the collection and analysis of embedded qualitative responses can augment and explain complex or contradictory survey responses (Driscoll, Appiah-Yeboah, Salib, and Rupert 2007).

Two instruments were designed for the data collection purposes: a survey instrument / questionnaire and an interview guide. The survey instrument was primarily based on multiple-item measurement, using a Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree”. Six items (observed endogenous/latent variables) measured societal culture (unobserved endogenous/latent variable), and 2 items each (observed endogenous/latent variables) measured other two unobserved endogenous/latent variables (organizational design and recruitment). The psychosocial component (unobserved endogenous/latent variable) was measured with 13 items (observed endogenous/latent variables whereas the interview guide contains set of open ended questions demanding flexibility in responses.

The set of questions contained in the two instruments were derived from the literature review, as recurring themes and guided by the set of research questions and the main aim of the study. The research questions centered on finding out the social construction of gender in science, engineering and technology education. The organizational and sociocultural barriers - culture of male- dominance, relationship among fellow women, discriminatory practices against women, family- friendly work policies, role models and mentorship issues. Also, questions were asked to ascertain the gender-driven division of labor in the Ghanaian mines - that is, to discover if indeed, few women participate in the multinational mine jobs, where are they functionally active. Questions were equally asked to measure women’s participatory progress levels beyond the barriers. What changes or shifting gender dynamics have occurred, witnessing more women taking up mine jobs within the multinational Ghanaian mines?

The interviews were conducted by the researcher at the school and work places of the respondents. Both women and men miners, mine managers, mining and mineral resources students as well as some mining engineering lecturers from University of Mines and Technology were interviewed.

Self - administered questionnaires were sent to 315 respondents randomly selected. Out of the 315 questionnaires administered, 310 were retrieved. But 6 of the retrieved questionnaires were excluded from the final data set on the basis of serious omissions in some of the scale items used. Consequently, the usable questionnaires extracted were 304 which produced a valid response output of approximately 98%. This preceded a pre-test of the instrument carried out at Anglo Gold Ashanti Limited in Iduapriem.

The interviews, which lasted between 45 minutes and 1 hour, were on their understanding of the barriers affecting participation of women in mine jobs of Ghana, as well as the shifting gender dynamics. The qualitative approach witnessed twenty seven recorded interviews of ten women and fifteen men. The interviews allowed the interviewees and participants alike to reflect on and discuss their experiences. This obviously allowed the researcher to capture how a number of diverse individuals make sense of organizational phenomena, including their interpretations (Gioia and Chittipeddi, 1991; Soderberg, 2003).

Also, two separate focus group discussions were organized. The first was with a group of students from University of Mines and Technology, who have been on vacation attachment with the mining organizations before. The second was with a group of miners, selected across the four mining companies. According to Kitzinger (1995) focus group discussions have advantages of non-
discrimination against people who cannot read or write and they can encourage participation from people reluctant to be interviewed on their own or who feel they have nothing to say. Also, a focus group discussion has a hallmark of explicit use of group interactions to produce data and insights that would be less accessible without the interaction found in the group (Morgan, 1997). Participant observation was also conducted at the mine sites, which provided the means of becoming acquainted with the miners work lifestyles, as well as the contextual setting for their narratives. This is in fulfillment of the context-depended nature of the study, as stated earlier.

4.3 Recordings and Analysis of Data

Voice recordings of interviews and focus group discussions under the qualitative method were done using a tape recorder. Recordings were further transcribed into themes, reflecting the five main research questions. The data were then organized thematically, including both the recurrent themes and issues that were not recurrent but were of interest in relation to the main aim of the study, and all quotes were verbatim and approved by interviewees.

Also, handwritten notes were taken in the course of both the interviews and focus group discussions to augment comprehension of the process. Though it is a hard sell to get people go back to pen and paper due to the advent of new computerized writing technologies, that old-fashioned generative note-taking enabled me summarize, paraphrase and concept-map the responses effectively for ease of learning, retention and comprehension.

Analysis was done on the qualitative and quantitative data sets. Analyses were guided and supported by three main things: literature, main aim of the study, and the research questions. The literature provoked key ideas that organize and shape the scientific lines of thought and argument. The aim and the research questions guided and strategically map out coherence and consistencies in the analyses and interpretations of the data so collected from the under studied mining companies.

The quantitative data adopted a step-by-step approach for the analysis. The first step involved a factor analysis aimed at establishing whether all the items (observed endogenous/latent variables) included in the different model components (unobserved endogenous/latent variables) measure the constructs of interest significantly. The second step undertaken was a structural analysis of the conceptual model to test the model of the unobserved endogenous/latent variables (i.e., psychosocial, societal culture, organizational design and recruitment). This was done using the structural equation modeling (SEM) with the Analysis of Moment Structures (AMOS) as the analytic technique. The use of the AMOS software for this analysis provided the opportunity to use the regression factor scores directly to predict the location of the individual items in the model (Tabachnick & Fidell, 2001). According to DiStefano, Zhu and Mindrili (2009), this procedure has the advantage of maximizing the validity of the estimates. Furthermore, the AMOS software gives the researcher the opportunity to conduct analyses for multiple levels of variables using a range of in-built statistical techniques, including (i) Chi Square (CMIN), (ii) Comparative Fit Index (CFI), and (iii) Root Mean Square Error of Approximation (RMSEA). Indicator fit in models is interpreted from the perspective that estimated indicator loadings on a latent variable must be 0.7 or higher (Schumacker & Lomax, 2004).
4.4 Research Ethical Considerations

A sense of ethical behavior, moral rules and professional codes of conduct were exercised in line with the demands of ethical legislations and requirements. It covered the whole research process, including defining contexts of the study, identifying the research population, sample determination, choice of method to gain access to informants, data collection, analysis, reporting and publication of results. This aimed at protecting interests of the key stakeholders – respondents and their companies or institutions, co-authors and editors of the respective journals.

Schutt (1996) noted that voluntary research participation is an ethical requirement. And informed-consent rules, when done properly, it ensures that individuals voluntarily will participate in the research with full knowledge of relevant risks and benefits. This then drew my attention to meet with management of the targeted study organizations in August 2014 to negotiate access to their respective companies. Introduction letters and copies of my instruments were distributed to the companies. In response, the respective mining companies grant conditional access to their facilities and information. The conditions being that I sign confidentiality forms and receive training and orientation on basic security, safety and health. I accordingly, in September 2014 took the training, orientation and signed the confidentiality forms. Being mindful of how management sometimes can take employees right to participation for granted, I went further to explain the notion of informed consent to the respondents and further explained that they were free to participate or not, or may start and withdraw when sensing discomfort.

For majority of human work scientists, field work constitutes a métier and the main platform for knowledge acquisition (Davies 2008; Heald 2003). Barrett and Groes-Green (2011) acknowledged the fact that lived life context and the narrative accounts people give on the context is significant. Fieldwork and participant observations which featured in the current work are viewed as interlinked strategies in social science research where insight is achieved by sharing time and space with the study population (Tjornhøj-Thomson and Whyte 2008); and to the researcher the field for research is a ‘sacred space’ given out wholly for the purpose of quenching the thirst for knowledge and understanding (Josephides 2003: 58). However the researcher must enter the field as a guest and the study population as the host, with both strictly observing a set of obligations and dilemmas the field may impose on both parties (Barrett and Groes-Green 2011). It follows that when the researcher is present in the community, it means that the domain of the study population is invaded and, therefore, the research process may be considered intrusive. In the current study, the dilemma presented with my presence in the field was that, the mine workers, on one hand, felt compelled to show hospitality - a typical Ghanaian ‘akwaaba’ gesture, which literally symbolizes warmth and a welcome to strangers, although they also felt threatened and insecure by my presence, coupled with pockets of suspicion that I was a spy, as few managers jokingly asked – ‘Are you sure you are not here to spy on our operations?’ So I had to prove beyond reasonable doubts, showing my identity card, with my photograph on it issued by the University of Professional Studies, Accra where I was a member of faculty.

Researchers equally have an ethical obligation to maximize benefits and minimize harm caused to subjects (Ringheim 1995). Individuals, groups and communities that contribute to research should benefit from the work they take part in. That the benefit so derived is considered a standard
requirement if research is to be considered ethical (Barrett and Groes-Green 2011). So I was confronted with yet another dilemma, where some of the mine workers viewed my presence as a researcher coming from Lulea University of Technology-Sweden, as a golden opportunity to gain knowledge, access to networks and resources. This is a typical expectation on persons coming from abroad. Unfortunately, I had not even visited Sweden by then and I had no practical details and knowledge on Sweden to share. As Thorne and Darbyshire (2005: 1108) rightly put it, “When the only tool you have is a hammer, all problems look like nails.” Accordingly I managed these critical and varied expectations by giving out a few souvenirs (pens, key holders and handkerchiefs) to each and every person interviewed. Some scanty information on Sweden was shared and indeed I am still in touch with some of the interviewees for updates on developments on mine work gender perspectives.

Similarly, social science researchers put emphasis on the centrality of systematic reciprocity for collective benefit as an ethical principle (Barrett and Groes-Green 2011). Here the main benefit is an activity in the form of an intervention aimed at given back to community, groups and individuals who participate in the research. In this regard, I identified a mentorship program as probably a solution to the lack of role models menace being a common complaint by many of the Ghanaian women miners interviewed. This was subsequently mentioned in one of my seminar series and some people were compelled to support the idea. Therefore in September 2016 a team from Sweden visited Ghana, which served as roadmap towards a probable international collaboration with Ghana Chamber of Mines and Women in Mining - Ghana. As elucidated by Barrett and Groes-Green (2011) that these forms of interventions, collaborations and exchanges may lead to building trust, mutuality and opens doors to different types of knowledge and benefits.

Also discussing and analyzing research data has ethical implications. A context-based study like the current one, is in its very nature socially and culturally negotiable. This is because social sciences are defined by cultural determinants and therefore do not operate in a social vacuum (Watney 1991). In mine work organizations in Ghana, organizational and sociocultural issues are understood within the context of the wider Ghanaian culture, and attached meanings based on traditional and learned beliefs. This implied in the current study, a high margin of professionalism was upheld in discussing sensitive personal issues bothering on stereotypes, binary differences, implicit gender biases, subordination of women and hierarchical privileges. In view of this, it was most likely that the research data was emotionally charged, sensitive and confidential as it drew on personal experiences and life histories of the respondents. Since the Ghanaian society is dominated by patriarchal values, discussions on gender equality and women’s empowerments may sometimes probably put researchers in an ambiguous situation and capable of evoking cultural responses of silence, but these were tactically managed with assurance of hypothetical names designated to respondents on grounds of anonymity (Sieber 1993). Data, they say, do not speak for themselves but only through the interpreter (Hitchcock and Hughes 1995:324). So in the current study, I took a personal responsibility for scientific, objective, critical and rigorous analysis for comprehensive meanings, implications, conclusions and applicability to good practice to ensure trustworthy.
In furtherance, the APA’s research code of ethics guide on intellectual property informed authorship status of the six appended papers in the current thesis. This is a model that demands adequate contribution as a qualification to become an author. Indeed adequate contribution from conceptualization, design, execution, analysis and interpretations of the research. With this in mind, the student and the team of supervisors met and discussed modalities and optimal solutions on authorship of the different articles. This reflects the inconsistencies on the co-authorship of the appended papers. This happened despite contemporary academe’s competitive “publish-or-perish” mindset.

Regarding journals and editors at the point of publishing results of the current study, critical ethical decisions were made in fulfillment of important ethical obligations. A case in hand centered on ‘Paper C’ as appended in the current work. After the paper was reviewed and accepted for publication, the authors detected an error based on logic, which had the potentials of changing the interpretations of the research findings. Permission from the editor was sought and error duly corrected. However, for a period of ten months today, the paper has yet to be published, and the editor consistently decline to respond to e-mails regarding the paper. This makes me wonder whether the editor took offence in our discharge of a crucial ethical responsibility in correcting the error.

The APA’s Ethics Code further warns social science researchers to be conscious of multiple roles and relationships that could reasonably impair their professional performance and judgment. In view of this, during the writing process of ‘Paper D’, consultations and discussions were made with a visiting professor, bothering on application of a particular theory. The said professor who also doubles as associate editor of the targeted journal, told he was going to declare that he was in conflict of interest situation to the editor-in-chief, so that he would not be assigned to review the affected paper.

In the first submission of ‘Paper A’ as appended in the current thesis, after the review processes, it was granted a conditional acceptance by a certain journal. The conditions were expressed in a note saying ‘please find attached the reviewers’ comments, strictly address them and also find it appropriate to review, cite and reference one or two papers from this journal. Unfortunately we could not find a fine mix of the papers recommended by the editor and saw a risk of joining unnecessary ‘citation societies’. So on ethical grounds, we declined and withdrew the paper.
CHAPTER FIVE

5. SUMMARY OF PAPERS AND SCIENTIFIC CONTRIBUTIONS

This chapter sums up the appended papers. The summary gives short description of the background to the papers, main results, and scientific contributions. Also the researcher’s personal contribution, in terms of the work done in each and every one of the papers highlighted.


Summary

Paper A investigates the influencing dynamics of non-gendered characteristics on employees’ recruitment in companies operating within the Ghanaian mining industry. The non-gendered characteristics refer to factors not relating to people of one particular gender. The non-gendered characteristics include psychosocial, cultural and organizational design factors. A conceptual framework linking these psychosocial, cultural and organizational design factors to recruitment processes was developed to guide the study. The quantitative data was first factor analyzed to establish the predictiveness of the conceptual model component indicators. A step by step analytical approach was further used. The first step consist of a factor analysis aimed at establishing whether all the items (observed endogenous/latent variables) included in the different model components (unobserved endogenous/latent variables) measure the constructs of interest significantly. The second step consist of structural analysis of the conceptual model to test the model fit of the unobserved endogenous/latent variables (i.e. psychosocial, societal culture, organizational design, and recruitment). This was followed by an analysis of the conceptual model for “goodness of fit” using the AMOS–based structural equation modeling approach. This was done using structural equation modeling (SEM) with analysis of moment structures (AMOS) as analytic technique. Measures of goodness of fit typically summarize the discrepancy between observed values and the values expected under the model. The use of AMOS software for this analysis provided the opportunity to use regression factor scores directly to predict the location of the individual items in the model (Tabachnick and Fidell 2001). The results showed that the non-gendered characteristics of employees’ recruitment in mining firms in Ghana, constrain the employability of women, which is influenced directly and positively by the firms organizational design factors, which is in turn influenced directly by the firms’ psychosocial and sociocultural factors. The study also showed that the non-gendered recruitment characteristic of the firms is influenced indirectly, but positively by the firms’ psychosocial factors, and negatively by other sociocultural factors.

Scientific contribution

Paper A contributes to literature in area of recruitment and placement of employees in mine work organizations. The paper’s wide quantitative feat did not only seek to satisfy the quantitative audience but also explored a wide range of recruitment characteristics of mine firms, dovetailing the relationships among sociocultural, psychosocial and organizational design factors. The paper is placed first because, it is generic in outlook, sets the base and firm grounds the qualitative
design and discussions aim at providing deep and rich understanding of the phenomena of mine work organizational gender perspectives. The paper further contributes to a model that can be used by future researchers to explain association among firms’ non-gendered recruitment characteristics such as organizational design, psychosocial and sociocultural factors. Mining firms can use this knowledge in developing objective recruitment processes, policies and practices to enhance future recruitment of all qualified human resource, irrespective of gender.

Author’s Contribution

I designed the paper, reviewed extant literature, negotiated and gained access to the understudied institutions, and gathered the empirical data. Mohammed-Aminu Sanda, my co-author, did the quantitative factor analysis and discussions.
5.2 Paper B: Enrolment Regimes and Gender Differences in University of Mines and Technology: Implication for Gender-Equity Discourse in Multinational Ghanaian Mines.


Summary

Paper B explores the effects of social construction of gender in science, engineering and technology education, how the phenomena translates into enrolment regimes in University of Mines and Technology, and how that subsequently affects recruitment of women into Ghanaian mines. Drawing from a mix of individual interviews and student’s enrolment data from 2011/2012, 2012/2013 to 2013/2014 academic years, for the various programs being offered. The university is a science and mineral resource technology base, established with the aim of producing world-class professionals in the field of mining, technology, and related disciplines. The university, with the mission to promote knowledge through effective teaching, learning, active research and dissemination of information, and to further provide professional services through extension activities to the mining and allied industries in Ghana. The university however, operated for a period of 48 years in its core mandate of admitting and training male engineers and male miners without a woman being trained. The university only admitted a first female student in the year 2000. Paper B highlights that the pattern of enrolment regime on the basis of gender is widely and unevenly spread. For instance, Mubarak (2006) in Nigeria analyzed gender differentials in enrolment into faculty of science, university of Ilorin between 1999 to 2004 academic years, and confirmed the issue of male-dominance in science-related programs. The management of UMaT in an interview issued a disclaimer of no malice or ill motives with deliberate restrictions on women enrolments.

Paper B pinpoints the social construction of gender in engineering, science, and mineral resources technology as a cause of few women gaining admission into the university. The social constructions explain meanings, notions, connotations, stereotypes and perceptions placed on the engineering education by society, and how it informs individuals’ actions with respect to how they view or perceive men and women in the engineering field. The paper draws from Barad's agential realism (1998) on ‘ontological inseparability of intra-acting agencies’ where she argued that pervasive motivation to social constructions and conceptualizations of gender in science, engineering, and technology is a product of dualisms and dichotomies such as female/male, woman/man and feminine/masculine in society. In accordance with Barad’s theory, there shall not be any point of justification to exclude women from science, technology, engineering and mathematics-related fields. The danger associated with social construction of gender in science and engineering is the societal perpetuation of stereotypes on who can do science, engineering and mining technology. Implicit stereotypes eventually tend not to favor women and probably turn most women and girls away from that field of studies. Canel et al (2000) provided grounds for concluding that in many places and times, some people in society went considerable length and height to prevent women from becoming engineers. Certainly, something they would not have to do, if women had inherently lacked either the mathematical abilities or the personal traits requisite for success in the engineering profession. A similitude to this social construction of gender in engineering is West and Zimmerman’s (1989) doing gender theory, which critically questioned the set of complex structures of socially guided perceptual, stereotyped, interactional and micro-political activities that cast particular pursuits as expressions of masculine or feminine in society. Women in engineering, therefore, face a double edge scenario: overcome hurdles to obtain training in engineering – and once trained, have difficulties in obtaining employment into the engineering jobs. The paper suggests that a conscious effort to encourage more female enrolments into science
and engineering-based education can be a success through exposition and elimination of erected and constructed gendered engineering and technology identify barriers and boundaries, as well as dismantling their maintenance and perpetuation both in educational and practical professional work life experiences.

**Scientific contribution**

Paper B highlights that the paucity of women in science, engineering, mining and mineral resources technology is neither biological nor natural, rather a societal construction of a fort. The paper shows how this appears in Ghanaian higher education in mining. By its research content, paper B contributes to push literature further in areas of gender and technology, as well as feminist technoscience studies. The paper contributes to generate a body of knowledge on effects of social construction of gender in science, engineering, and mineral resource technology education on gender differences in enrolment regimes and recruitments processes in Ghana. Specifically, the paper elucidates how the social constructions of gender in technology related education constitute barriers with consequential effect in delaying women’s admissions into UMaT, which subsequently opens a gender gap or gender differentials in enrolment regimes in the University. The paper subsequently shows how the male-dominant enrolment regimes in the university constitute a major pre-entry barrier to women’s mine work participation in the multinational Ghanaian mines.

**Author’s Contribution**

In this paper, the candidate designed the paper, did the write up of the main body, reviewed extant literature, negotiated access to the understudied institutions, gathered the empirical data, and did the analysis. Mohammed-Aminu Sanda the co-author, also contributed part of the analysis.

Summary

Paper C reflects consciously on set of organizational practices, processes, and policies working against women’s effective mine work participation in multinational Ghanaian mines. Adopting a mixed method design, the paper used both quantitative and qualitative data to generate the results. For instance, a profile of gender representation proportions shown in table 1, paper C appended, creates a sense of sex composition among employees from the understudied mining companies. Kanter (1977) proposed that the composition of a workforce must be at least 15% of women to reduce the minority effect, or at least 30% of women to attain the real positive effect of gender mixing. The paper gives an indication that Ghanaian mines are behind both at reducing the minority effect and achieving the real positive effect of gender mixing.

The low women’s mine work representation proportions in Ghana is in line with other international studies. For instance, a study in Asia Pacific explained how between 1900 and 2000, the percentage of women employed in Indian coal mines fell from 44% to a less than 6% of the mine workforce (Lahiri-Dutt 2012). Similar to these Ghanaian and Asian cases, Andersson et al (2013) concluded that about 80-90% of all employees are men in the large-scale Swedish mines. This suggests modern mine works still have a long way to battle with male-centrism in the industry.

The paper further shows that among the mine business partners, nearly all workers are men. I speak here of contractors, consultants, transportation companies, manufacturers and suppliers engaged to provide civil engineering works, the supply of hard and soft mining packages, drilling, blasting, crushing and grinding. Another critical agent in the mine work political structure is the Ghana Mineworkers’ Union of Trade Union Congress. As shown in this paper, membership of the unions across the mines, both senior and junior member categories, weigh heavily towards the men. Also, the leadership is male. The concerns being raised in the current work against male-dominance cultures supports research in Swedish mining industry by Abrahamsson (2008) and Andersson et al (2013) where concerns are expressed that though the mining industry may have evolved in many respects, old beliefs on close relationship between mining and masculinity still exist: an idealization of a certain type of miner masculinity deep rooted in the old manual, heavy and dangerous mining work, characterized by macho masculinities. This could be contemplated as a ‘doing gender’ of a sort, practices where virtually every activity is being socially assessed as to its manly or womanly nature (West and Zimmerman 1989). In this sense, it might be fair to acknowledge that modern work organizations like the mines are microcosms of modern societies, and so far as almost every activity in society is partitioned on the basis of gender, doing gender might be unavoidable in the mining industry as well.

The question as to whether sustainable work-life balance, family-friendly policies and practices do exist in Ghanaian mining industry, was also discussed. This can be compared to an expression captured in the interviews for this study: ‘if the sensitivity of the job requires you to be available at any given time, and in full utilization, you are not likely to recruit a woman.’ This statement
goes against provisions of the national labor laws on maternity leave and other leaves of absence. Legislations on maternity leave do exist under leave regulations of mining companies of Ghana. On submission of a medical certificate signed by the company’s medical officer or a registered medical officer or a registered midwife, a woman who becomes pregnant shall be granted maternity leave with pay as follows: six (6) weeks before confinement and six (6) weeks after confinement. This suggest a three months of maternity leave to a nursing mother. I did not only consider it as woefully inadequate to provide effective child care but also see it as a ‘cosmetic joke.’ This can be understood as an example of what West and Zimmerman (1989) described as situated doing gender type, carried out in virtual or real spaces where people are oriented towards production and reproduction of gender, and a constitution of practical and procedural means of legitimizing the fundamental divisions of society. The Ghanaian example contrast best practices elsewhere such as Sweden and other Scandinavian countries, where working parents are entitled to 480 days of paid parental leave, of which 60 days are reserved for the father in line with the Swedish state’s strict policy of promoting gender equality.

Also, the lack of role models and mentorship for young female miners constitutes a noted challenge to women mine work participation. The lamentation that: ‘I don’t see women at the top of this organizational hierarchy, which makes me think that there is no future for me in terms of career progression’ might be interpreted in two ways: first, it could mean a state of frustration associated with a sense of hopelessness in continuous functioning in the mines as a woman without a bright future! On the other hand, it could mean an expression of mistrust out there, where women may be hesitant to be mentored by male mentors. This suspicion is confirmed by Kanter’s (1977) proposition that in work environments where women are few and do not occupy top management positions, they might suffer from role model constraints and might turn to rely on the men who are experienced for coaching. Ironically those men (dominant) might see women (token) as stereotypes rather than equally competent peers to deal with. But is this an inescapable rule? Can a man (mentor) and a woman (mentee) relationship prove effective, and move gender equality process forward? West and Zimmerman (1989) in doing gender believed that stereotyped notions have the consequential effects to fuel uncertainties and implicit biases against women. Also, it has a high propensity of negatively affecting attitudes and behaviors, hindering fulfillments of lifetime dreams and aspirations.

Scientific contribution

Paper C contributes to building a body of literature on organizational gender perspectives. One may also say that masculinities and the culture of male-dominance in mine jobs have been long researched by various scholars, therefore paper C is a mere repetition. However, with relatively few studies on Africa in general, and Ghana in particular, Paper C then becomes relevant and contributes to bridging a literature gap. The paper advertently imputes the mining industry of Ghana has remained gendered, characterized with male-dominance, prevailing macho masculinity cultures, implicit gender biases, lack of family friendly work policies, role models and mentorship constraints, and lack of support from fellow women, constitute participatory barriers against women.
Author’s Contribution

Rufai Haruna Kilu design the paper, write up the main body, reviewed extant literature, negotiated for access to the understudied institutions, gathered the empirical data, and performed the analysis. Mohammed-Aminu Sanda, Maria Udén and Eira Andersson, all as part of their supervision, critically read the text and advised accordingly.

Summary

The gold mining industry is a major player in Ghana’s socioeconomic development, contributing to job creation, GDP growth, royalties and revenue mobilization to the state. However, the industry is characterized by gender inequalities, constituting participatory barriers to women. This paper examines the sociocultural barriers affecting effective participation of women in Ghanaian mine jobs. The paper further explores the transformations that have occurred, occasioning a shift in gender dynamics, witnessing more women taken up mine jobs. The paper further adopts the case study method for the investigation. A method appropriate when the research questions are in the form of ‘how’ and ‘what’ and when the study focuses on contemporary phenomena in a real-life (Yin 2014). The study also deploys a multiple case study approach. Eisenhardt (1989) stated that between 4 and 10 cases usually work better. And qualitative research design was used coupled with meta-narratives.

Regarding the sociocultural barriers, paper D found ‘- common prejudices, perceptions and implicit stereotyped notions on gender roles-.’ This outcome supports Yakovleva (2007) in her earlier work that measured women’s participation in Ghanaian mining industry. Her results indicated sociocultural taboos, domestic and family commitments impose heavy burdens on women, hindering their independence and effectiveness to participate in mine works. Paper D further shows how sociocultural barriers grow to influence and cause organizational barriers. Regard the expression that ‘my mother says I should have opted a nursing profession, instead of the mine job, that I will die early if I continue working in the mines.’ This is a demonstration of spreadsheet of problems - how global challenges become local; and how societal issues become organizational. What this paper termed ‘socio-osmosis’ - a gradient diffusion of sociocultural beliefs, which diffuses into the basic fabric of the mine work organizations. Sociocultural barriers appearing as common prejudices, perceptions and implicit stereotyped notions, may appear unfounded but could carry negative effects on women’s mine work participation. In line with the doing gender theory, as presented by West and Zimmerman (1989) his paper describes designated preconceived gender roles and uninformed professional identity judgements characterized by preclusionary or exclusionary effect of preventing individuals, in this case, women, from pursuing their life time career interest further.

Beyond the barriers, however, Paper D showcased change processes in background dispositions, witnessing a shift in gender dynamics with more women now taking up mine jobs within the multinational Ghanaian mining industry. It is fair to acknowledge the conscious efforts and initiatives within the mining industry and allied institutions, which paid off in gradually reducing and reversing the age long male - dominant and masculinity cultures in the mines. The observed change processes as captured in paper D include - ‘the dawn of women in mining,’ ‘towards a gender-driven mining initiatives’ and ‘the ore-solidarity movements.’ This Ghanaian mine work change process illustrates the proverbial expression: ‘there is light at the end of the tunnel’ – meaning the Ghanaian mining industry might have been long challenged with pre-entry, sociocultural and organizational barriers, prospects of relief and success to break barriers and build bridges now glare at faces.
Scientific contribution

Paper D scientifically contributes to literature in two different respects:

1. Literature on corporate organizational barriers.
2. Literature on organizational change management processes.

The paper further produces useful body of knowledge - common prejudices, perceptions, and stereotype notions on gender roles - capable of being used by practitioners to proffer explanation to corporate organizational barriers. A similar contribution is made to generate knowledge - the dawn of women miners, towards a gender-driven mining, and the ore-solidarity – also subject to utilization in explaining modern corporate organizational change processes.

Author’s Contribution

A single authored paper: the candidate single handedly designed, did the write ups, reviewed extant literature, negotiated access to the understudied institutions, gathered the empirical data, and performed the analysis.

Summary

In the Ghanaian mines, Public Relations (PR) practice is generally titled, ‘Community Affairs and Public Relations’ – a field of mine work practice that is functionally and numerically dominated by women. Paper E determines roles of Community Affairs and Public Relations’ Practitioners in Ghanaian mines, and further explores why women dominate the field of Community Affairs and Public Relations in the mines. The paper uses a phenomenological inquiry which adopts qualitative approaches, and conducts individual interviews with respondents in three mining companies. Discourse analysis was employed in analyzing the statements of the respondents.

The paper shows that community affairs and public relations officers from the mines, function as the face of the mining companies in the communities in terms of engagements and communications. This is against the background that mining has lots of impact on both environment, and the people who live around the mines. So, community affairs and public relations officers are tasked with maintenance and provision of needs of communities within which the mines operate. They are equally responsible for social investment contributions; being what the companies give back to society. The brunt of mitigating the socio-economic cost of mining falls on the mining companies, and the liaison between the occasional embittered communities and the mining companies, is the Community Affairs and Public Relations Officer. Internally, the Community Affairs and Public Relations Officer, in turn, promotes the views of the communities to other departments of the mining enterprise to understand the effects of their operations on the communities, and then to be conscious about their existence, so that in everything that anyone does they must have the community at heart. And this crucial role requires a certain caliber of Community Affairs and Public Relations’ officers. As Fuller (1998) posits earlier that, for good corporate governance in any economy, we need such female virtues like cooperation, caring, pacifism and their nonviolence nature to promote peaceful coexistence in industrial organizations.

Paper E further indicates the factors which account for the PR practice internationally, are not the same as the pull factors regarding female dominance in community affairs and public relations practice in Ghanaian mines. The international factors include mutual adaption between organizations and their public; maintenance of mutually beneficial relationships between organizations and the publics; quality management for good corporate image and professional crisis management (Seitel 2001; Cutlip and Broom 1974 cited in Bekoe 2012). However, these statements by some respondents are pointers to the peculiar reasons why females dominate the field in Ghana: ‘you know as women, by nature we are more tolerant, and the communities when they are coming to lay complaints or grievances, they sometimes come very annoyed, aggressive and shouting all over. However, when they come to meet you as a woman because our culture and tradition emphasize values such as respect for women, it is difficult for the communities to be aggressive towards you as female community affairs and public relations manager; therefore, they calm down. The statement that ‘by nature, we are more tolerant’ implies that women have certain inherent tendencies which place them above men in some circumstances such as the practice of PR in the Ghanaian mines. Besides, the statement evokes nuances about gender because it
foregrounds the Ghanaian traditional perception of women as soft and tender, hence the need for them to be protected. This traditional perception, ironically, becomes the strength of women in PR practice in the Ghanaian mines. Therefore, female community affairs and public relations officers serve virtually as shields against the venoms and darts of anger emanating from the occasional embittered community members.

Scientific contribution

Paper E contributes to extant literature in the field of division of labor in modern work organizations. The paper further contributes to knowledge creation that can be useful in explaining the concept of gendered division of labor in mine work organizational practices. The paper also contributes to knowledge production, by elucidating that the current pull - push factors regarding female dominance in community affairs and public relations practice in Ghanaian mines, hinges on the powers vested in women by Ghanaian culture, custom, and tradition, for them to be granted audience and respected, no matter the height of provocations.

Author’s Contribution

I designed the paper, did part of the write ups of the main body, reviewed the gender part of the extant literature, negotiated access to the understudied institutions and gathered the empirical data. Ackrom Brian, who has expertise in language and public relations, also reviewed part of the extant literature on public relations and did the analysis.
Summary

The current paper is presented last on the following grounds; first to mark end of the six appended papers. Second to for-ground my future research interest - an interest motivated by my abstract/theoretical knowledge so acquired in my several years of teaching the Environmental Management and Sustainable Development Course in University of Professional Studies, Accra. An abstract knowledge I intend to put into practice within the context of mine work organizational sustainable development perspectives, hence the design and writing of the current paper. Danelski (2009) argued in support of the ideas behind paper F, that as the world’s population increases, demand for resources and infrastructure equally increase, hence the adoption of green technologies and sustainable development practices to enable companies meet their current demands, support economic growth without compromising the ability of the future generation to satisfy its needs.

Paper F explains green technology as encompassing and continuously evolving sets of methods, materials, and techniques, developed and used for environmental protection and conservation of natural resources. This work culture makes great effort towards achieving sustainable mining. Mining companies are noted for massive waste generation and huge energy consumptions, and as mining activities increase, the risk of greater environmental pollution and degradation, accidents and deaths also looms. This paper, therefore, explore the motivation and trends of green technology adoptions among multinational mining companies in Ghana.

Drawing on a qualitative case study methodology, data was collected through individual interviews with workers of some multinational mining companies in Ghana. The paper shows how green technology awareness messages were visible across various mines such as ‘Pollution prevention pays’, ‘Zero tolerance for fatalities’, and ‘Think green and save the environment.’ The paper further reveals that effect of globalization, the green movement, socioeconomic benefits and regulatory frameworks were set of motivating factors propelling green technology adoptions. Also, there is a shift from traditional and inefficient methods of mining to modern, efficient and green technologies, which impacted in economic utilization of scarce resources such as optimized fuel consumption, effective water treatment and re-use, dust suppression, effective restoration and reclamation of lands, improved ecosystem, increased land agricultural productivity, and the famous breath - alcohol detectors, playing critical roles in reducing accidents at the mines. A development said to be attracting an increasing diversity and equality in the mine jobs of Ghana.

Scientific contribution

Paper F in the first place contributes to literature on sustainable mining. Beyond the historical and present studies on mine work organizational gender perspectives, this paper plays a futuristic role in postulating, possible, probable and preferable future research area. In other words, the paper sets the agenda, direction and laid a foundation for my future research in Ghanaian mining industry. A paper that contribute to knowledge in my future research space aim at improving safety
and health practices, enhancing lean production, ensuring mine work sustainability and a brighter future mining in Ghana. A prerequisite to attract diversity and inclusive mining in Ghana.

Authors’ Contribution

I designed the paper, did part of write ups of the main body, reviewed extant literature, negotiated access to the understudied mining companies, and gathered the empirical data and part of the analysis and discussions. Affutu Robbert the co-author, who is also an expert in Environmental Management and Sustainable Development, did part of the analysis.

5.7 Relationship among Papers, Research Questions, Theory and Methods

This section presents the relationship among the appended papers, their corresponding research questions answered, as well as theories and methods applied as captured in table 2.

Table 2: Connection among Papers, Research Questions, Theory and Methods

<table>
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<tr>
<th>Papers</th>
<th>Research Question</th>
<th>Theory</th>
<th>Methods</th>
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<td></td>
<td></td>
<td>Doing Gender</td>
<td>Undoing Gender &amp; FTs</td>
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<td>C</td>
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<td>D</td>
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<td>E</td>
<td>RQ5</td>
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Source: field work 2014

Papers B, C, D & E respectively proffer answers to research questions 1, 2, 3, 4 &5 (see table 2). The doing gender theory (West & Zimmerman 1989), its antonym undoing gender (Butler 2004)/ feminist technoscience (Barad 1998) as well as the new social movement theories (Touraine and Melucci 1995; Braig and Wölte, 2002) featured prominently in providing rich rigor and scientific insights to the papers. Paper A appeared lone ranger quantitative, while papers D, E & F are mainly qualitative. Papers B & C deployed a mix of qualitative and quantitative approaches.
Connection among Appended Papers

The appended publications - papers A, B, C, D, E & F exhibit both complementary and independent relationships towards achieving the main purpose of the thesis - identifying the mine work participatory barriers to women, and exploring the shifting gender dynamics in the Ghanaian mining industry beyond the barriers.

Figure 7: Connection among Papers that seek to answer research questions

From figure 7, papers B, C & D complemented each other in exposition of the mine work participatory barriers (doing gender) against women in the multinational Ghanaian mines. Research and awareness creation to the basic existence of the barriers, coupled with set of deconstruction initiatives and policy interventions – quota systems, gender main streaming and affirmative actions also played mediating role (undoing gender). And the function of the mediation role is the change regimes in papers D & E.

**Paper A: Investigating the non-gendered recruitment characteristics of mining firms in Ghana: the role of sociocultural, psychosocial and organizational design factors**

This paper bears a generic and widespread relationship with the other papers B, C, D, E, & F. This means it explored range of characteristics not relating to people of one particular gender among the mining firms. The wide quantitative feat of the paper resonates to satisfaction of the quantitative audience of the study. The paper further set the base, and firm-ground the qualitative design and discourse in other papers (B, C, D & E) to flow. This makeweight of quantitative and qualitative mix provide deep and rich understanding of the phenomena under investigation. Caracelli and Green (1997) argued the mix designs are capable of expanding scope of research, and ensuring limitations of one type of data is offset or balanced by strengths of another.
**Paper B: Enrolment regimes and gender differences in University of Mines and Technology: implication for gender-equity discourse in multinational Ghanaian mines**

The focus of paper B in exploring the social constructions of gender in mineral resource technology education as pre-entry barrier to women, differs from paper C in its focus to expose mine work organizational barriers. And Papers B & C further contrast paper D in its focus to unmask sociocultural barriers affecting women’s mine work participation. In short, papers B, C & D differ from each other in their respective focus and drive towards mine works barrier-determinations. Papers B, C & D though identified different types of barriers, they cumulatively confirm Yakovleva’s (2007) study on women’s participation in Ghanaian mine jobs, whose results showed existence of social and cultural barriers, imposing heavy burdens on women’s effectiveness in mine works. A fair demonstration from the papers that, the mine work corporate climate of Ghana is very much gendered and socioculturally expressed, to the disservice of women. The papers in their barrier-expositional drive, further correlate the doing gender theoretical stance of West and Zimmerman (1989) as discussed earlier.

**Paper C: Reflections on organizational barriers vis-à-vis women participation in largescale Ghanaian mines**

This paper reflects consciously on set of organizational practices and hierarchical structures that hinder smooth participation of women within the Ghanaian mines. The identified barriers are mostly formal, and internally influenced at micro-organizational levels. This defines differences between paper C on one hand, and papers B and D on the other. The papers B & D present set of barriers that are external, informal, environmental, socioculturally influenced, and structural at macro-societal levels.

It is a common knowledge that, the formal barriers ie educational traditions and legislations - may have been broken or are reducing in effectiveness. For instance University of Mines and Technology’s adoption of new admission regimes as captured in paper B, consequentially led to a 23% women representations by 2013/2014 academic year. Meaning the university had passed the 15% of women enrolment figure needed to reduce the minority effect, further passed the 20% quota system set for women’s admission by the university, and now working towards the 30% of women enrolments to enable them attain a real positive effect of gender mixing Kanter (1977). This gives an indication that barriers associated with papers B & C, which appear formal, are being subject to a gradual removal. However, the informal barriers remain resilient, similar to Andersson et al, (2013) in a report ‘breaking ore and gender patterns in Swedish mines’ hold contrary views, and lamenting that, the informal barriers remain as difficult as the ore itself to be broken.

**Paper D: Beyond the barriers: witnessing shifting gender dynamics in multinational Ghanaian mine jobs**

This paper is unique in relation to the rest of the papers. It provides answers to two research questions in this study. Also a relationship of ‘viscous porosity of a sort’ was observed between papers C, B & D. A situation where the informal and sociocultural barriers and beliefs identified by papers B & D, did not only remain resilient and adamant to change. They rather creep, and gradually find their way into the formal organizations (universities and mining companies) to
constitute pre-entry and participatory barriers respectively, hence few women representation in the Ghanaian mines. For instance, a profile of gender representation proportions shown in table 1, paper C creates a sense of sex composition among employees from the understudied mining companies. The paper gives an indication that Ghanaian mines are lagging behind both at working to reducing the minority effect and working to achieve the real positive effect of gender mixing Kanter (1977).

The paper D went further to explore a change regime beyond the barriers, showcasing a paradigm shift in gender dynamics, where barriers are getting lifted and bridges getting crossed, with more women now taking up mine jobs in Ghana. Similar to the undoing gender theory (Butler 2004). Paper D also, in its change outlook, witnessed women miners in Ghana, socially organized and solidarized. Instinctively and spontaneously stepping forward in collective opposition to the male-centric cultures, and making clarion calls for change. Paper D, structurally and functionally matches the theoretical assumptions under-pining the European inspired new social movement theory (Touraine and Melucci 1995; Braig and Wölte, 2002). Paper D equally bears a co-relationship with paper E. In this regard, both papers individually and collectively join hands in expressing the emerging functional and numeral visibility of women in the Ghanaian mines. What the current work earlier described as the dawn of women in Ghanaian mines.

**Paper E: Gender, community affairs and public relations practice in Ghanaian mines: a sociolinguistic study of gender and language nuances**

This paper explains roles of Community Affairs and Public Relations’ Practitioners in Ghanaian mines. And further, explore why women dominate the field of Community Affairs and Public Relations? The paper in its focus on conventional mine work division of labor bears asymmetric relationship with papers B, C & D by shifting away from the traditional exploration of participatory barriers. Instead, the paper illuminates the public relations and community affairs as a female-dominated field within the mines. Papers E and D in part, complement and play a mediating role. And while the former acknowledges women dominance in Community Affairs and Public Relations portfolios, the later demonstrates a regime of change, drawing collective attention to increasing number of Ghanaian women taking jobs in mining beyond the barriers.

**Paper F: Mining in a green technology space - perspectives of multinational mining companies in Ghana**

This paper explains Green technology as encompassing and continuously evolving sets of methods, materials, and techniques, developed and used for environmental protection and conservation of natural resources. A work culture that makes great effort towards achieving sustainable mining. Paper F further reveals that effect of globalization, the green movement, socioeconomic benefits and regulatory frameworks were set of motivating factors propelling green technology adoptions. A development suspected by the current study to be able to attract more women participation in the mine jobs in Ghana. Paper F further presents a futuristic relationship with Papers A, B, C, D and E in postulating, possible, and preferably my forthcoming research area. In other words, the paper sets the agenda, direction and laid a foundation for my future research in Ghanaian mining industry.
CHAPTER SIX

6.0 Implications and Conclusion

This chapter presents implications on theory, policy and practice. The limitations of the study are equally highlighted. And conclusions drawn within the context of social construction of gender in science and technology education, the organizational and sociocultural barriers, and the change processes within the multinational Ghanaian mining industry.

6.1 Theoretical Implications

Historical evidence abound to explain that traditional mining in Ghana was characterized by unconventional methods, involving use of crude tools and implements, coupled with dangers and general high risks. Yet women remained resilient and participated alongside the men in traditional gold mining trade in Ghana (Ofosu-Mensah 2011). Thus, mining became quite a normal work for both men and women. However by the year 1900 there was a sudden turn of events, when Article 2 of the International Labor Organization (ILO) convention 45 of 1935 came into play, forbidding women from underground mining (Dumet 1998). A protective legislation of a sort, and Ghana as a member of ILO complied. Subsequently women working in the mines, especially underground were perceived incompetent mothers and wives. This historical context is a pointer to the fact that people in the past have done mining in different ways, and they will continue to mine in various ways now and in the future. This historical account equally explain how views on mining and gender have changed over the years, and further set the tone for ‘doing gender’ and Barad’s theory.

Therefore, the first theoretical progress regarding this study is the identification, utilization and application of the ‘doing gender theory’ of West and Zimmerman (1989) and its counterpart ‘epistemology of the Feminist Technoscience’ of Barad (1998). These set of theories provided explanations and predictions similar to explanations regarding the mine work participatory barriers, and how the Ghanaian society (humanity) is striving to (re)organize its dealings with mining, and coming out with new modes of intra-action affecting both human and technical organization of the mine works. For instance, assumptions on Barad's theory of agential realism holds that the world is composed of phenomena - "the ontological inseparability of intra-acting agencies." That things or objects do not precede their interaction, rather, 'objects' emerge through particular intra-actions. Barad's agential realism is at once an epistemology (theory of knowing), an ontology (theory of being) and ethics. That specific practices of mattering have ethical consequences, and excluding other kinds of mattering, onto-epistemological practices are always in turn onto-ethico- epistemological.

These theories I found very relevant and could have been used earlier to proffer better scientific groundings to the identified barriers. More especially, the pre-entry barriers in the form of social construction of gender in science, engineering, and technology education with regards to paper B, as well as the organizational barriers pertaining to paper C. I suspect the delay in this theoretical applications consequentialy constrain the theoretical rigor of papers B and C. When ‘the well fit’ theories were not used in those papers, I could see in retrospect, a missing link to make the implicit explicit. This notwithstanding, when ‘the well fit’ theories were identified and used subsequently to explain the barriers in the ‘Paper Summary Chapter’ of this ‘jacket’ I got a sense of relief, with theoretical assurance of valid discussions and conclusions being drawn in those papers.
6.2 Implications for Practice

Implicit stereotypes, prejudices and perceptual notions on gender roles dominated the defining barriers against effective mine work participation of women in the multinational Ghanaian mines (Papers B, C & D). The implications to practice being that:

First, the stereotype notions translate into practical programs and practices capable of hindering women’s ability to fulfill their potentials. This then has a limiting implications on women’s career choices and opportunities to self-actualize in the world of mining.

Also, the stereotypes and perceptual notions imply overt, covert, direct and indirect inequalities in the mines. Including gender pay gaps, occupational segregations, denial of promotions to leadership positions, as well as glass ceiling effects on women.

The prejudices and stereotypes equally implies an increased casualization of women workers in the mines, with consequential effect of feminizing poverty, since the mines are among the top high paying jobs in Ghana.

And stereotype notions further justify implicit gender biases, which reinforce and perpetuate historical and structural patterns of discriminations against women. Consequentially, discrimination costs in terms of development, it impedes democracy, human rights denied, peace and security endangered at societal levels.

Sustainability, diversity and inclusion management have also become modern organizational features. Indeed, it is a common knowledge that commodity prices are really bad. The available options for solution include sustainability, and to make any business sustainable and relevant, you cannot cut out women. A diverse workforce has a competitive advantage, and in a constantly changing world, organizations need to adapt to rapidly changing markets. A workforce mirroring the structure of the market is able to react swiftly to evolving environments. Higher innovation level, improved change acceptance, better customer understanding, unlocking new avenues for talent, and providing tools for helping organizations deal with the changing structure of society due to immigration are just a few positive outcomes in organizations with focus on gender equality, sustainability, diversity and inclusion management.

The long standing male-dominance and masculinity cultures that characterized the Ghanaian mine works really cost too much for the mine work industrial practitioners to ignore. It also comes with the following implications for practice:

- First, it questions the mining companies’ modern organizational statuses.
- Secondly, it raises concerns on diversity management, social inclusion and social sustainability commitments of the mines.
- It further defines the anti-social nature of the mines.
- And goals of gender equality attainment becomes very difficult in the world of mining.

Away from the barriers, comes the change regimes - towards a gender-driven mining, the dawn of women miners, and the ore-solidarity movement (see paper D). These regimes can be explored and applied to ensure barriers fall, building bridges, and promoting gender equality in the mines.
Gender equal mining implies, huge subscription to modern organizational models, with high propensity of effecting organizational change, and possibilities of creating effective and good work environment for both men and women in the mine works of Ghana. This further implies an increased mine work productivity, good corporate governance, high profit margins, competitiveness and gender-driven social innovations.

6.3 Policy Implications

The thesis found the phenomena of social construction of gender in science, engineering, and mineral resource technology education as a barrier. Implies societal perceptions and individuals’ implicit stereotype notions determine who qualifies to be an engineer or miner in Ghana. And of course, this statement by its gendered nature, implies men, more than women, qualify to be engineers. This in itself is a problem, with practical implications of widening the gender gap in Science, Technology, Engineering and Mathematics (STEM). The government of Ghana should therefore as a matter of policy take steps to adopt and implement gender equality measures in hiring of personnel into the public sector of the Ghanaian economy. This will chart the path of leadership by example for the private sector to follow, and the mining companies for that matter in their recruitments, to target women. The government of Ghana should also as a matter of urgency facilitate removal of barriers associated with social construction of gender in STEM, and work to promote, and sustain gender parity in enrolment regimes. Alternatively, the government may institute a 30% quota system in enrolments across board for all science, engineering and technology programs of study in the universities. This will enable the universities attian a real positive effect of gender mixing in science, engineering, technology and mathematics programs (Kanter 1977). And the government, ensuring an increasing representation of women in decision making processes being key towards making an economic case for gender equality.

Although a university course of major, certainly does not completely determine careers. However, differences in skills and training imparted by different courses clearly defines which career doors open or close to who after graduation. Skills and competencies in mining engineering, geomatics engineering, mine planning and knowledge of mineral processing will definitely place a candidate to function in the mines and related fields, and in this case the men. This explains why few women are represented in the Ghanaian mines. This implies the mining companies need to adopt and boost measures aim at promoting gender equality, and adoption of hiring models targeting women. Those companies with gender equality measures captured in their recruitment policies, the Ghana Chamber of Mines should put in place mechanisms for monitoring and implementing their gender equality strategies. The current three months maternity leave period for female mine workers is too short. This implies, it is inadequate for nursing women miners to provide an effective child care. Therefore the mining companies need to adopt measures aim at improving their work-life balance.

6.4 Limitations of the Study

The current study contextually explores the social construction of gender in science, engineering and mineral resource technology education as pre-entry barriers, as well as the organizational and sociocultural barriers constituting participatory barriers. The work beyond the barriers examines
the change processes within the multinational Ghanaian mining industry. This work by design targets only the large-scale Ghanaian mines, against the knowledge of the fact that, the artisanal and small scale mining as well as ‘galamsey’ operations also do exist. Both the large-scale and small-scale mining operations are legal within the mining laws of Ghana. However the ‘galamsey’ operations are illegal, though people flout the laws to operate. And while the former is formalized in terms of hierarchal authority structures, explicit goals and objectives, policies and programs, well defined communication channels, and more especially with well-functioning human resource outfits; the latter is characterized with informalities. Come to think of limitations associated with the current work in scope, content, context and beyond, two future research interest emerged:

1. To design a comparative study to establish the contrast on mine works gender perspectives between the overt large-scale formal companies and the covert small-scale informal mines.

2. To broaden the scope and content of the current study to measure the role of green/technology adoptions in popularizing recruitment of women among the large scale multinational Ghanaian mines.

6.5 Conclusion

Results from Paper B suggests the social construction of gender in technology related education consequentially delay women’s admissions, and lead to male-dominant enrolment regimes in University of Mines and Technology. A situation that opens major pre-entry constraint, and further explain the current few women’s representation in the multinational Ghanaian mines. Also male-dominance cultures, implicit gender biases, unfriendly work-life policies, role models and mentorship constraints were noted organizational barriers contained in Paper C. While common prejudices, perceptions and stereotyped notions of gender roles constitute the sociocultural barriers as in paper D. These pre-entry, organizational and sociocultural barriers cumulatively affect effective participation of women in the multinational Ghanaian mining industry. By these, the thesis has gone some way in providing answers to the first three questions posed at the outset of the work: ‘How does social construction of gender in science and technology education affect gender differences in enrolment regimes and mine work recruitments?’ ‘What are the organizational barriers affecting effective participation of women in multinational Ghanaian mine jobs?’ and ‘Which sociocultural barriers affect effective participation of women in multinational Ghanaian mine jobs?’

Results from Paper E found that the Community Affairs and Public Relations’ outfit of the mining industry of Ghana is both numerically and functionally female-dominated. Reason being the Ghanaian culture empowers women with deep feelings of ovation, obeisance, and worship. A prowess which position them in a better pedestal to attract audience, communicate, touch hearts and manage conflicts better as and when they arise. This is why the paper concluded: ‘therefore female community affairs and public relations officers serve virtually as shields against the venoms and darts of anger emanating from the occasional embittered community members.’ This also showed the work has in another respect answered the fourth question: ‘If indeed, few women participate in the multinational mine jobs, where are they functionally active?’
Away from the barriers, Paper D showed a regime of change emerging from mine works organizational gender perspectives. Bringing to view the down of women in mining, towards a gender-driven mining initiatives, and the ore-solidarity movement. And this also in a way, provide answer to the fifth and final question: ‘Beyond the barriers, what changes or shifting gender dynamics have occurred, witnessing more women now taking up mine jobs within the multinational Ghanaian mines?

Regarding ‘the dawn of women in mining’ evidence abound in paper D showing a mining university ‘undoing gender’ in its enrollment regimes. The university after its maiden admission of a woman, further introduced gender mainstreaming policy in its admission programs, with a quota system targeting a 20% women admissions. This affirmative stance of the university corroborates the Science, Technology and Mathematics Education clinics, instituted in Ghana in 1987, aim at promoting and popularizing science and technology education among girls.

Paper D also showcase set of initiatives ‘towards a gender-driven mining’ with gender equality, women’s empowerment programs, diversity, inclusion and sustainable management goals being pursued among the mining companies in Ghana. These gender-driven mining initiatives support the Government of Ghana’s recognition of Gender Equality and Women’s Empowerment, being critical to the attainment of sustainable national development. The gender-equality consciousness equally supports Butler’s (2004) undoing gender theory, which argued that social and human organizations across the globe, seek more substantial equality between men and women, and more just arrangement of socioeconomic and political institutions. This suggests a clarion call for a paradigm shift from doing gender to illuminating social interactions and organizational systems, policies, processes and practices that reduce gender differences, and avoidance of organized utilizations of implicit stereotypes in evaluating women in the world of work.

And the ‘ore-solidarity movement’ was next diagnose by paper D. A new women’s movement in the mines, with strong social bond, exhibiting kind of cohesion and solidarity on the basis of their gendered uniformity, with high determination among members. The women feel connected through ties of similar educational and professional training, common occupational exposures, and collective work-life experiences. Creating room for individual initiatives, creativity, and their reflections, centered on collective interest and open discussions. Although the individual women miners perform different tasks and often have different personal values and interest, the order and very nature of the solidarity hinges on their reliance, resilience, interdependence, self and resource mobilization to champion the course of women in the mining industry of Ghana.

The activities and initiatives of the ore-solidarity symbolizes hope for Ghanaian women, calling for inclusive mining, encouraging and inspiring the female youth to give mining their best shot. That they can make it to the top with hard work, courage and a dash of boldness. The solidarity model, functionally compares to the historic Ghanaian feminist and women movements formed in the 1980s, and theoretically rooted within the new social movement theory (Touraine and Melucci 1995; Braig and Wölte, 2002 and Barry et al 2012).
The ‘ore-solidarity’ haven first structurally acknowledge their token status in a male-dominated field, strategically develop self and collective consciousness, exhibit cohesion base on gendered homogeneity. Then systematically attached supreme value to collective dignity, equality of opportunity for both men and women miners, and social justice at mine work places.

Secondly, aside the strategy deployed, the ore-solidarity equally emerged in a grand style, spontaneously judged that time was due to step forward, in expressed dissatisfaction with masculine dominant cultures in the mines, with its associated gender inequalities. Hence a desire for change towards set of recruitment policies and practices that are gender neutral.

And thirdly, the solidarity was formed, with its aggregate set of core-values, orientations, concepts and assumptions, coupled with the individual members’ competence and skills permeating the social fabric of mining and allied institutions through a complex web of interactions. The solidarity then explored available platforms, with deep voices, deploying networks of civil society, political think tanks and the offices of Ghana Chamber of Mines to advocate, lobby and exchange ideas towards a gender neutral mining.

This ore-solidarity model captured in the current study, has change implications. And the change strategies, skills and styles embedded in the model, implies a probable future research replications to describe, explain and predict change regimes in similar male-dominated settings such as forestry, building and the construction industry.

Finally, it is crucial to re-emphasize that masculinity in itself is anti-social in outlook, and the very culture of masculinity dominance in mine workspaces in Ghana constitute a bane to organizational and national gender equality efforts, and probably socio-sustainably too expensive to ignore. And to make the Ghanaian mining business sustainable and relevant, women can never be cut out of the value chain equation. Therefore, a conscious national effort is recommended to encourage more female enrolments into science and engineering-based education. Affirmative action is equally recommended for gender deconstruction and promotion of gender democracy. And indeed this move for inclusivity will engender poverty eradication, and work towards achieving mine work organizational growth and development, their global competitiveness and an assurance for gender-driven social innovative mining in Ghana. It is estimated that, effective exploitation of the results and practical implementation of recommendations from the current thesis by relevant stakeholders such as the mining companies in Ghana, Chamber of Mines Ghana, Land and Natural Resources Ministry, Gender Women and Social Protection Ministry, University of Mines and Technology, Women in Mining-Ghana, as well as international collaborators, will trigger the following benefits: In the short term, there will be a change in societal awareness and attitudes. In the medium term, there will be a change in decisions, procedures, programs, practices and human behaviors. And in the long term, there will be a national policy and social change to embrace gender equality in the world of mining in Ghana.
6.6 Post Script

The ‘triple divorce syndrome’ characterizes my academic curiosity to embark on this Ph.D. study. This is a ‘sociocultural infection’ mostly affecting people who relocate for one or two reasons. The ‘infection’ keeps me away from my family, away from my friends, and away from the comfort zone of my home culture. A personal clinical diagnoses I made in Schiphol airport on transit in entering Sweden for the first time. Similar to the proverbial saying ‘curiosity killed the cat,’ which is mostly used to warn against the dangers of ‘unnecessary’ exploits.

Contrarily, a less frequently seen rejoinder to ‘curiosity killed the cat’ is ‘but satisfaction brought the cat back!’ And I start counting the benefits and my blessings associated with this academic exploit. First is my exposure to international cultures, richness of ideas, and new perspectives of life and the world as a whole.

Also, as a then member of faculty in University of Professional Studies, Accra without a Doctoral training, constitute a challenge to my career progression. Therefore, this doctoral position enable me fully utilize the state of art academic infrastructure in Lulea University of Technology in Sweden. This academic exploit further pay with my academic capacity building and my stretch within the field of human work science, gender and technology, work and organizational gender perspectives. This has well equipped me with core competencies, skills and preferred attitudes requisite in enhancing, and re-enforce my position of maturity and an independent researcher. A position that enables my knowledge transferability, which resonates and repositions me well to contribute towards growing, developing and strengthening my faculty in University of Professional Studies, Accra.

The knowledge of the fact that, a social problem, when identified and well communicated is half the solution, impacted on this work. For instance, as part of effort to reach out to wide range of audience, communication, and dissemination strategies were deployed. They include several departmental seminars, workshops and international conferences, where the problem of male-dominance and masculinity cultures constituting participatory barriers to women’s mine work participation was discussed, in search for solutions. The communication and dissemination stage equally enhanced my academic engagements and intellectual development. It further enabled me build and belong to a network of community of practice in area of gender and technology research.

Few scientific publications on mine work organizational gender perspectives in Ghanaian context constituted major literature gap. The current thesis produced six peer-reviewed scientific articles, as appended. The results are readily available for utilization by policy makers, researchers and the academic communities of practice. This in no uncertain terms constitute relevant contribution towards the literature gap-bridging.

The industrial impact of the current work is fascinating! A mentorship program as probably a solution to the identified mentorship and role-model constrain. Being a common complaint by many of the Ghanaian women miners interviewed, I subsequently recommended an institution of a mentorship program in one of my departmental seminar series, and some people were compelled to support the idea. Therefore in September 2016, a team from WiTEC Sweden and WiTEC Europe visited Ghana, which served as a roadmap towards a possible international collaboration.
with Ghana Chamber of Mines and Women in Mining-Ghana to roll out a mentorship program for the women working in the Ghanaian mining industry.

Figure 8: Representatives from WiTEC and Women in Mining Ghana
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The African Gender Equality Index 2014


PAPER A

INVESTIGATING THE NON-GENDERED RECRUITMENT CHARACTERISTICS OF MINING FIRMS IN GHANA: THE ROLE OF SOCIOCULTURAL, PSYCHOSOCIAL AND ORGANIZATIONAL DESIGN FACTORS

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ABSTRACT
This paper explores the influencing dynamics of psychosocial, cultural and organizational design factors on the non-gendered characteristics of employee recruitment in firms operating in the Ghanaian mining industry that constrains the employability of women. A conceptual framework linking psychosocial, cultural, and organizational design to recruitment processes was developed to guide the study. Quantitative data was collected in four mining firms in Ghana using a questionnaire. The collated data was firstly factor analyzed to establish the predictiveness of the conceptual model components' indicators. This was followed by an analysis of the conceptual model for “model goodness fit” using the AMOS-based structural equation modeling approach. The results showed that the non-gendered characteristics of employees’ recruitment in mining firms in Ghana, constrains the employability of women, is influenced directly and positively by the firms organizational designs, which is in turn influenced directly by the firms’ psychosocial and sociocultural factors. The study also showed that the non-gendered recruitment characteristic of the firms is influenced indirectly, but positively by the firms’ psychosocial factors, and negatively by other sociocultural factors. By implication, the study provides knowledge that can be used to understand the rationale behind the non-gendered characteristics of employee recruitment in Ghanaian mines and the influencing roles of organizational design factors as well as psychosocial and cultural factors. Mining firms can use this knowledge in developing gendered recruitment policies to enhance future recruitment of all qualified human resource, irrespective of gender.

Keywords: Women; recruitment characteristic; organizational design; psychosocial factors; sociocultural factors; Ghanaian mining firms.

INTRODUCTION
Although the preamble to the 1992 Republican Constitution of Ghana begins with an all-inclusive phrase that “We the People...” reality teaches a different lesson because these words are not legally binding, creating room for discrimination, inequality and marginalization against women in contemporary Ghanaian society. Gender is not a personal trait, but rather an emergent feature of social construction. It is a social situation, social arrangement and a means of legitimating one of the most fundamental divisions of society (Ampofo, 2014). Ampofo (2014) noted that while almost everyone is born with a particular sex, either as male or female, people are not born with a gender, but grow into one, or are given one. Contemporarily, such understanding of gender is not global and differs across the world or even among different societies. In this paper therefore, women are in focus. This is because, in Ghana, women are traditionally the homemakers and are the ones affected most, especially when organisations lack work-life balance initiatives (Aryeetey, Yeboah and Sanda, 2011). Such organizations are therefore challenged in their ability to retain valuable professional women employees, and as such become non-gendered due to the lack of alternative work arrangements that could aid such professionals attain work-life balance, and as a consequence help improve the quality of their work-life (Aryeetey et al., 2011). Marginality, inequality and discrimination are terms generally used to describe and analyze psychosocial structures, political and economic spheres, where disadvantaged people struggle to gain access to resources, and fully participate in social life (Brodwin, 2001; Alhazza, 2015). Marginality is
viewed as a temporary state of having been put aside of living in relative isolation, at the edge of a system (psychological, cultural, social, political or economic), because such victims do not correspond to the mainstream philosophy (Brodwin, 2001). Marginality, inequality and discrimination are therefore, critical crosscutting concepts in the field of empirical social science research, in examining organizational and psychosocial structural disparities among individuals in the light of legitimacy, equity and social justice (Brodwin, 2001). In social science theory and practice, people are generally classified by their membership in groups. These group statuses are frequently divided into binary categorizations such as men/women and abled/disabled, with the former groups vested with positions, power, prestige and value while the latter groups are disadvantaged (Adams, Bell and Griffin, 1997).

Recruiting women into traditionally male-dominated jobs is now a global phenomenon, and Ghana is not an exception. In the Ghanaian sociocultural environment, most women (especially those who are married) seeking to work as professionals in organizations are mostly confronted with the challenges of trying to draw a fit between their professional personal-selves and their established sociocultural norms (Sackey and Sanda, 2009). Furthermore, societal roles of most professional women as wives are clearly defined and this has evolved the perceived notion by most Ghanaian women that they have no alternative but to endure the impact of marriage as a cultural artifact on their professional career development (Sackey and Sanda, 2010).

The issue of why women are few, and how they were excluded from mine jobs has become a global research interest. A profile of gender representation proportions to create a sense of sex composition among employees from some multinational mining companies was carried out in Africa, specifically Ghana (Kilu, Andersson, Sanda and Uden 2016), featuring statistical data sourced from various Human Resource Managers aim at explaining employees’ status by gender in those companies. The results showed majority of employees in the multinational Ghanaian mines are men: suggesting an average between 85–95% of the workforce being men across management, supervisory, core operations and ancillary work positions. In a similar vein across the large scale European mines, and more specifically in Swedish mines, about 80 – 90% of all employees are men (Andersson, Faltholm, Abrahamsson and Lindberg 2013). In Asia Pacific, Lahiri-Dutt (2012) posits between 1900 and 2000, the percentage of women employed in Indian coal mines fell from around 44% to a less than 6% of the mining work force. Historically, women have faced exclusion from mining as a result of prevailing organizational designs, psychosocial structures and legislative restrictions (Roya, 2000). In Great Britain, women were legally excluded from working underground by the 1842 Mines Act. Although women were excluded in Britain from working in mines, they still participated in strikes and supported mine work activisms (Bradley, 1989). In the light of this, one may argue that, the mine work, world over is confronted with the realities of male-dominance and few women representations. Even in today’s era in which a strong economy demands a productive and engaged workforce, an increase in family and job-related responsibilities, especially among professional women in a developing economy, such as Ghana, has made it difficult for them to respond to the demands of their personal responsibilities (Aryeetey et al., 2011). The women exclusion phenomenon however, was not universal. Bradley (1989) has noted that in countries, such as, Germany, India and Belgium, women worked underground until the twentieth century. The post-World Wars also led to a huge increase in the employment of women in the mines. According to Bradley (1989), these women did heavy work, such as, dragging and pushing trucks or covering of coal, and also worked as coal carriers, sieving coal, loading, unloading coal and weighing it. This mine activity by women changed in the 1950s, when men started taking over, to a point that in the 1970s only 0.4% of all workers in mining and quarrying were women (Bradley, 1989). In the 1960s in India women worked in open-cast mines and in the 1970s, Chinese and American women also took up mine work (Bradley, 1989).

In Ghana, the gold discovery story line centered on a woman on her way to draw water from the river, the issue of why women are few, and how they were excluded from mine jobs has become a global research interest. A profile of gender representation proportions to create a sense of sex composition among employees from some multinational mining companies was carried out in Africa, specifically Ghana (Kilu, Andersson, Sanda and Uden 2016), featuring statistical data sourced from various Human Resource Managers aim at explaining employees’ status by gender in those companies. The results showed majority of employees in the multinational Ghanaian mines are men: suggesting an average between 85–95% of the workforce being men across management, supervisory, core operations and ancillary work positions. In a similar vein across the large scale European mines, and more specifically in Swedish mines, about 80 – 90% of all employees are men (Andersson, Faltholm, Abrahamsson and Lindberg 2013). In Asia Pacific, Lahiri-Dutt (2012) posits between 1900 and 2000, the percentage of women employed in Indian coal mines fell from around 44% to a less than 6% of the mining work force. Historically, women have faced exclusion from mining as a result of prevailing organizational designs, psychosocial structures and legislative restrictions (Roya, 2000). In Great Britain, women were legally excluded from working underground by the 1842 Mines Act. Although women were excluded in Britain from working in mines, they still participated in strikes and supported mine work activisms (Bradley, 1989). In the light of this, one may argue that, the mine work, world over is confronted with the realities of male-dominance and few women representations. Even in today’s era in which a strong economy demands a productive and engaged workforce, an increase in family and job-related responsibilities, especially among professional women in a developing economy, such as Ghana, has made it difficult for them to respond to the demands of their personal responsibilities (Aryeetey et al., 2011). The women exclusion phenomenon however, was not universal. Bradley (1989) has noted that in countries, such as, Germany, India and Belgium, women worked underground until the twentieth century. The post-World Wars also led to a huge increase in the employment of women in the mines. According to Bradley (1989), these women did heavy work, such as, dragging and pushing trucks or covering of coal, and also worked as coal carriers, sieving coal, loading, unloading coal and weighing it. This mine activity by women changed in the 1950s, when men started taking over, to a point that in the 1970s only 0.4% of all workers in mining and quarrying were women (Bradley, 1989). In the 1960s in India women worked in open-cast mines and in the 1970s, Chinese and American women also took up mine work (Bradley, 1989).

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are challenged per their roles in designing work environments to help their female employees create a good work-life balance. Aryeetey et al. (2011) noted that despite the increasing prominence of Ghanaian female professional employees at the workplace, their traditional family roles have not waned and as such they continue to bear the pressures of balancing work and family roles. This is because many professional female employees find it difficult to respond to the demands of their work and family responsibilities within the framework of the traditional work schedule (Aryeetey et al., 2011). Generally, the mining literature has increasingly focused on work and safety, human capital development, unionism, legislation, changing technology and global. The relatively few works on gender in mining sought to understand issues pertaining to workplace cultures, psychosocial structures and gendered behaviours in mines. As established in the extant literature, the context of these studies was external to the Ghanaian mining environment; there was an initial study on gendered behaviours in Ghanaian mines by Kilu, Anderson and Sanda (2014). This therefore, signifies the paucity of studies on the gender implication on mining firms’ recruitment characteristics in the Ghanaian context. The current study therefore seeks to explore and understand the influencing dynamics of psychosocial, cultural and organizational design factors on the non-gendered characteristics of employees’ recruitment in firms operating in the Ghanaian mining industry

LITERATURE REVIEW
This overview begins with the theory of patriarchy which points to social consequences of the biology of human reproduction. The theory postulated that because of child birth women assumed tasks associated with home and child care while men perform other tasks requiring greater strength, speed, expertise and absence from home, prestigiously establishes contacts with other groups, accumulated possessions from trade and gained experience and become powerful, while little prestige was given to the ordinary, routine, taken for granted activities of women (Henslin, 2002). The theory of patriarchy functions in a way of teaching women how to subjugate themselves and teaches men how to dominate and this system of sexist domination and counter subjugation is carried forward to other spheres of society (Farganis, 2008). According to the theory, gender is the primary division in humanity, societies, groups and individuals. Invariably, there are set up barriers leading to unequal access to power, property and prestige on the basis of sex, hence sociologists and other social scientists classify females as minority group. The requirement by law in most countries for corporate entities to meet some special needs of female employees, such as maternity leave, child care centers and rooms for nursing mothers, appear to make women workers more expensive to manage than men. Consequently, women have become the last to hire and first fired (Henslin, 2002). This observation has been supported by studies that traced the institutionalization of hegemonic masculinities in specific organizations like the mines and male dominant role in organizational decision making (Hodges and Budig, 2010). This is further related to the glass ceiling experience of females. According to Cotter, Hermens, Ovadia and Vanneman (2001) the glass ceiling theory describes invisible sociocultural and organizational barriers (glass) through which women can see elite positions but cannot reach them (ceiling). According to the theory, the invisible barriers prevent women from obtaining and securing the most powerful, prestigious, and high pay jobs in the labour market (Cotter et al., 2001).

The glass ceiling continues to exist although there are no explicit obstacles keeping women from acquiring advanced jobs, and there are no recruitment advertisements that specifically exclude women from participation but the barriers do lie beneath the surface (Cotter et al., 2001). When companies exercise this type of discrimination, they typically look for the most plausible explanation they can find to justify their decision, mostly done by citing qualities that are highly subjective or by retrospectively emphasizing or de-emphasizing specific criteria that gives the chosen candidate the edge (Cotter et al., 2001). There are arguments which suggest that the glass ceiling has been broken and that women are no longer hindered from achieving their desired goals in their careers (Wrigley, 2002). Women also learn to play by men’s rules and adopting styles that make men comfortable (Henslin, 2002). The preference theory also seeks to explain and predict women’s choices regarding productive and reproductive work. According to Blackburn (2002), there exist two types of women: those who are interested and give more attention to their career development and those who are more concerned with their families. Women who are career-oriented give more attention to their careers. Such women mostly live as single women and have no interest in children (Blackburn, 2002). These set of women are always discriminated against and regarded as acting against societies’ morally accepted norms such as marriage and childbirth (Blackburn, 2002). They are also viewed as trying to compete with their male counterparts to whom they are supposed to be submissive (Blackburn, 2002). Women who give more attention to their families share the societal believe that women’s basic roles in the family are to give birth and take care of the children (Blackburn, 2002). The conceptual model
presented in figure 1 below shows the relational links between psychosocial, sociocultural, and organizational design variables and their consequential influence on the recruitment characteristics of a mining firm in Ghana.

Figure 1: Conceptual framework of relationship between psychosocial, sociocultural, and organizational design variables and recruitment characteristics of Ghanaian mining firms

The psychosocial factors are personal in nature, and centered on personal interest, motivation, ambition, self-confidence and self-esteem among some females to break barriers, and veer into certain jobs considered as male preserves. Peculiar attitudes, behavior and personality characteristics are among major factors affecting recruitment of women in the mines. Also, discrimination, the generally held beliefs restricting females to domestic roles, stigma, customs and traditions, as well as perceptions and stereotypes are noted factors. Maintaining an effective balance between work and life is another area where a lot of working women report experiencing troubles. The social cost of working as a miner include doing long hours, travel and stay on-site and unsociable life (Carter & Kirkup, 1990). The cultural factors affecting the recruitment of women are elements of gender-based stereotypes. These include the cultural perception that women, unlike men, tend to prioritize family life to professional career, and as such, will be more committed to their family (or future family) than their work when recruited. Thus, mining companies tend to recruit persons who are culturally perceived to 'fit-in' the mine-work social environment, but which characteristics women are deemed as lacking.

The organizational design factors are made up of organizational culture and organizational climate elements (Mullins, 2016). These elements act and interact with each other, also interact with the sociocultural factors, and subsequently affect recruitment and selection processes in work organizations, as captured in figure 1 above. The organizational cultural factors are essential elements in the understanding of organizations and gaining commitment of workers (Mullins, 2016). They include male resistance to females, deeply held beliefs, values and assumptions doubting women capabilities at work. In the recruitment and selection process, women are often asked inappropriate and discriminatory questions concerning their plans for marriage and starting a family (Blackwell, 2001). These organizational cultures are often influenced by societal cultures in which it is located and subsequently affect recruitment processes in work organizations. Other organizational design factors are properties perceived directly or indirectly by employees to be major forces in influencing employees' behavior (Fulop, Linstead & Lilley, 2009). These include, lack of opportunities for personal growth and development, lack of support services, lack of mentorship, access to information and technology (Fulop et al., 2009). Other design factors are the extent to which industry and higher education put measures in place to retain female staff subsequent to child birth, whether jobs are guaranteed in relation to career breaks, the availability of flexi-time and part-time opportunities and the presence of affordable child care facilities (Fulop et al., 2009). Thus arguing from the perspective of Sidanius and Pratto (1999) and Pratto, Stallworth, Sidanius and Siers (1997), it is important to unmask the gendered nature of organizational structuring, particularly the bureaucratic structures that fixate control and rationality, creating a form of organization that tended to be a structural manifestation of male domination.
METHODOLOGY
The research was designed using the survey approach. The selection of participants was characterized by the researchers’ criteria that persons to be selected for the study (i.e. data sources) must be a willing participant with a relatively high role perception and ability (Sanda, 2010, Aryeetey et al., 2011). In this regard, four (4) key mining firms operating within Western Region of Ghana were contacted to solicit their participation in the study, and they all agreed to participate. A sample of 315 employees were randomly selected from the 4 firms.

PROCEDURES FOR DATA COLLECTION
The design of the questionnaire was primarily based on multiple-item measurement scales derived from the reviewed literature, using a Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree”. Six items (observed endogenous/latent variables) measured socioculture (unobserved endogenous/latent variable), and 2 items each (observed endogenous/latent variables) measured other two unobserved endogenous/latent variables (organizational design and recruitment). The psychosocial component (unobserved endogenous/latent variable) was measured with 13 items (observed endogenous/latent variables). In the data collection process, the questionnaire was sent to all the 315 employees randomly selected from the 4 firms. Out of the 315 questionnaires administered 310 were retrieved. But 6 of the retrieved questionnaires were excluded from the final data set on the basis of serious omissions in some of the scale items used. Consequently, the 304 usable questionnaires were extracted, representing a valid response output of approximately 98%.

PROCEDURES FOR DATA ANALYSIS
A stepwise analytical approach was used. The first step consisted of a factor analysis aimed at establishing whether all the items (observed endogenous/latent variables) included in the different model components (unobserved endogenous/latent variables) measure the constructs of interest significantly. The second step consisted of a structural analysis of the conceptual model to test the model fit of the unobserved endogenous/latent variables (i.e. psychosocial, societal culture, organizational design and recruitment). This was done using structural equation modeling (SEM) with analysis of moment structures (AMOS) as analytic technique. The use of AMOS software for this analysis provided the opportunity to use regression factor scores directly to predict the location of the individual items in the model (Tabachnick and Fidell, 2001). According to DiStefano, Zhu and Mindrilä (2009), this procedure has the advantage of maximizing the validity of the estimates. Furthermore, the AMOS software also gives us the opportunity to conduct analyses for multiple levels of variables using a range of in-built statistical techniques, including (i) Chi Square (CMIN), (ii) Comparative Fit Index (CFI), and (iii) Root Mean Square Error of Approximation (RMSEA). Indicator fit in models is interpreted from the perspective that estimated indicator loadings on a latent variable must be 0.7 or higher (Schumacker and Lomax, 2004).

RESULTS
RESPONDENTS’ PROFILE
The demographic distribution of the study respondents is shown in table 1 below.

<table>
<thead>
<tr>
<th>Demographic Factors</th>
<th>Frequency (N)</th>
<th>Valid %</th>
<th>Cumm. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>231</td>
<td>76.0</td>
<td>76.0</td>
</tr>
<tr>
<td>Female</td>
<td>73</td>
<td>24.0</td>
<td>100</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 20 years</td>
<td>6</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>20-29 years</td>
<td>153</td>
<td>50.3</td>
<td>52.3</td>
</tr>
<tr>
<td>30-39 years</td>
<td>98</td>
<td>32.2</td>
<td>84.5</td>
</tr>
<tr>
<td>40-49 years</td>
<td>38</td>
<td>12.5</td>
<td>97.0</td>
</tr>
<tr>
<td>More than 50 years</td>
<td>9</td>
<td>3.0</td>
<td>100</td>
</tr>
<tr>
<td>Levels of Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificate</td>
<td>2</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Diploma</td>
<td>48</td>
<td>15.8</td>
<td>16.5</td>
</tr>
<tr>
<td>Degree</td>
<td>220</td>
<td>72.4</td>
<td>88.9</td>
</tr>
<tr>
<td>Post graduate</td>
<td>27</td>
<td>8.9</td>
<td>97.7</td>
</tr>
</tbody>
</table>
As it is shown in table 1 above, 76% (N=231) of the respondents were males while 24% (N=73) were females. Only 1 (0.3%) study participant was physically challenged while the remaining 302 (99.7%) participants were not. A total of 247 (81.3%) of the respondents held university degrees, and 50 (16.5%) held diploma or college level certificates. One hundred and fifteen (37.8%) of the respondents have been working with their firms for not less than three years, and 11 (3.6%) have more than 5 years of experience with their firms.

Factor Analysis for Model Components
The factor analysis was conducted using the AMOS-based structural equation model (SEM) approach for each of the proposed model’s components in order to assess the model’s goodness of fit. The standardized model-fits generated by the AMOS software for the structural model entailing the unobserved endogenous/latent variables (model components) and their observed endogenous variables/indicators are shown in figure 2 below.

Figure 2: AMOS-generated path diagram showing standardized indicator loadings for the model components and their observed indicators in the conceptualized structural model

Factor Analyses of Psychosocial Component
The standardized regression estimates (i.e. factor loadings) for indicators of the psychosocial component of the structural model are shown in table 2 below.
Table 2: Standardized regression estimates of observed indicators for psychosocial component

<table>
<thead>
<tr>
<th>Observed Indicators</th>
<th>Indicator Label in Model</th>
<th>Standardized Regression Estimate ($R$)</th>
<th>Squared Multiple Correlation ($R^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men have better access to education and possess critical skills required by mining firms.</td>
<td>b12</td>
<td>0.321</td>
<td>0.103</td>
</tr>
<tr>
<td>Women are few in the mines because mining jobs require certain level of physical strength.</td>
<td>b13</td>
<td>0.185</td>
<td>0.034</td>
</tr>
<tr>
<td>Some mine work practices discriminate against women.</td>
<td>c15</td>
<td>0.174</td>
<td>0.030</td>
</tr>
<tr>
<td>Advancement of women is not a priority in the mines.</td>
<td>c16</td>
<td>0.332</td>
<td>0.110</td>
</tr>
<tr>
<td>Women lack role models in the Ghanaian mines.</td>
<td>c17</td>
<td>0.190</td>
<td>0.036</td>
</tr>
<tr>
<td>Work conditions in the mines do not favour women.</td>
<td>c18</td>
<td>0.200</td>
<td>0.040</td>
</tr>
<tr>
<td>Different pay for comparable works exists.</td>
<td>c20</td>
<td>0.239</td>
<td>0.057</td>
</tr>
<tr>
<td>Language used at work is gender neutral.</td>
<td>c21</td>
<td>0.247</td>
<td>0.061</td>
</tr>
<tr>
<td>Women constitute about ten percent of workforce in the mines.</td>
<td>c22</td>
<td>0.195</td>
<td>0.038</td>
</tr>
<tr>
<td>Promotion in mine firms is based on merit, work experience, performance and training.</td>
<td>c23</td>
<td>-0.180</td>
<td>-0.032</td>
</tr>
<tr>
<td>Work policies in the mines are family friendly.</td>
<td>d24</td>
<td>-0.010</td>
<td>-0.010</td>
</tr>
<tr>
<td>Women are faced with unfriendly organizational culture in the mines.</td>
<td>d29</td>
<td>0.609</td>
<td>0.489</td>
</tr>
<tr>
<td>Promotion in mine firms is based on luck, network and connections to senior leaders.</td>
<td>d30</td>
<td>0.578</td>
<td>0.334</td>
</tr>
</tbody>
</table>

Estimation from the SEM analysis, as shown in table 2 above shows that only 2 indicator variables have factor loadings greater than 0.5, and as such, are effective indicators of psychosocial influence in the mining work environment in Ghana. These factors are: d29–women are faced with unfriendly organizational culture in the mines ($R = 0.609, R^2 = 0.489$) and d30 – Promotion in mine firms is based on luck, network and connections to senior leaders ($R = 0.578, R^2 = 0.334$).

**Factor Analysis of Sociocultural Component**

The standardized regression (i.e. factor loadings) estimates for the indicators of the sociocultural component of the structural model are shown in table 3 below.

Table 3: Standardized regression estimates of observed indicators for sociocultural component

<table>
<thead>
<tr>
<th>Observed Indicators</th>
<th>Indicator Label in Model</th>
<th>Standardized Regression Estimate ($R$)</th>
<th>Squared Multiple Correlation ($R^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociocultural barriers prevent women from getting jobs and advancing in mining firms.</td>
<td>b10</td>
<td>0.459</td>
<td>0.211</td>
</tr>
<tr>
<td>Patriarchal values and norms are a barrier to women participation in mine work.</td>
<td>b11</td>
<td>0.453</td>
<td>0.205</td>
</tr>
<tr>
<td>There is stigma associated in using family friendly policies.</td>
<td>c25</td>
<td>0.410</td>
<td>0.168</td>
</tr>
<tr>
<td>Macho-masculine characteristics associated with mining activities create and sustain a sense of male dominance in the industry.</td>
<td>d26</td>
<td>0.034</td>
<td>0.001</td>
</tr>
<tr>
<td>Stereotypes on women exist in the mining industry</td>
<td>d27</td>
<td>0.260</td>
<td>0.068</td>
</tr>
<tr>
<td>Traditional beliefs dictate that women should not enter mines</td>
<td>d28</td>
<td>0.539</td>
<td>0.291</td>
</tr>
</tbody>
</table>
As it is shown in table 3 above, estimation from the SEM analysis showed that only one indicator variable has a factor loading greater than 0.5. This factor is: \( d_{28} \) – Traditional beliefs dictate that women should not enter the mines \( (R = 0.539, R^2 = 0.291) \).

### Factor Analyses for Organizational Design Component

The standardized regression (i.e. factor loadings) estimates for the indicators of the organizational design component of the structural model are shown in table 4 below.

<table>
<thead>
<tr>
<th>Observed Indicators</th>
<th>Indicator Label in Model</th>
<th>Standardized Regression Estimate ( (R) )</th>
<th>Squared Multiple Correlation ( (R^2) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women are the last to be hired and the first to be fired by mining firms</td>
<td>b14</td>
<td>0.376</td>
<td>0.141</td>
</tr>
<tr>
<td>In the mines, women do not get opportunities to take challenging assignments</td>
<td>c19</td>
<td>0.524</td>
<td>0.275</td>
</tr>
</tbody>
</table>

Estimation from the SEM analysis shown in table 4 above shows that one indicator variable has a factor loading greater than 0.5. This factor is: \( c_{19} \) – In the mines, women do not get opportunities to take challenging assignments \( (R = 0.524, R^2 = 0.275) \).

### Factor Analyses for Recruitment Component

The standardized regression (i.e. factor loadings) estimates for the indicators of the recruitment component of the structural model are highlighted in table 5 below.

<table>
<thead>
<tr>
<th>Observed Indicators</th>
<th>Indicator Label in Model</th>
<th>Standardized Regression Estimate ( (R) )</th>
<th>Squared Multiple Correlation ( (R^2) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some recruitment practices and principles fail to recruit women</td>
<td>b8</td>
<td>0.363</td>
<td>0.132</td>
</tr>
<tr>
<td>Firms openly prefer male/macho persons for mining jobs</td>
<td>b9</td>
<td>0.562</td>
<td>0.316</td>
</tr>
</tbody>
</table>

As it is shown in table 5 above, estimation from the SEM analysis showed that only one indicator variable has a factor loading greater than 0.5. This factor is: \( c_{19} \) – Firms openly prefer male-macho persons for mining jobs \( (R = 0.562, R^2 = 0.316) \).

### Structural Analysis of Model's Goodness of Fit

Derivations from the factor analyses of the model components identified the requisite observed endogenous/latent variables that have significant relationships with their respective unobserved endogenous/latent variables. All the four-unobserved endogenous/latent variables (i.e. psychosocial, sociocultural, organizational design, and recruitment) had observed endogenous/latent variables that have significant predictive relationships. A summary of these associated variables and a measure of their significant standardized regression estimates is shown in table 6 below.

<table>
<thead>
<tr>
<th>Observed Indicators</th>
<th>Indicator Label in Model</th>
<th>Standardized Regression Estimate ( (R) )</th>
<th>Squared Multiple Correlation ( (R^2) )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychosocial Component</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women are faced with unfriendly organizational culture in the mines</td>
<td>d29</td>
<td>0.609</td>
<td>0.489</td>
</tr>
<tr>
<td>Promotion is based on luck, network and connections to some senior leaders of the company</td>
<td>d30</td>
<td>0.578</td>
<td>0.334</td>
</tr>
</tbody>
</table>
Observed Indicators

<table>
<thead>
<tr>
<th>Indicator Label in Model</th>
<th>Standardized Regression Estimate (R)</th>
<th>Squared Multiple Correlation (R²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial Component</td>
<td>PSYSOC</td>
<td></td>
</tr>
<tr>
<td>Sociocultural Component</td>
<td>CUL</td>
<td></td>
</tr>
<tr>
<td>Superstition and traditional beliefs that women should not enter mines</td>
<td>d28</td>
<td>0.539</td>
</tr>
<tr>
<td>Organizational Design Component</td>
<td>OBDG</td>
<td></td>
</tr>
<tr>
<td>In the mines, women do not get opportunities to take challenging assignments</td>
<td>c19</td>
<td>0.524</td>
</tr>
<tr>
<td>Recruitment Characteristics Component</td>
<td>REC</td>
<td></td>
</tr>
<tr>
<td>Firms openly prefer males for mining jobs</td>
<td>b9</td>
<td>0.562</td>
</tr>
</tbody>
</table>

The indicator fit in this model is interpreted from the perspective of Schumacker and Lomax (2004) that estimated indicator loadings on the latent variable must be 0.7 or higher. The criteria used to establish model fit among the respective latent variables include; Chi Square (CMIN), Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA). The model fit summary is also shown in table 7 below.

Table 7: Goodness fit statistics for the conceptualized structural model

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Goodness fit</th>
<th>Default model</th>
<th>Independence model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi Square Estimation (CMIN)</td>
<td>NPAR</td>
<td>72</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>CMIN</td>
<td>577.721</td>
<td>1060.524</td>
</tr>
<tr>
<td></td>
<td>DF</td>
<td>227</td>
<td>276</td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>CMIN/DF</td>
<td>2.545</td>
<td>3.842</td>
</tr>
<tr>
<td>Baseline Comparisons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFI (Δ1)</td>
<td>0.455</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>RFI (ρ1)</td>
<td>0.338</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>IFI (Δ2)</td>
<td>0.579</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>TLI (ρ2)</td>
<td>0.456</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>0.553</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation</td>
<td>RMSEA</td>
<td>0.071</td>
<td>0.097</td>
</tr>
<tr>
<td>Error of</td>
<td>LO 90</td>
<td>0.064</td>
<td>0.091</td>
</tr>
<tr>
<td>Approximation</td>
<td>HI 90</td>
<td>0.079</td>
<td>0.103</td>
</tr>
<tr>
<td>PCLOSE</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

As it was highlighted in the conceptual model (see figure 2), the hypothetical relationship among four (4) unobserved endogenous/latent variables (model components) alongside their respective observed endogenous/indicator variables were tested per the data collected and minimum was achieved for the structural model. Based on the goodness of fit statistics shown in table 7 above, it is evident that the overall model fit appears quite good. This is because the estimated $\chi^2$ of 577.721 (df $= 227$) has probability level of 0.000 which is smaller than the 0.05 used by convention. Thus the null hypothesis that the model fits the data is rejected. Additionally, the estimated Root Mean Square Error of Approximation (RMSEA) value of 0.071 is also larger than the recommended value of 0.06 (Hu and Bentler, 1999), and thus rejects the null hypothesis of a good model fit. Even though the estimate for the Comparative Fit Index (CFI) of 0.553 indicates an acceptance of the null hypothesis, it also suggests that the model fit to the data is questionable. The standardized regression weights and critical ratio estimates obtained from AMOS is highlighted in table 8 below. The estimates for correlation between the latent variables are also shown in table 9 below.
Table 8: Standardized regression weight and critical ratio estimates for components' relationships in conceptualized structural model.

<table>
<thead>
<tr>
<th>Association</th>
<th>Standardized Regression (R)</th>
<th>Standard Error (SE)</th>
<th>Critical Ratio (CR)</th>
<th>Probability (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORGD &lt;--- PSYCHOSOCAL</td>
<td>1.603</td>
<td>2.444</td>
<td>1.847 **</td>
<td>**</td>
</tr>
<tr>
<td>ORGD &lt;--- CULT</td>
<td>-0.640</td>
<td>0.879</td>
<td>-0.840 **</td>
<td>**</td>
</tr>
<tr>
<td>RECRUT &lt;--- ORGD</td>
<td>0.881</td>
<td>0.161</td>
<td>6.029 **</td>
<td>**</td>
</tr>
</tbody>
</table>

** very significant

It is observed from table 8 above that the standardized regression weight (R) and critical ratios (CR) signifying the ability of PSYCSOC (psychosocial) to predict ORGD (organizational design) (R = 1.603, CR = 1.847) is very significant. This predictiveness is reinforced by the very significant relationship (α = 1.031, p < 0.01) that exists between the two latent variables as highlighted in table 9 below.

Table 9: Correlation estimates for components in the conceptualized structural model

<table>
<thead>
<tr>
<th>CUL</th>
<th>PSYCSOC</th>
<th>ORGD</th>
<th>REC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUL</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYCSOC</td>
<td>0.894**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>ORGD</td>
<td>0.792**</td>
<td>1.031**</td>
<td>1.000</td>
</tr>
<tr>
<td>REC</td>
<td>0.698**</td>
<td>0.908**</td>
<td>0.881**</td>
</tr>
</tbody>
</table>

** very significant (p < 0.01)
* significant (p < 0.05)

The ability of CULT (sociocultural) to predict ORGD (organizational design) (R = -0.640, CR = -0.840) is also very significant. The strength of this predictiveness, as indicated in table 9 above, is reinforced by the very significant correlation (α = 0.792, p < 0.01) between these latent variables. Similarly, the ability of ORGD (organizational design) to predict RECRUT (recruitment process) (R = 0.881, CR = 6.029) is also very significant. The strength of this predictiveness, as indicated in table 9 above, is reinforced by the very significant correlation (α = 0.881, p < 0.01) between these latent variables. While the critical ratios for all these three associations are very significant (p < 0.000), the respective factor loadings (standard regression values) are greater than Schumacker and Lomax’s (2004) threshold factor loading of 0.7. This therefore indicates the significant predictiveness of the relationships between the respective latent variables. Even though both the psychosocial and sociocultural factors have no direct effect/influence with the recruitment process, there was evidence of indirect effects as observed from table 10 below.

Table 10: Regression estimates for standardized indirect effects between model components

<table>
<thead>
<tr>
<th>CULT</th>
<th>PSYCSOC</th>
<th>ORGD</th>
<th>RECRUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORGD</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>RECRUT</td>
<td>-0.564</td>
<td>1.412</td>
<td>0.000</td>
</tr>
</tbody>
</table>

As it can be inferred from table 10 above, CULT (sociocultural) has an indirect and negative influence on RECRUT (recruitment process) (α = -0.564, p < 0.05). On the contrary, PSYCSOC (psychosocial) has a very significant indirect, but positive influence on RECRUT (recruitment process) (α = 1.412, p < 0.01).

**DISCUSSION**

This study explored the influencing dynamics of psychosocial, cultural and organizational design factors on the non-gendered characteristics of employee recruitment in firms operating in the Ghanaian mining industry that constrains the employability of women. The results has shown that the male-dominated recruitment culture among the mining firms is influenced directly and positively by the character of their organizational design which is also influenced directly by both psychosocial and cultural factors. The recruitment culture is also affected indirectly by the psychosocial factors positively and by the cultural
factors negatively. The fit of the latent variables in the model derived from the structural analysis is shown in figure 3 below. A possible explanation for these findings is that the mining sector differs substantially from the other business sectors in the country. This explanation can be justified by observations from extant literature to the effect that since organizations are sociocultural systems, they may reflect values, beliefs, assumptions and ideologies that diverge substantially from those obtained in the ambient society, particularly when these organizations are growing rapidly (Schein, 1988, Sanda and Kuada, 2016). Thus, since the mining sector in Ghana is growing rapidly, this may mean that the business cultures of individual mining firms (and for the industry as a whole) are likely to be more dynamic and volatile than the general business culture in Ghana.

Figure 3: Derived structural model showing relationship between psychosocial, sociocultural, and organizational design variables and recruitment characteristics in Ghanaian mining firms

In contrast to Harrison and Carroll (1991) observation that high growth businesses are likely to device new methods of solving problems or seek and accept ideas and management styles that may not be consistent with some aspects of the societal culture, the growth of the Ghanaian mining sector appears not to have resulted in the re-orientation of their macho-recruitment characteristics. The recruitment characteristics continued to be influenced by the character of their organizational design which continued to be influenced directly by both psychosocial and sociocultural factors shaped by the long-term traditional mining culture. The recruitment culture is also affected indirectly by the psychosocial factors positively and by the cultural factors negatively. This finding affirms the notion that the recruitment of non-macho human resource, such as women into traditionally male-dominated jobs continues to be a challenge as a result of prevailing organizational designs, psychosocial structures and sociocultural influences (Benya, 2009).

Mining firms in Ghana require diversified employees with the competence and qualification to undertake both primary and support functions. The results are therefore consistent with the theoretical postulation that because of child birth, women are associated with home and childcare tasks while men perform other tasks requiring greater strength, speed, and expertise (Henslin, 2002), as it is with mine work. The findings are also consistent with the predictions forwarded in the glass ceiling theory ( Cotter et al., 2001). As noted by Cotter et al., (2003), there is invisible sociocultural and organizational barriers (glass) through which women can see elite positions, but cannot reach them (ceiling). As it was found in this study, the sociocultural barriers relate to superstition and traditional beliefs that women should not enter the mines environ. The psychosocial barrier also has to do with the situation whereby women who get recruited in to work in the mines encounter unfriendly organizational cultures, whereby the possibility of their developmental promotions is rested on potential luck as well as their networking capabilities and personal connections to leadership. The study, thus provides an understanding of sociocultural and psychosocial barriers that inhibits recruitment characteristics of mining firms in Ghana, and which barriers discourage recruitment of women into the mining work environment. This observation ascribes to the glass-ceiling theoretical notion ( Cotter et al., 2001) that invisible barriers prevent women from
obtaining and securing the most powerful, prestigious, and high pay jobs in the labour market. By implication, the dynamism of an industrial culture can help shape individual employees’ perception of their responsibilities over time, providing them with repertoires of meaningful interactions with other members of their organizations (Martin, 1992). Using Sackmann’s (1992) argumentation as point of departure, these repertoires of behavior in mining firms, as found in this study, has helped define the sociocultural and psychosocial boundaries of firms in the industry within the ambient macho culture. Thus, the glass-ceiling continues to exist in mine work practices process in Ghana, even though there are no explicit obstacles that prevent women from acquiring the requisite education, training and expertise in mine work.

Of course contemporary recruitment advertisements of firms in the mining sector do not appear to specifically exclude women from partaking in the application process, however, the inhibiting psychosocial and sociocultural barriers lie beneath the surface (Cotter et al., 2001), and do prevail with significant influences. This therefore, has some implications for human resource management strategies in Ghanaian mining firms, especially when an account is taken of arguments suggesting that the glass ceiling has been broken and that women are no longer hindered from achieving their desired goals in their careers (Wrigley, 2002). For example, firms whose recruitment process professes to the notion of equal opportunity will provide room for all gender entries, including women, will have satisfied and committed employees. This is because women have now been found to be highly motivated with fierce competitive spirit, as well as the willingness to give-up sleep and recreation for the sake of career advancement, aside learning to play by men’s rules and adopting styles that make men comfortable (Henslin, 2002) in mine work. This observation delineates the presumption justifying the macho characteristics of the mine work environment that the level of complexity of routine tasks is high simply because of the dynamics of the operational environment. As found in this study, it was this macho characteristic of the work environment that manifested into an organizational design barrier whereby women do not get opportunities to take challenging tasks or assignments in mine work. Arguing from the perspective of Kakabadse and Kakabadse (2009), what is important is for the firm to view role clarity as an important element in the organizational design, with clear emphasis on when employees are expected to work together in a cooperative and complimentary manner. This will help the mining firms alleviate the macho-induced sociocultural and psychosocial barriers in their recruitment processes, allowing for the genderization of human resource entry, sharpening the expectations of the gendered human resource, and enhancing management’s ability in anticipating how members of the gendered work environment will react towards each other’s behaviours. In this regard, mining firms in Ghana need to put in place structures and procedures that clearly specify the scope of responsibilities of employees within high-growth industries characterized by rapidly changing business environments (Sanda and Kuada, 2016).

Building on the findings of this study, it can be argued that the larger the number of committed and diverse employees are in a mining firm, the more effective they are likely to be when it comes to exerting positive influence and raising the level of commitment of other employees. The underlying argument is that if diverse employees exhibit commitment in their communication and behavior, many more employees will pay attention and act likewise. Although many of the employees in the current study are men who appear to be committed, policies must be designed to engender the workforce by increasing the number and diversity of committed employees, especially women, in mining firms since such diverse employees stand to contribute positively towards their firms' attainments of increased organizational performances. This observation is in line with Blackburn’s (2002) argumentation that women who are career-oriented tend to give more attention to their careers, and by implication are highly committed. In order to delineate the sociocultural discriminative notion that such carrier-oriented set of women are trying to compete with their male counterparts to whom they are supposed to be submissive (Blackburn, 2002), the mining firms must put in place deliberate and balanced strategies of matching their competencies with tasks. These women should be gradually introduced to new and complex tasks for them to experience personal success on the job and thereby feel good about themselves (Sanda and Kuada, 2016). As their managers get to know them better, and can more confidently assess their skill levels, they can give them gradually increasing challenges in order to keep them excited about their work (Sanda and Kuada, 2016).

CONCLUSION
The study has provided empirical evidence to support the association between sociocultural factors, psychosocial factors, organizational design factors, and recruitment process that contributes to organizational performance in the Ghanaian mining industry. The gender-imbalanced recruitment characteristics of mining firms in Ghana are influenced directly and positively by the character of their organizational design, which is also influenced directly by the firms’ psychosocial and sociocultural factors.
Their recruitment processes are also affected indirectly and positively by psychosocial factors and negatively by cultural factors. Based on the findings, it is concluded that for the mining firms to be able to develop a gender-balanced recruitment processes: they must pay attention to their cultural and psychosocial environments, as well as their organizational designs. The study thus provided empirical knowledge that can be used to understand the rationale behind the gender-imbalanced characteristics of the recruitment processes in mining firms and the influencing roles of both psychosocial and cultural factors, in a developing country context, such as Ghana. This provides avenues for the firms to learn how to incorporate this knowledge in developing a gender-balanced recruitment policies that can enhance future recruitment of all qualified human resource, irrespective of gender. The study has provided knowledge that can be used to understand the rationale behind the non-gendered characteristics of employee recruitment in Ghanaian mines and the influencing roles of organizational design factors as well as psychosocial and cultural factors. Firms can use this knowledge in developing gender equal recruitment policies to enhance future recruitment of all qualified human resource, irrespective of gender.

REFERENCES


PAPER B
Abstract
The paper assessed gender perceptions of science and engineering courses, gender differences in enrolment regimes in University of Mines and Technology; and how both translated to recruitment of females in the mines. Drawing from a mix methodological approach, it was evidenced that gendered perceptions and stereotypes on science and engineering courses accounted for few females pursuing science, engineering and technology courses in UMaT. These perceptions, the general dislike for engineering courses by most females for fear of mathematics and the knowledge of the fact that engineering is quite difficult, explain the phenomenon of female under-representation in the mines. Though the progressive feminine enrolment regimes, due to gender main streaming initiative in UMaT, whereby women are giving some leverage. The moment a woman gets aggregate 36, which is maximum aggregate or minimum point of qualification, and she chooses mining related course, she is admitted, whereas in some cases, their men counterparts with aggregate 10 or 14 may not be considered. This is gradually working towards achieving a 20 percent quota for women. Though this, of course, is translating into increased female recruitment into the mines, the pace still remains slow and relatively insignificant. By implication, female under-representation in mine work environment point to the fact that mines are missing such feminine values necessary for corporate sustainability, growth and development. Therefore affirmative action plan is recommended at all levels of mine work planning that will ensure inclusion of such feminine virtues to impact profitably and propel growth of the mining industry in Ghana.

Keywords: Enrolment Regimes, Gender Differences, Gender-Equity Discourse, University of Mines and Technology, Ghanaian Mines

Introduction
Women constitute an indispensable social group in development agenda of nations. As a result, United Nations Development Projects (UNDP) established a special Division for Women in Development, aim at promoting concrete action to ensure that women effectively participate in global socioeconomic projects. It preyed on women to assume active roles in all sectors and at all levels of social development, both as agents and beneficiaries. Thus, policies on industrialization, food and agriculture, science and technology and sociocultural development must involve women. Women are undoubtedly a critical mass to reckon with, being more than half of the world’s population. Yet they perform two-third of the world work, earn one-tenth of the world’s income and own less than one-tenth
of the world’s property (Mubarak, 2006). Results of population and housing census revealed there are about 12,633,978 females and 12,024,845 males, implied females constituted 51.2 percent of the population and males 48.8 percent, resulting in sex ratio of 95 males to 100 females (PHC, 2010). Thus, statistically women representation is significant enough to inform development of the Ghanaian economy. However, most of them are challenged on grounds of science, engineering and technological education.

Access to education is empowering, enabling people to monitor policy, lobby, learn, collaborate, campaign and react to legislation (Harding and Parker 1995). Education is also a powerful mechanism for societal and economic progress. Education equally helps people earn respect and recognition; it is indispensable part of life both personally and socially. However, unequal access between male and female gender divides is a major problem, especially in science, engineering, technology and mining related courses in Ghana. Harding and Parker (1995) observed that in most cultures, participation in science education is strongly influenced by gender. Heggarty (1995) argued that women are not only less likely to choose to study science related courses than men; the male students appear more active participants than female students in science classes in Africa. This phenomenon according to Hoffmann-Barthes, Nair and Malpede, (1996) is situated in the context of Africa’s problems of poverty, disease, malnutrition, famine, drought, civil strife, vigilante groups, militants and war, combined with poor access to shelter, electricity and basic health services. Recent happenings across the globe demonstrate the potential of science, engineering and technology education for improving quality of people's lives, eliciting major sociocultural transformations, hence widely accepted that psychosocial development, hugely depends on harnessing and applying Science and Technology achievements, where regrettably females are few. Also, developed countries with only 17% of the world’s population, dominate the field of science and technology research by 95%. In contrast with developing countries, where 70% of the world’s population lives, possess only 5% of the world's science and technology research (Hoffmann-Barthes, et al, 1996). This therefore explains how powerful and development oriented is science and technology education to humanity.

In this global platform with gender imbalanced scale of science and technology education, the African situation is more abysmal, representing the least scientifically advanced in the world, paying little attention to equality in science enrolment in schools, where national spending on science and technology education being negligible, national research and development spending by universities and other institutions of higher learning being woefully ineffective, and institutional infrastructure of science and technology being badly challenged (Hoffmann-Barthes, et al 1996). Invariably, if high level of scientific and technological input is to be achieved for effective industrial development, no country can afford to leave 51.2% of its population out of the process. Yet, a combination of factors have prevented females from gaining equitable access to science, engineering, technology and mining related education in Ghana.

These developments have lead to a focus of this paper to create the understanding as to how science, technology and mining engineering careers are gender perceived. How these perceptions affect enrolment of females into University of Mines and Technology (UMaT), a mineral resource technology and engineering
based university in Ghana, and how this translate into female employment in mine work environments.

**Literature**

The study is strategically situated within the context of this literature, with the aim of guiding, shaping and directing the affairs of the research. Many scholars and policy makers have noted that women have historically been underrepresented in the fields of science, technology, engineering and mathematics, and are exploring the various reasons for the existence of this gender gap, as well as seeking ways to increase diversity within the fields. The pipeline metaphor has been used by some researchers to describe the educational programs in the STEM (Science, Technology, Engineering, and Mathematics) fields. The metaphor is based on the assumption that having sufficient students from STEM background requires both having sufficient input of them at the beginning of their studies, and retaining these students through completion of their academic programs. The metaphor is a key component of STEM diversity that ensures sufficient qualified candidates are available to fill scientific and technical positions (Clark 2005). That science, technology, engineering, and mathematics (STEM) career tracks from elementary schools to initial employment has been depicted as pipelines. It is generally believed that if a sufficient number of women are encouraged to pursue sciences and mathematics in their elementary and high-school years, exposed to technology early on, and persuaded to enter science and engineering programs in college or university, the gender disparities now present in STEM would disappear. However, women’s percentages in STEM decrease as they progress through the pipelines. Men, for the most part, travel smoothly from the beginning to the end of the pipeline and thus dominate STEM. That the pipeline is said to be leaky – thus, a steady attrition of females at every level of STEM, from elementary school into the workplace (Clark 2005).

In a study conducted by Mubarak (2006) in Nigeria, with the purpose of analyzing gender differentials in students enrolments into faculty of science, university of Ilorin between 1999 to 2004 academic years. Employing descriptive statistics, the results showed that the number of male students admitted out number that of female students in science related programs. This among other scientific studies in this direction, call for a conscious national effort to encourage more female enrolments into science-based courses. Similarly, Alebiosu (2006) conducted a research in Nigeria, which aimed at assessing gender influence in students’ interest in learning organic chemistry in senior secondary schools. The study was quantitative in approach, with evidence that, though males dominated the female students in the organic chemistry class both male and female students expressed high interest in organic chemistry topics.

Also, in a study by Du (2005) in Denmark; at the 3rd European Gender and ICT Symposium in Manchester. The work examined gender, theories of learning and engineering. It was evidenced that men and women have different access to participation in community of science and engineering, but the social image of engineers and the culture of engineering educational institutions are masculine. Further, in the work of Phipps (2002), it was observed that the professional identity of an engineer is still mainly male; hence the expectation is that an engineer will be a man. As such there are few female role models for young women interested in venturing engineering careers. This therefore
serves as very important discouraging factor to feminine participation in engineering.

And Canel, Oldenziel & Zachmann (2000), hold the view that, there is no scientific evidence to demonstrate conclusively that, women engineers think or design differently from their male colleagues. And that several authors have provided sufficient grounds to believe that in many places and times, men have gone to considerable lengths to prevent women from becoming engineers; something they would surely not have done if women inherently lacked either the mathematical abilities or the personal traits requisite for success in the profession. That, of course women had to overcome hurdles to obtain training and – once trained – have found difficulties in getting employed in the fields of engineering. This claim go to suggest that, the factors which go to explain the relative paucity of women in engineering are neither biologic nor economic

**Methodology**

The study employed a mix of quantitative and qualitative methodological approaches. Drawing from a descriptive survey, the quantitative data was sourced from an established statistical data base on enrolment figures by gender and by faculty from University of Mines and Technology (UMaT). All students admitted into UMaT since inception up to date, pursuing various programs across the two main faculties – mineral resources technology and engineering faculties constituted the target population while from 2011/2012 to 2013/2014 academic year’s enrolments figure of 3,410 students, constituted the study population. The quantitative method employed basic statistical tools such as tables and bar graphs to present the results. This was qualitatively augmented with in-depth interviews conducted with UMaT officials, some human resource managers from the mines, some mine managers and some mine workers. Key informants were selected using purposive and convenient approaches. An interview guide was self-developed and used to conduct the interview sessions. Responses were recorded and subsequently transcribed and organized into themes for analysis, reflecting the objectives of the study. Analysis was done thematically to generate the findings.

**Results and Discussions**

**Gendered Perceptions of Science, Engineering and Mining Related Courses**

Socially, an average Ghanaian parent harbored negative perceptions against the female child. Given that a family with two siblings, female and male; when they are home, the male sits down learning, while the female go to the kitchen to perform some domestic chores. Though these two siblings may possess equal Intelligent Quotients (IQs), when they sit for exams, the male stand a higher chance of beating the female due to the learning advantages he has over the female. Meanwhile, when it comes to admissions into senior high level, high and better grade scored candidates are placed to pursue science related courses while the low grade scorers are admitted to pursue arts related courses; hence few females in the sciences. In this regard, a mining engineering professor had this to say: “If you check right from the university, females are few in science and engineering related programs because of the perception that engineering is quite difficult.” In some jurisdictions, where family resources are inadequate to cater for male and female siblings, priority is given to the male-child education to the neglect of the female. The thinking is, the female will get marry and be catered for. In this vein, a respondent said:

*If I take you back to the training point of view, you are not likely to get a lot of women doing science that will take them*
to engineering related works including mining. The historical background of the mine work being labeled as a dangerous profession, and a woman coming to do engineering program, and end up in the mines, ward them off (Seidu, a senior industrial hygienist).

This explains how gender division of courses; perceiving science and engineering as preserve of the male while arts related courses are preserve of the female, has become a sociocultural issue and national in character. This finding also collaborated the work of Phipps (2002), which argued that the professional identity of an engineer or scientist is still mainly male; hence the expectation is that an engineer or scientist will be a man.

**Students’ Enrolment by Gender into University of Mines and Technology (UMaT)**

Table 1 below contains statistical data explaining students’ enrolment by gender into the two main faculties: mineral resources technology; and engineering as well as various departments pursuing programs in undergraduate, masters and PhDs in UMaT.

<table>
<thead>
<tr>
<th>FACULTY</th>
<th>UNDER GRADUATE</th>
<th></th>
<th>MASTERS</th>
<th></th>
<th>PhD</th>
<th></th>
<th>GAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>SUB TOTAL</td>
<td>M</td>
<td>F</td>
<td>SUB TOTAL</td>
<td>M</td>
</tr>
<tr>
<td>Mineral Resource Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geomatic engineering</td>
<td>43</td>
<td>10</td>
<td>53</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Geological engineering</td>
<td>50</td>
<td>10</td>
<td>60</td>
<td>12</td>
<td>0</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Mining engineering</td>
<td>47</td>
<td>10</td>
<td>57</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Mineral engineering</td>
<td>49</td>
<td>11</td>
<td>60</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Petroleum engineering</td>
<td>31</td>
<td>9</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>46</td>
<td>8</td>
<td>54</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Electrical engineering</td>
<td>51</td>
<td>9</td>
<td>60</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Mathematics</td>
<td>68</td>
<td>5</td>
<td>73</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Computer science</td>
<td>45</td>
<td>10</td>
<td>55</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grand Total</td>
<td>430</td>
<td>82</td>
<td>512</td>
<td>40</td>
<td>0</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>Percentage (%)</td>
<td>84</td>
<td>16</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>100</td>
<td>83</td>
</tr>
</tbody>
</table>

Source: Adapted from Planning & Quality Assurance Unit / UMaT, 2012

At the undergraduate level in the year under review, 430 male students represented 84% while 82 female students representing 16% were offered admissions into the university. At the graduate level, 40 male students representing 100%, with no female student admitted to pursue the master’s program that year. At the PhDs, 5 male students representing 83% while 1 female student representing 17% were offered admission. Therefore the undergraduate level had more female enrolments, followed by the PhDs but no single female was admitted at the master’s level.
Figure 1 below presents total student enrolment by programs and levels in University of Mines and Technology.

![Graph](image)

Figure 1: Total Students’ Enrolment by Gender into UMaT in 2011/2012 Academic Year

Table 2 below contains statistical data explaining student enrolment by gender into the two main faculties as well as various departments, pursuing programs in undergraduate, masters and PhDs in UMaT.

Table 2: Distribution of Male and Female Students’ Enrolled into UMaT in 2012/2013 Academic Year

<table>
<thead>
<tr>
<th>FACULTY</th>
<th>UNDER GRADUATE</th>
<th>M</th>
<th>F</th>
<th>SUB TOTAL</th>
<th>M</th>
<th>F</th>
<th>SUB TOTAL</th>
<th>M</th>
<th>F</th>
<th>SUB TOTAL</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mineral Resource Technology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geomatics engineering</td>
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<td>9</td>
<td>59</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>Geological engineering</td>
<td>49</td>
<td>8</td>
<td>57</td>
<td>14</td>
<td>2</td>
<td>16</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td>Mining engineering</td>
<td>53</td>
<td>6</td>
<td>59</td>
<td>19</td>
<td>3</td>
<td>22</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>84</td>
</tr>
<tr>
<td>Mineral engineering</td>
<td>43</td>
<td>12</td>
<td>55</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>65</td>
</tr>
<tr>
<td>Petroleum engineering</td>
<td>32</td>
<td>7</td>
<td>39</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>51</td>
<td>8</td>
<td>59</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>63</td>
</tr>
<tr>
<td>Electrical engineering</td>
<td>46</td>
<td>8</td>
<td>54</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>Mathematics</td>
<td>64</td>
<td>6</td>
<td>70</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>86</td>
</tr>
<tr>
<td>Computer science</td>
<td>41</td>
<td>7</td>
<td>48</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>51</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>429</strong></td>
<td><strong>71</strong></td>
<td><strong>500</strong></td>
<td><strong>62</strong></td>
<td><strong>6</strong></td>
<td><strong>68</strong></td>
<td><strong>21</strong></td>
<td><strong>3</strong></td>
<td><strong>24</strong></td>
<td><strong>592</strong></td>
<td></td>
</tr>
<tr>
<td>Percentage (%)</td>
<td><strong>86</strong></td>
<td><strong>14</strong></td>
<td><strong>100</strong></td>
<td><strong>91</strong></td>
<td><strong>9</strong></td>
<td><strong>100</strong></td>
<td><strong>88</strong></td>
<td><strong>12</strong></td>
<td><strong>100</strong></td>
<td><strong>300</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from Planning & Quality Assurance Unit / UMaT, 2013
At the undergraduate level, 429 male students represented 86% while 71 female students representing 14% were offered admissions into the university. At the graduate level, 62 male students representing 91%, with 6 female students representing 9% were admitted to pursue the master’s program that year. For the PhD, 21 male students representing 88% while 3 female student representing 12% were offered admission. Meaning that, more females were again admitted at the undergraduate level, followed by the masters’ level, with the least female enrolments at the PhD level.

Figure 2 below presents total student enrolment by programs and levels in University of Mines and Technology.

Figure 2: Total Students’ Enrolment by Gender into UMaT in 2012/2013 Academic Year
Table 3 contains statistical data explaining student enrolment by gender into the two main faculties as well as various departments pursuing programs in undergraduate, graduate and PhD in UMaT.
Table 3: Distribution of Male and Female Students’ Enrolled into UMaT in 2013/2014 Academic Year

<table>
<thead>
<tr>
<th>FACULTY</th>
<th>UNDER GRADUATE</th>
<th>M</th>
<th>F</th>
<th>SUB TOTAL</th>
<th>M</th>
<th>F</th>
<th>SUB TOTAL</th>
<th>M</th>
<th>F</th>
<th>SUB TOTAL</th>
<th>GAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mineral Resource Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geomatic engineering</td>
<td>73</td>
<td>27</td>
<td>100</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>103</td>
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</tr>
<tr>
<td>Geological engineering</td>
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<td>21</td>
<td>79</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>87</td>
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</tr>
<tr>
<td>Mining engineering</td>
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<td>15</td>
<td>88</td>
<td>15</td>
<td>2</td>
<td>17</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>Mineral engineering</td>
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<td>25</td>
<td>86</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>Petroleum engineering</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>Environmental &amp; safety Engineering</td>
<td>64</td>
<td>21</td>
<td>85</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>85</td>
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<tr>
<td>Engineering</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Mechanical engineering</td>
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<td>10</td>
<td>0</td>
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<td>111</td>
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<tr>
<td>Electrical engineering</td>
<td>87</td>
<td>19</td>
<td>106</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>148</td>
<td>25</td>
<td>173</td>
<td>15</td>
<td>1</td>
<td>16</td>
<td>9</td>
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<td>10</td>
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</tr>
<tr>
<td>Computer science</td>
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<td>30</td>
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<td>0</td>
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<td>1</td>
<td>0</td>
<td>1</td>
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</tr>
<tr>
<td>Grand Total</td>
<td>802</td>
<td>241</td>
<td>1043</td>
<td>65</td>
<td>4</td>
<td>69</td>
<td>15</td>
<td>3</td>
<td>18</td>
<td>2260</td>
<td></td>
</tr>
<tr>
<td>Percentage (%)</td>
<td>77</td>
<td>23</td>
<td>100</td>
<td>94</td>
<td>6</td>
<td>100</td>
<td>83</td>
<td>17</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from Planning & Quality Assurance Unit / UMaT, 2014

At the undergraduate level, 802 male students representing 77% while 241 female students representing 23% were offered admissions into the university. At the masters’ level, 65 male students representing 94%, with only 4 female students representing 6% admitted to pursue the master’s program that year. At the PhD level, 15 male students representing 83% while 3 female students representing 17% were offered admission. This also create the understanding that, more females were admitted at the undergraduate level, followed by the masters level, with the least female enrolments at the PhD level.
Figure 3 below presents total student enrolment by programs and levels in University of Mine and Technology.

![Figure 3: Total Students' Enrolment by Gender into University of Mines and Technology - 2013/2014 Academic Year](image)

The University of Mines and Technology (UMaT) has two main faculties namely; faculty of mineral resources technology and faculty of engineering. The faculty of mineral resources technology offers courses in geomatics engineering, geological engineering, mining engineering, mineral engineering, petroleum engineering as well as environmental and safety engineering. On the other hand, the engineering faculty offers courses in mechanical engineering, electrical engineering, mathematics and computer science. For the three years under review, the mineral resources technology faculty had a total of 276 female students as compared to the engineering courses. It further confirms earlier perceptions that most female students dislike engineering courses basically for fear of mathematics.

Also, general female enrolments into the university over the three years running had been revealing as captured in tables 1, 2 and 3. In the 2011/2012 academic year, number of female students enrolled stood at 82, representing 16% at the undergraduate level. This figure subsequently reduced to 71 representing a 2% reduction in enrolment of females in the 2012/2013 academic year as captured in table 2 above. The enrolment figure further went up to 241, representing 23% of female enrolment in the 2013/2014 academic year. Though this represents an increase in female enrolment by 170, this is partly due to the introduction of
Gender mainstreaming; the figure remains significantly low as compared to the 802 male enrolments in that year as captured in table 3 above. These outcomes supported earlier works of (Du 2005 and Mubarak 2006), that men and women have different access to participation in the community of science and engineering, but the social image, culture and character of engineering educational institutions are masculine in outlook. To further buttress the above findings, (Boakye 1997) concluded that barriers to girls’ education are multifaceted and interrelated. That, while the barriers affect girls and boys, girls are affect disproportionately. But he identified common barriers as: poverty, traditional beliefs and practices; perceptions of the role of girls by families and communities; the opportunity costs of sending girl–child to school; inadequate number of female teachers as role models; teenage pregnancy, early marriage, and inadequate sanitary facilities. Other barriers include low self-esteem, gender biases in classroom practices, minimal guidance and counseling services and sexual harassment.

In the course of the interviews, to further understand the gender imbalance in enrolment regimes, in UMaT, a Pro-Vice Chancellor said: ‘since 1977 in a class of 150 students in Kwame Nkrumah University of Science and Technology, we had only two females in that class, so the gender imbalance in enrolments is not today.’ This create a sense of how age long the problem has been in the Ghanaian school system. But on the contrary, a female geologist said: ‘Things are gradually changing, the number of female enrolment is increasing; the graph is going up, if you go to UMaT, female enrolments are progressively increasing.’

In an interview with the authorities of the University of Mines and Technology to gain in-depth understanding of the gender imbalance in enrolments, a respondent said:

the few female enrolment in the university is never intentional, we have been making deliberate effort to encourage women to come to this university, by giving them some leverage, for that reason, we have instituted what is called Gender Mainstreaming. This means that the moment a female gets aggregate 36 which is the maximum aggregate or minimum point of qualification, and such a female candidate chose a program from the university, it will be given to her as a lady whereas their male counterparts with aggregate 10 or 14 may not even be considered. Now we are looking at about 20% quota for women in-take, and they have proven us right. When they come to the university, they perform well. For the last two years running, female students have been picking the best overall student awards in this University (Sulemana, a Vice Chancellor).

Engendering Multinational Mine Work in Ghana

Table 4 below contains statistical data indicating employees’ gender in some selected multinational mining companies in Ghana.
Table 4: Distribution of Male and Female Employees Recruited into some Selected Multi National Mining Companies in Ghana

<table>
<thead>
<tr>
<th>Mining Company</th>
<th>Sex Distribution of Employees</th>
<th>Total</th>
<th>Percentage Sex Distribution of Employees (%)</th>
<th>Total Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Fields, Tarkwa Gold Mines</td>
<td>96 F 2,453 M</td>
<td>2,549</td>
<td>4 F 96 M</td>
<td>100</td>
</tr>
<tr>
<td>Golden Star Resources Bogoso Ltd</td>
<td>26 F 799 M</td>
<td>825</td>
<td>3 F 97 M</td>
<td>100</td>
</tr>
<tr>
<td>AngloGold Ashanti Iduapriem Limited</td>
<td>44 F 612 M</td>
<td>656</td>
<td>7 F 93 M</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>166 F 3,864 M</td>
<td>4,030</td>
<td>14 F 286 M</td>
<td>300</td>
</tr>
</tbody>
</table>

Source: HR, 2014

From table 4 above, Gold fields, Tarkwa Gold Mines has a total work force of 2,549 out of which 96 are females representing 4% while the male population stood at 2453, representing 96%. This explained a total male dominant work force in the company. In Golden Star Resources Ltd., total workforce is 825, out of which female workers are 26, representing 3% while the male workforce stood at 799, representing 97%. This outcome further expresses few female representations in the company. In AngloGold Ashanti Iduapriem, the total workforce is 656, out of which 44 are females; representing 7% while 612 are males representing 93%. In all, Gold Fields Tarkwa Mines Ltd., has majority of 96 female employees, followed by Anglo Gold Ashanti Iduapriem Ltd., with 44 employees while Golden Star Resources Ltd., had the least, only 26 female employees. This created the understanding that male workers significantly outnumber their female counterparts in the 3 major multinational mining companies under studied. This further suggests that the few female university enrolments as captured in tables 1, 2 and 3 had direct recruitment implications on the female representation in the mines.

In an interview to sample views on the few female representation in the mine work, a respondent had this to say:

>naturally, the operational side of the mine work is not female friendly because of the nature of the job and the tools we use. In the mining field, most of the jobs involves operation of heavy duty equipment, and training females to use such equipment is very difficult and even after they are trained other challenges set in; the married ones get pregnant, go on maternity leaves and prior to the maternity leave, you can’t put her on the machine, and if u can’t put her on the machine, what other way can the person be useful to the business (Agyemang, a Mining Manager).

According to the study, there are numerous reasons explaining female under representation in the mine work. The demand for physical strength is one; the shift systems also do not favor recruitment of the females. The difficulty in a female driving in the night, the heavy nature of the mining equipment, and the general risk associated with the mine work. Mining is also production oriented; therefore managers will
look for people who can facilitate the work, hence the masculine and macho domination.

**Implications for Gender-Equity Discourse in Ghanaian Mines**

Results of the study as presented above in various forms has practical, social, economic and policy implications for the ongoing gender-equity debate in Ghanaian mines. The study showed a significantly few number of females than males enrolled into the faculties of mineral resources technology and engineering, offering various programs and degrees leading to mine related jobs. This few female enrolments may by implication account for the few female representation in the multinational mining companies in Ghana, as indicated in table 4 above.

However, the 2013/2014 enrolment figures of (241) females as captured in table 3, point to a progressive increase in female enrolment into the university as compared to the previous years. This increase in educating females has a social development policy implication that works with a long-term investment that yields exceptionally high returns for individuals, families, communities and nations. The onus therefore lies on those occupying leadership positions to continuously change things positively for a girl-child education, especially in the sciences to strive. Indeed, socioeconomic development in the 21st century hinges on science and technology education. It was also evidenced that, some of the few females who were enrolled into the university never took mining as a profession for lack of interest. This implies that it is one thing pursuing science, engineering and mining related courses; but it further takes interest of the individual to take up a mining job. The fact of the matter being that, the nature of the mine work scare most ladies from veering into the job, especially when on attachment and see how tedious the work is, they conclude that it is the preserve of the male. So it takes a few who really have the course at heart and the joy for the job to remain.

Furthermore, the few female representation in the mine work, point to the fact that the mines are missing such feminine values necessary for mine work development. For instance, the growing recognition that females are endowed with classic style of communication and community affairs services in the mines, which appears to be vital in mine work environment, placing them in solid public relations portfolios, with absolute responsibilities of linking the mines to the local communities. This has a practical implication for the mines, that, for good corporate governance in the mines, we need such female virtues like cooperation, caring, pacifisms and their nonviolence nature to promote peaceful coexistence in the industry.

It was evidenced from some respondents that, there is no better and profitable organization than one that employ and involve women as key players. That such corporate decisions and strategies have immediate implications for poverty reductions, good nutrition, good health, and reinvestment at the family, community, and ultimately, country level. Hence the multinational mining companies have the obligation to institute affirmative action in their recruitment, training and development plans in Ghana to leverage these feminine potentials for growth.

**Conclusion**

Ghana’s population is dominated by females (PHC, 2010), ironically, this vital force has been left behind in science, engineering, mineral resources technology education; and jobs, including mining jobs, partly due to some sociocultural odds that militate against them. It was evidenced that enrolments of girls at all
levels of education had increased; but retention, completion, and quality remain problematic. This educational challenge further tied to explain why females are few in the mine work environment. In view of this, the paper measured gendered perceptions of science and engineering courses, explored gender differences in enrolment regimes in University of Mines and Technology, between 2011/2012 to 2013/2014 academic years, pursuing programs and degrees in both mineral resources technology and engineering, and to ascertain how the gender differences in enrolment translated into recruitments of females in the mines. Reasons being a long standing societal perception and stereotype that science and engineering courses are the preserve of the male students. Also, the general dislike of engineering courses by most females basically because of the fear for mathematics and the knowledge of the fact that engineering is quite difficult were cited. Invariably, it was evidenced from the study that, male enrolment figures significantly outnumbered that of the female in University of Mines and Technology. In response to this gender imbalanced enrolments regimes, the university instituted what is called ‘gender mainstreaming’ a package aimed at achieving progressive increase in enrolment of females into the university. Though the progressive feminine enrolment regime is translating into progressive increase in female recruitments in the mine works, the pace remains slow and relatively insignificant. Other reasons aside education, dictating the pace include the fact that the operational side of the mine work is not female friendly due to the nature of the job and the tools being used such as heavy duty equipment. Also, demand for brut physical strength is another factor. The shift system in place does not favor the females as well. In view of this and the knowledge of the fact that mining is production oriented; therefore managers will look for people who can facilitate the work, lead to explain the phenomenon of masculine, machismo, macho domination in the mine work environment.

By implication, the female under-representation in the mine work point to the fact that the mines are missing such feminine values necessary for corporate sustainability, growth and development. Therefore affirmative action plan be instituted at all levels of mine work planning that will ensure inclusion of such feminine virtues like cooperation, caring, pacifisms and their nonviolence nature to impact positively in the mining industry. The study also recommends training of more female teachers in the science and technology disciplines to serve as role models for the girl child. Also, the media and educational institutions alike are encouraged to adopt and project balanced and non-stereotyping reportage of boys and girls educational images.

References
Manchester. UK. Being a PhD study in University of Southern Denmark.


Abstract

Writing from gender and organizational perspectives, this article reflects consciously with nuances upon varied effort working towards resolving the long existing binary barriers in the world of mine work. Working towards this goal, this article raises questions as to which organizational practices, processes, and procedures function to create participatory barriers to women in Ghanaian mine jobs. Adopting a mixed method design, the paper points to the culture of male-dominance, gender biases, role models and mentorship constraints, unfriendly family work policies, and relationship among women in male-dominated settings. These outcomes, according to the study, constitute considerable concern for organizational development, with practical implications for industry, employment, labor relation practices, and public policy in Ghana. Therefore affirmative action among others is recommended for gender deconstruction, and promotion of gender democracy, an agenda for inclusivity, and a safety valve for poverty escapes and a compact for achieving gender-equality in multinational Ghanaian mines.

Keywords: gender, binary barriers, male-dominance, gender democracy, sustainable development, Ghanaian mines
1. Introduction

Ghana is an attractive mineral resource base, and the mining industry is an important part of the Ghanaian economy, with gold alone accounting for over 90 percent of the mining sector. Ghana is the second largest gold producer in Africa and 10th largest producer in the world (see: world top 10 gold producer-countries). The gold mines in Ghana employs over 28,000 people, directly contributing about 38.3 percent of total corporate tax earnings, 27.6 percent government revenue and 6 percent GDP in 2011 (Aryee, 2012). The industry also contributes significantly to sustainable development through implementation of Corporate Social Responsibility (CSR) programmes for host communities and the general Ghanaian public. However, to fully realize potentials of the sector to contribute to socio-economic development, certain key challenges have to be addressed especially, poor diversification of the mines in area of gender equality. For example, Kwami (2007) did a study aimed at identifying obstructions to women participation in Ghanaian mines. The study showed prejudice, cultural restrictions and discrimination against women. Though women are majority of the Ghanaian population, yet underrepresented in mine works. This then raises a sustainability concern for core stakeholders in the mining industry.

Although Ghana's large-scale mining sector has received extensive attention, its dynamics in labor market issues continue to be poorly understood. And several issues remain unresolved that serve to obscure rather than unravel the binary barriers affecting effective participation of women. The problem moved beyond unresolved differences and took center stage in general mining literature focusing on health and safety, unionism, legislation, changing technology and global markets to the neglect of an equally critical aspects like diversity management and gender equality in Ghanaian mine work environment. Most of the studies on women in mining are foreign in nature, problematizing their application in Ghanaian context, and the relatively few works done on Ghana are mainly on small scale mining (Klu, Anderson & Sanda, 2014).

In Ghana, mining is popularly perceived to require brut-physical strength, and as a preserve for men. It is evident that this perception can be found world-wide. These types of masculine ideals are shown to dominate mine workers' culture and practices. Especially, where gender equality debate is highly present in the surrounding society, such as the Scandinavian context (Abrahamsson, 2008; Abrahamsson & Johansson, 2006; Andersson, 2012, Andersson, Fältholm, Abrahamsson & Lindberg, 2013). Generally, the situation in Ghana has many parallels all over the world. In Australia, Bryant & Jaworski (2011) examined the gendering of skills shortage in selected industries including the mines, and the results pointed to gender discriminatory practices. Similarly, Purevjah (2010) studied gender equity issues in Mongolian mines. The study showed that majority of mining companies advertised mining jobs openly expressing preferences for male employees. According to Lahiri-Dutt & Macintyre (2006), the gendered construction of the mines and mining, and the conventional hegemonic notions of mining as a masculine job raise critical questions relating to gender and development, leading to major transformational processes in contemporary mine landscape, especially in developing countries. This inevitably leads to large scale formal mining companies being pressurized to improve their environmental, social and community commitments. And each and every one of these commitments needs to incorporate a gendered outlook if their contributions are to yield any meaningful and equitable results.

Historical antecedence to the phenomena of male-dominance in the mining sector is revealing and constituted both formal and informal barriers. The formal barriers are attributed to legal and legislative instruments, as well as educational traditions that construct science, technology,
engineering and mathematics as male preserve. For example, in Britain, women were legally excluded from working underground by the 1842 Mines Act. Similarly, in early 1900s, Article 2 of the International Labor Organization (ILO) convention 45 of 1935 came into play, forbidding women in underground mining. That article further stated that “no female, whatever her age, shall be employed in underground work in any mine.” Turning to the continent of Africa, legislative acts of 1898 and 1911, banned women from underground work in South African mines.

The informal barriers, on the other hand, are products of long standing cultures and traditions that segregated and stereotyped women from certain occupations. Evidence abounds from Yao (2006) in China, whose study sort to identify reasons why few women were employed in the coal mines of China. The results showed, the custom of foot-binding, cultural factors, and customs in traditional China, where it was ominous for women to be present in the mining tunnels. Similarly, in South African mines, women were excluded from mine work participation due to their value in food production and their natural reproductive functions. Therefore, both the formal and informal barriers makes the mine labor market unfriendly for women. Although a lot of the formal barriers may have been broken, lots of the informal barriers still persist.

The phenomena of women exclusion from mining and underground work may not have been universal over time. The inter World War periods led to a huge increase in the employment of women in the mines, due to lots of men joining the war fares. Bradley (1989) noted that in Germany and Belgium women worked underground until the twentieth century. Also, in 1960s in India, women worked in open-cast mines, and by 1970s, Chinese and American women also took up mine work (Bradley, 1989). According to Bradley, these women did heavy works such as dragging and pushing trucks and covering of coal. They also worked as coal carriers, sieving, loading, unloading and weighing coal. Bosman (1967) states that in Ghana, gold was obtained in or between certain hills and in river gravels where the streams enter the sea, and women use to flock to the seashore after heavy rains to pan for gold. According to him, the collection and washing of beach gravels and sand at Elmina and Axim were done by women and boys after violent rains. That women used large troughs and trays, which they filled with sand and gravels and washed repeatedly with fresh water till all the lighter materials was removed. The concentrate containing the gold was washed again in a small tray until all the dross was removed, leaving the gold.

Similarly, industrial and organizational sociological studies have paid considerable attention to male-dominated work contexts (Kerfoot & Knight, 1993). The character of these contexts provides fertile grounds for development of studies on women’s experiences in bureaucratic and professional organizations. Researchers prior to 1970s, tended to study male subjects, without considering female subjects and eventually turned blind eyes to the way sex and gender impact on organizations (Hearn & Parkin, 1983). Ground breaking works by Acker & Van Houten (1970); Kanter (1970) and other feminist theorists, open debate on significance of gender within work organizations, making a business case for work place equity, and laying solid foundation for gender and organizational paradigms (Wicks 2002). Rational for the new paradigm hinges on calls to expose and end discriminatory practices against women, which characterized work organizations and organizational analysis (Mills & Tancred 1992). Moving beyond the era of discriminatory critiques emerged a new order focusing on developing feminist theories of work organizations. This was shortly followed by numerous applied feminist technoscience studies that engendered explanations on organizational dynamics that create and sustain discrimination. As the field of feminist technoscience gained acceptance, the debate broadened to capture details on
masculinity, femininity and diversity management in work places. The continuous debate on this subject, lead to explain how women participation is limited in male-dominated industries such as engineering, construction, forestry, and mining.

This article undertakes a critical review based on relevant studies on organizational analysis, including the more recent interest in gender and technology, supported with empirical data to contend, and illuminate some of the key binary challenges confronting women in Ghanaian mine work organizations as a result of male-dominance cultures. In this regard, we raise the question on the organizational barriers affecting women, and their implications on gender equality. This in no uncertain terms will stimulate new research, to ensure better understanding of the organizational barriers, and subsequently move forward to make Ghanaian mine works more equitable, diversity tolerant and socio-economically sustainable.


Ghana has a culture of work-life, a long-standing national thinking, set to defining initiatives designed to creating more flexible, and supportive work environment, to enable employees focus on work tasks while at work, and enhancing productivity. Flexible work practice is a favored strategy in today’s Ghana, aim at meeting the needs of both businesses and employees (Aryeetey, Yeboa, & Sanda, 2012). Also, contemporary Ghanaian human resource managers deploy strategic approaches to managing employment relations with emphasis on leveraging people’s capabilities aim at achieving sustainable competitive advantage, through a distinctive set of integrated employment policies, programs, and practices, working towards more flexible and supportive work environments.

Work-life cultures are proven to be universal, Wei, Yill & Tian (2013) in China, explored how Human Resource Management helps organizations build supportive work-life/family balance work environments. The study showed that, although there is a positive relationship between implementation of Work-Life Balance (WLB) programs, and organizational performance and employees’ well-being, those programs’ under-utilization showed that un-supportive organizational culture form the barrier for the desirable outcomes of commitment and productivity. The study recommends that HRM departments should help organizations establish supportive organizational cultures, ones that elicit support, and enhancement of women’s positions. That only by the establishment of supportive work-family/life cultures that organizations and employees can capitalize on the implementation of WLB programs.

Also, legislations on maternity leave exist under leave regulations of mining companies of Ghana, as contained in their collective bargaining agreements. It stated that on submission of a medical certificate signed by the company’s medical officer, or where circumstances demand by a registered medical officer, or a registered midwife, a woman who becomes pregnant shall be granted maternity leave with pay as follows: six (6) weeks before confinement. Six (6) weeks after confinement. In addition, a further four weeks unpaid leave may be taken. On resumption of duty, a nursing mother shall be granted a forty-five (45) minutes, twice a day to nurse her child for a period of one year and close from work at 3:00 pm instead of 5:00 pm.

However, these regulations regarding working time limits and leave entitlements, have not been very helpful in enabling employees manage work and family responsibilities effectively. Similarly, Aryeetey et al, (2012) in Ghana, conducted a study to identify the challenges inhibiting
professional female employees from maintaining good work-family life balances, and also to
develop a framework that organizations can use to understand such challenges, towards the design
of alternative work arrangements to enhance the retention of professional female employees. The
study revealed that conflict between work and non-work obligations, such as family
responsibilities, are sources of stress which could motivate professional female employees to quit
their jobs. Also, flexible time, compressed workweeks and telecommuting were identified as the
most preferred alternative work arrangements as motivational tools to help retain their professional
female employees, not only to improve the quality of their work-life balance but also to enhance
their productivity in their organizations.

The 2010 Population and Housing Census (PHC) report in Ghana, indicates that the economically
active population 15 years and older, by sex and industry indicates that men stands at 54.7 percent,
as compared to 45.3 percent of women, a figure slightly higher than women. The report revealed
that the women’s limited opportunities for employment in the formal sector is partly due to lower
levels of education and other factors challenging their employability generally. This implies men
are more likely to be employees than women in Ghana, as it may be in other parts of the world.
The report further shows that the private sector, including mining companies, absorbs 93.1 percent
of the economically active persons, with the public sector absorbing only 6.9 percent. Therefore,
the private sector remains the largest employer of the working population in Ghana.

The report further indicated women representation in manufacturing (the second largest sector)
stands at 51.9 percent, slightly above the men’s 48.1 percent. In wholesale and retail businesses,
women represented 56.7 percent as compared to 43.3 percent men. In accommodation and food
services, women representation stood at 54.7 percent as against 45.3 percent for the men. Women
equally topped in household activities by 59.4 percent compared to 40.6 percent men. The
knowledge of the fact that women out numbered men in some key industries is highly refreshing
and becoming increasingly interesting, with implications for poverty alleviation, and effective
inclusivity in industrial participation in Ghana.

In contrast, the report showed that men outnumbered women in areas of agriculture, forestry, and
fishing by 55.5 percent compared to 44.5 percent. According to the report, agriculture, forestry,
and fishing, inarguably remain the largest industrial sector in Ghana. In building and construction,
men dominated by 86.1% representation compared to 13.9 percent women. And in mining and
quarrying, which is central to this paper, men dominated by 80.8 percent compared to 19.2 percent
for women. Therefore, the Ghanaian mine work is male-dominated, as evidenced in the PHC report
in 2010.

3. Theoretical framework

Gender scholars and feminist theorists since 1980s have been critical on social constructions, and
categorizations of society into able and disable, man and woman, male and female as well as
division of roles and occupational segregations into all-male, all-female and mix jobs (Ampofo,
2014; Connel, 2010). In her manifesto for the cyborg in 2004, Donna Haraway criticized western
traditions like patriarchy, colonialism, essentialism, and naturalism as being problematic
formulations of categories and identities leading to "antagonistic dualisms" that are systematic to
the logics and practices of domination of self and others, male and female, animal and machine,
culture and nature. Instead, Haraway argued for a world of potent fusion, what we described as a
'magnetized world’’ committed to breaking down of boundaries and binary barriers. A world capable of melting down peril partialities, a world challenged to dissolving polarity and hierarchical dominations. This in our frame of thought will ensure effective world set to joining parts and pieces into wholes, as may be observed in a natural behavior of a normal bar magnet, reacting to magnetic substances.

Similarly, in her Agential Realism and Getting Real in Meeting the World Halfway, Karen Barad (1998), challenged the disciplinary divide between epistemology and ontology. Instead, suggested a new approach to knowledge production called ‘onto-epistemology.’ This refers to the study of inseparability of matter, human subjects, as well as inseparability of ‘‘being’’ and ‘‘knowing.’’ We draw this analogy- ‘‘I am a man, you are a woman.’’ And because ‘‘I am a man, I perfectly fit into machine, technical and engineering jobs’’ and because ‘‘you are a woman, you don’t fit into these set of machine, technical and engineering jobs.’’ This is a typical case of social construction, characterized with occupational segregations that this study is not comfortable with. Barad’s theoretical formulation among other theories work towards elimination of categorizations, wiping away of discrimination and marginality in society as a whole, and the world of work in particular, as it may be the case in mine works of Ghana.

Also, some thirty-nine years ago, Kanter (1977), in her foundational work, entitled ‘‘the many and the few, in men and women of the corporation,’ where creation of masculinity was central in the organization she understudied. The work, of course, explained the administration of corporate bureaucracies, exposing growth of a ‘‘masculine’’ ethic in management, and ‘‘feminization’’ of the clerical work. The most suited part of Kanter’s work to this paper is, ‘‘why tokens face special situations?’’ The work pointed out that, the proportional rarity of tokens is associated with three perceptual tendencies namely: visibility, contrast, and assimilation.

The first perceptual tendency i.e. visibility of tokens accord them attention, earn them a wide group member’s awareness share, and make them less and less surprising, unique and noteworthy. Hence turns to mount unnecessary performance pressures and demands on them. Of course, this situation may lead to stress or events or experiences perceived as threats or challenges to the affected individuals, which can be either physical or psychological.

The second perceptual tendency i.e. contrast of tokens, which is a polarization and exaggeration of differences between the many and the few. In uniform groups, members and observers alike may never become self-conscious about the common culture type, which remain taken for granted and implicit. However, in contrast, the presence of a person or two in a group, bearing a different set of social characteristics, increases the self-consciousness of the numerically dominant group, and the consciousness of the observer about what makes the dominant a class. They will then become more aware of both their commonalities and differences from the token. In order to preserve their commonalities, they try to keep the token slightly outside, thereby creating a boundary for the token. According to Kanter, in this scenario, there is a tendency to exaggerate the extent of differences between the dominant and the token, because tokens by description are too insignificant a number to defeat or deny unjustified generalizations. So, it is easier for the commonalities of the dominants to be noted in contrast to the tokens. Therefore, the tokens can easily be perceptually isolated, and cut off from the core of the group as compared to the dominants who represent a greater share of the group, and can never face the brunt of group isolation. In social psychological terms, isolation from a group is tantamount to estranging. George Simmel describes a stranger as a member of a group, who lives and participates, yet remains distant from
other native members of the group. That a stranger is perceived extraneous to the group, and even though in constant interaction with other group members, his/her “distance” is more emphasized than his “nearness.”

Assimilation, the third perceptual tendency, involves the use of stereotypes, or familiar generalizations about a person’s social type. In most cases, characteristics of a token are distorted to fit the generalization. Of course, Kanter’s theory posits that tokens are easily stereotyped than people found in appreciable proportions. It is also easier for a tokens to find an instant identity by conforming to pre-existing stereotypes. So tokens are ironically, both highly visible as people who are different, and yet not permitted the individuality of their own unique, non-stereotypical characteristics.

According to Kanter, the aggregate effects of the three perceptual tendencies may lead to turnover and failure rates being measured much higher among tokens than that of the dominants, both at enterprises and early grade positions. Kanter also emphasized on the universality of the theory which is applicable to peoples of any kind who are rare and scarce, such as the few women among many men in science and technology settings, the lone black among a majority white community, the lone man among majority women and the few foreigners among natives. That any situation, characterized with significant types of people highly skewed, can produce similar results.

4. Method and Materials

This paper report findings on fieldwork from the four understudied mining companies and a mining university in, and around Tarkwa in the Western Region of Ghana. Tarkwa is the capital town of Tarkwa-Nsuaem Municipality which forms part of the 22 Metropolitan, Municipal and Districts in the region. A well noted mining town, hosting several mining companies and activities, giving out approximately 24 tons of gold annually, hence the justification for choice of Tarkwa as the study area.

Access to these four studied organizations was negotiated through the respective human resource managers, with the aim of satisfying basic ethical requirements in research. The researchers visited the field three consecutive times. The fieldwork span over a period between August 24th to December 31st 2014, spending a period of 21 working days in the field. The four understudied mining companies were; Gold Fields Ghana Limited Tarkwa branch, incorporated in 1993 as a legal entity. The government of Ghana holds a 10 percent free carried interest, as required under the mining law of Ghana. Next is Anglo Gold Ashanti-Iduapriem mines, wholly owned by Anglo Gold Ashanti. The Iduapriem property is a 110 km square concession. Then comes the Golden Star Resources Ltd. in Bogoso, near Tarkwa. A Canadian based company, incorporated in 1992. The Company holds 90% interest in both Wassa, Prestea and Bogoso gold mines in Ghana. The Damang Ore body was first discovered between 1990 and 1995 when Ranger Gold entered the area to mine the tailings of the Abosso Gold Mine. In 1997 the construction of the Damang mine and mill completed and mining commenced.

4.1 Design of the study

In this study, we adopted a mixed method design, due to its numerous pragmatic advantages. First, employing the designs can lead to expanding the scope or breadth of research to offset the weaknesses of either approach alone, or by ensuring that the limitations of one type of data are
balanced by the strengths of another (Caracelli & Green 1997). Also, the aim is to further ensure that understanding is improved by integrating different ways of knowing (Carvalho and White, 2007). Other views hold that, the collection and analysis of embedded qualitative responses can augment and explain complex or contradictory survey responses, and also, collection and analysis of structured survey and key informant interviews in an iterative analytic process can provide important information on emergent and unexpected themes (Driscoll, Appiah-Yeboah, Salib, & Rupert 2007). The basis for employing these designs are likewise varied, but they can be generally described as methods to expand the scope or breadth of research to offset the weaknesses of either approach alone (Caracelli & Green 1997).

1. Most of the data reported in this paper were derived verbatim from interviews conducted by ourselves, at the work places with both women and men miners, mine managers, as well as some mining engineering lecturers from University of Mines and Technology, that lasted between 45 minutes to 1 hour, on their understanding of the organizational barriers affecting participation of women in mine jobs of Ghana. The qualitative approach witnessed twenty seven recorded interviews, made up of ten women and fifteen men. The interviews allowed the interviewees to reflect on and discuss their experiences. This is obviously not a method for the collection of objective data (Czarniawska, 2002), but it allowed us to capture how a number of diverse individuals make sense of organizational phenomena, including their interpretations (Gioia and Chittipeddi, 1991; Soderberg, 2003).

2. Also, two focus group discussions were organized, first with a group of students from University of Mines and Technology, who have been on vacation attachment with the mining organizations before. And secondly with a group of miners, selected across the four mining companies. According to Kitzinger (1995), focus group discussions have advantages of non-discrimination against people who cannot read or write and they can encourage participation from people reluctant to be interviewed on their own or who feel they have nothing to say. Also, focus group discussion has a hallmark of explicit use of group interactions to produce data and insights that would be less accessible without the interaction found in the group (Morgan, 1997).

3. A self-developed, pre-coded questionnaire was administered to 304 respondents, made up of 231 men and 73 women.

4. Also, a pre-test of the instrument was done at Anglo Gold Ashanti Limited in Iduapriem.

5. Participant observation was also conducted at the mine sites, which provided means of becoming acquainted with the miners work lifestyles, as well as the contextual setting for their narratives.

6. And of course, both the qualitative and quantitative data were simultaneously collected.

4.2 Means of recording, documentation, and analysis

We recorded the interviews and focus group discussions, and subsequently transcribed them. The data were then organized thematically, including both the recurrent themes and issues that were not recurrent, but were of interest in relation to the aim of the study. Also, handwritten notes were taken in the course of the interviews to augment comprehension of the process.
We focused the analysis on both literature and the aim of the study. The process of data analysis witnessed a merger of both qualitative and quantitative data sets. These data sets were linked by key informant identifications to ensure that records contained both the survey and the interviews. The qualitative data were analyzed for codes or themes manually. These codes were then developed into qualitative response categories. All quotes were verbatim, and have been approved by the interviewees. Hypothetical names have been used in the presentation of the study results. This on ethical ground seeks to protect confidentiality of the respondents. Results generated, then provide illustrations on organizational barriers affecting women participation in Ghanaian mine jobs.

5. Results

5.1 Phenomena of male-dominance in Ghanaian mine jobs

A profile of gender representation proportions to create a sense of sex composition among employees from the four understudied mining companies was done and captured in table one. This contains statistical data sourced from various Human Resource Managers, explaining employees’ status by gender in those companies.

Table 1: Gender distribution of employees in the four understudied mining companies

<table>
<thead>
<tr>
<th>Mining Companies</th>
<th>Male N</th>
<th>Male %</th>
<th>Female N</th>
<th>Female %</th>
<th>Total N</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold Fields Ghana Ltd, Tarkwa</td>
<td>2,453</td>
<td>96</td>
<td>96</td>
<td>4</td>
<td>2,549</td>
<td>100</td>
</tr>
<tr>
<td>Anglo Gold Ashanti, Iduapriem</td>
<td>612</td>
<td>93</td>
<td>44</td>
<td>7</td>
<td>656</td>
<td>100</td>
</tr>
<tr>
<td>Golden Star Resources Ltd, Bogoso</td>
<td>799</td>
<td>97</td>
<td>26</td>
<td>3</td>
<td>825</td>
<td>100</td>
</tr>
<tr>
<td>Gold Fields Ghana Ltd, Damang</td>
<td>1,508</td>
<td>94</td>
<td>92</td>
<td>6</td>
<td>1,600</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>5372</td>
<td>380</td>
<td>258</td>
<td>20</td>
<td>5,630</td>
<td>400</td>
</tr>
</tbody>
</table>

Source: HR, 2014

First is Gold Fields Ghana Limited, Tarkwa branch. The company is male-dominated, with male representation stood at 96 percent as compared to the few women representation of 4 percent. Second is the Anglo Gold Ashanti-Iduapriem mine, which is also male-dominated by 93 percent as compared to 7 percent women workforce. Then comes the Golden Star Resources in Bogoso. This company also has majority of its employees being men, thus, 97 percent as compared to the few women representation 3 percent. Gold fields Damang branch was the fourth company studied. It has 94 percent male workforce, as compared to 6 percent women representation. These findings suggest a problem of male-dominance and gender inequality, which may be working against sustainable development of the industry. This in turned set the pace for us to explore the organizational barriers working against participation of women in the mine industry of Ghana.
In order to gain understanding of the organizational barriers facing women in mine jobs of Ghana, a five scale itemed questionnaire was designed to complement the interviews. The scale runs between disagree to strongly agree. Questions among others centered on culture of male-dominance, relationship among fellow women, discriminatory practices against women, lack of family-friendly work policies, and lack of role models and mentorship issues. These questions were chosen against the background that, they constituted common and recurring themes in literature on gender equality and work-life studies, and responses are contained in table 2 below.

Table 2: Organizational barriers affecting participation of women in Ghanaian mines

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagreed</th>
<th>Strongly Disagreed</th>
<th>Undecided</th>
<th>Agreed</th>
<th>Strongly Agreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>The lack of support from fellow women</td>
<td>83</td>
<td>29.4</td>
<td>28</td>
<td>9.9</td>
<td>23</td>
</tr>
<tr>
<td>Discrimination against women</td>
<td>20</td>
<td>7.1</td>
<td>41</td>
<td>14.5</td>
<td>23</td>
</tr>
<tr>
<td>The lack of role models and mentorship</td>
<td>67</td>
<td>24.8</td>
<td>22</td>
<td>8.1</td>
<td>45</td>
</tr>
<tr>
<td>Lack of family-friendly work policies</td>
<td>46</td>
<td>16.4</td>
<td>52</td>
<td>18.6</td>
<td>55</td>
</tr>
</tbody>
</table>

Source: Field Work 2014

5.2.1 Gender biases

Women in male-dominated professions experience some biases in the course of their working life, Mantei recounted:

Sometimes management is not sure, they are scared and then discriminate against women. The women are mostly perceived weaker, and not suitable for the mine job. The thinking is that ‘after all, they can’t go far, the work is tedious, and working hours are not favoring them. They want people who are in always, and continuous!’ So, summing up all these, recruitment panels mostly settle on male candidates. ‘This is discrimination to the highest order, which is unfair!’

Similarly, Anatu put into perspectives her feelings about management in discriminatory selection of only men for screening programs, bothering on toxic effect of workplace exposures, which she finds very difficult to comprehend:

I remember one or two occasions have I stood up to say no, enough is enough; you have to include the women when doing certain things! Sometimes screening programs for toxic effect of workplace exposures, a basic health issue, and everybody is a man. I find it very difficult because we are all in the same department, doing the same thing, with same risk exposures, why do you consider only the men? And a woman is picked, only when there is no man!

Another response that sounded common among many women miners interviewed centered on discrimination on career development and progression. Josephine lamented:
Regarding programs for your career development, they will not consider you as a woman. Sometimes they think you will give birth and will not be stable, why developing you instead of the men, who will always be around. I personally sometimes put it before them that, it is an act of discrimination!

Also, a woman respondent specifically complained on a notch incensement, which is a performance assessment during the year, where recommendations are made to top up salaries of miners.

See, this woman worked very hard, and one thing I noticed about my women colleagues is that they are very, very hard working! Even when she was pregnant, she could close at 10 pm. She gave birth in April, took maternity leave for 3 months, and surprisingly, she was denied the notch incensement. So, i ask myself, is child birth now organizational mistake or a crime? If someone doesn’t speak up, it will happen to another, and continues. So these are some of the challenges confronting us as women.

5.2.2 Family-friendly work policies

Results of the study further attributed ineffective family-friendly policies to participatory barriers confronting women in the mines. Both male and female respondents attested to this fact. Sumani, a male mine worker had this to share:

The other reason that may not be revealing is, women going on maternity leave, even though we may fear mentioning it but that is the fact, the thinking is, you give such a high profile job in the mines to a woman and the time you may need her to take critical corporate decisions she is on maternity leave, this disrupts progress. On the contrary, you a male won’t go on paternity leave, even if you have hernia you will still go to work.

Similarly, Agyekum, a mine manager had this to say:

Other women miners made it a habit to become pregnant, and given birth to children when their services are required for us to pay them. So we paid one particular woman for three years when she had not drove the truck even once because we did not want to be partial. We advised her to reduce the speed of child birth before we realized just as the child was growing up, another one was on the line. We saw that this thing will not help the business, she actually opted for redundancy, we paid her the money and she left.

Sadiqque also expressed his view in this subject, just as earlier respondents did:

It is a business! See, these women, you bring them in, and across a cyclical period, they bleed on monthly bases. It is a 30 day cycle, they start from a point to a point, example, they start from 25 to the 5th of the following month. On monthly basis, you will lose about 6 to 7 days. Some have bad abdominal-crumbs, and have to be admitted in the hospital, and as a business man whose eyes are on a certain tonnage and targets, and assuming she is a critical person in the group. There will be a shakeup; someone has to be pulled from elsewhere to replace her. In fact, if the sensitivity of the job requires you to be available at any given time, and in full utilization, you are not likely to recruit a woman, you can see it as a form of discrimination, but for a good reason!
Hazel expressed his lamentation as:

On the surface, no one can say it, but within ourselves, we know that is the practice. As you can see this empty desk, it was being occupied by a woman assisting me here. She is in charge of data entering, she is not here because she is gone to give birth, and her absence is costing me a lot!

5.2.3 Relationship with fellow women in male-dominated contexts

Many of the women miners interviewed expressed their views regarding relationships with fellow women. Vida gave an account which reflects that of the majority of the female miners:

Let me give you this example, in my department, we are four women, one is not vocal, she doesn’t want to come in at all, and the other one, when you stand to talk at meetings she tells you to sit down. Sometimes when you say something and there is this collective voice no! You lose hope and feel like never to talk in meetings.

Similarly, Nihad gave an eloquent lamentation of this problem:

Even your women colleagues turn to draw you back in this organization. Because they think and believe there is no need to stand up and support your legitimate course of action, in fighting for your right, and for the collective interest of all women. So that is my worry in this organization.

Also, Akosua recounted to earlier respondents:

…but still, some of my female colleagues will not really accept the fact that they have to be there! It is heart breaking when you want to stand for every one and people will be drawing you back, saying certain things, sometimes you are considered as the spokesperson for the women, and sometimes you need support from your colleague women and you will not get it.

5.2.4 Lack of role models

The role model concept is very important for women in male-dominated jobs. This has a tendency for motivation, and to avoid women likelihood of feeling lonely. According to the respondents, Ghana is yet to produce a woman mine managing director or a mine manager in its mining history, even though a woman had been a chief executive officer of the Ghana Chamber of Mines for several years, in Ghana. This in no uncertain terms demotivates participation of women in Ghanaian mines. In this regard, Effua, a female respondent recounted:

I do not see women at the top of my organizational hierarchy, which always makes me sad, and think that there is no future in terms of my career progression in the mines. I always entertain fears I will be stuck to this small corner forever.

In such work environments like the mines, where women are few, most of them may need role models to coach them, which they lack. Ironically, the men as dominant group may see a minority group as a stereotype than equally competent peers. Another female miner shared this:

Also, the mine job is male-dominated work environment. In this case a little effort from a man, he is there! But you as a woman need to put in extra, extra effort to get to the top. In an environment like this, being a woman means, you are already written off. Also, for the
6. Discussions

In this paper, we reflected on the participatory barriers facing women in Ghanaian mine jobs. The barriers identified were of course, organizational in nature and character. This conclusive discussion centred on how such organizational practices and processes work cumulatively to create the current phenomena of male-dominance in such an economically viable sector of the Ghanaian economy.

The Ghanaian mining sector is fast growing and attracting huge capital investment from foreign, and multinational investors, whose eyes are detailed on continuity of operations, high tonnage, and profit. Of course, this capitalization of the mine production process is never gender-neutral. This statement in the course of the interview that ‘they want people who are in always, and continuous!’ implies and lead us to hold growing suspicion of resentments against women, which may equally manifest in subtle discriminatory behaviors towards them in the world of mine works, as some of the respondents attested to. These behavioral patterns may range from implicit recruitment biases to explicit maintenance of long working hours, long distance work places, and unpopular shift systems. We also think that women may be distracted in an attempt to respond to some of these unfair treatments. Probably they may focus their energy, effort and time dealing with them to the neglect of core functions assigned them within the organizations, which in itself is problematic, finding themselves in a state of double jeopardy. In contrast, their men counterparts could concentrate on proactively developing their careers through the mechanisms and opportunities available to them.

Also, a critical examination of responses regarding family-friendly policies, lead to a grand and visible exposé as to extent to which family-unfriendly some modern organizations are. For instance, this expression that ‘if the sensitivity of the job requires you to be available at any given time, and in full utilization, you are not likely to recruit a woman.’ We consider this statement as a gross violation to some provisions of the national labor law, provisions on maternity leave and other leaves of absence. Indeed, legislations on maternity leave do exist under leave regulations of mining companies of Ghana. It stated among other things that ‘on submission of a medical certificate signed by the company’s medical officer, or where circumstances demand by a registered medical officer, or a registered midwife, a woman who becomes pregnant shall be granted maternity leave with pay as follows: six (6) weeks before confinement, and six (6) weeks after confinement.’ Precisely, three months of maternity leave to a nursing mother? We do not only see this as woefully inadequate to provide effective child care but also see it as ‘cosmetic joke’ on the part of employers. Even, in the mist of these structural inadequacies surrounding the maternity leave in Ghana, some mining companies still express reluctance in employing women. We adopt this critical posture, against the backdrop of comparisons with best practices elsewhere! Swedish parents, for instance, are entitled to 480 days of paid parental leave, of which 60 days are reserved for the father. This is in line with the Swedish state’s strict policy on promoting gender equality, hence mothers and fathers are expected to share the 480 days equally.

The lack of role models and mentorship for young female miners was a noted challenge. This reflected in a stated lamentation that ‘I don’t see women at the top of this organizational hierarch, which makes me think that, there is no future for me in terms of career progression.’ This statement may have two implications. On one hand, it could mean a state of frustration associated with sense
of hopelessness in continuous functioning in the mines. On the other hand, it could imply an expression of mistrust out there for a woman to be mentored by a male mentor. Just as Kanter (1977) puts it, that in work environments where women are few and do not occupy top management positions, they may lack role models, and may turn to rely on the men who are experienced for coaching. Ironically, the men (dominant) may see women (token) as a stereotyped, than equally competent peers to deal with. This is intensely interesting, and go further to explain how man (mentor) and woman (mentee) relationship may, in most cases not prove effective, going forward!

Another phrase ‘even your women colleagues turn to draw you back… no need to stand up and support your legitimate course of action…so that is my worry!’ This constitute a crystal statement of reasonable expectation from women as ‘tokens’ in male-dominated settings; explaining possibilities of women wielding corporate power through formation of alliances. This expectation confirms what Kanter (1977) emphasized in explaining power, its importance for leadership in large organizations, and how power is accumulated through activities and alliances. That sources of bureaucratic powerlessness is a function of basic structural issues, such as constraints imposed by work roles and effects of opportunity, power, and few numbers of women in ‘men’s worlds’ make them operate at a disadvantage. And how same structures or organizations systematically make some people ‘look good,’ and others ‘look bad.’ So, the victims, in this case, cannot be blamed! We expect a combination of governmental legislations, organizational policies, and programs to produce positive change.

In this regard, we show case the formation of Women in Mining (WIM) Ghana. Founded by group of women miners, to support and facilitate education on mining for themselves and for those not acquainted with the role women play in the industry. WIM - Ghana, further seek to educate its members on the technical and other aspects of the mineral resource and related industries through informative and educational programs. They institute and promote such educational, scientific, legislative and other programs as will foster unity and public awareness of the economic and technical interrelationship of mineral production with the national economy, and the public good. In addition to providing valuable educational benefits, the WIM organization function to offer members an opportunity to acquire new personal and professional contacts. Their regular meetings also provide a vital communication link for the variety of women representation, and a number of personal improvement workshops. With mining being a male-dominated, these women felt their purposes could best be served via self- organization, and mobilizations. The membership include women engineers, geologists, secretaries, community affairs and public relations and other women mine workers.

In furtherance, the claim that ‘women are few in mine jobs because of the difficult work conditions’ does not hold water. We argued that difficult work conditions in the mines is gender neutral and not a monopoly of women brunt. Of course, work by nature is difficult, characterized with sacrifice of leisure and pleasure, and the men equally bear the burden of difficult work conditions, therefore we reject this claim. In the mist of all these challenges confronting women, we think the picture, is not all that blur for women in Ghanaian mine jobs, and we definitely expect light at the end of the tunnel. Some mine managers attest to the fact that some women miners have survived, amazingly doing very well, showing that whatever the men can do, they are equally capable. That, it is not every man who is stronger than every woman. Some women are even stronger than some men, and some women are also more intelligent, and more technically inclined than some men, and as well, some women are emotionally stronger than some men. So, the claim of lack of physical, mental and emotional strength, constituting barriers
to women participation in the mines, is neither here nor there, and gradually becoming subjects of history!

**Conclusion**

This paper gave a reflexive account of mine work organizational practices and processes that functioned singularly, and collectively to create participatory barriers to women, and how these barriers lead to create and sustain a culture of male-dominance in multinational Ghanaian mines. The culture of male-dominance in mine jobs may long be researched by various scholars in gender and technology studies, therefore one may argue, there is no need for repetition! However, most of such studies are foreign and European based, with few studies on Africa in general, and Ghana in particular, hence this work contributes to bridging a huge body of literature gap in the field, in Ghanaian context.

We realized the phenomena of masculinization of industrial mining practices as reflected over in this work, are mere constructions under technological changes, organizational designs as well as produced and re-produced by sociocultural identities. In our frame of thought, these masculinities do not only occasion overly visibility of men, but it also contributed to a higher conflation of masculinity with necessity, conceding to men expertise and prestige over women, which is a concrete fallacy. Also, arbitration of institutionalized authority, laws, systems and structures of governance, all of which have informed, and entrenched hierarchies and technologies which are often gender bias. Similarly, the biological essentialism, apparent in construction of the bodies, as explained in earlier reviewed texts, exposes the implicit masculine biases of men, representing women as unfit for certain work spaces, including mining because of their reproductive responsibilities. This then perpetuates the idea that men are naturally unable to work with women without violating the basic and fundamental norms of appropriate behaviors.

Therefore, the unbroken male-dominance is source of considerable concern, with practical implications on gender, and feminist technoscience studies as a whole, the mining industry, in particular, employment and labor relations institutions and public policy in Ghana. It also constitute a threat to gender equality, promoting economic marginalities, a challenge to mine work sustainability developments, and probably leading to socioeconomic exclusion of women in an all-important sector of the Ghanaian economy. Though current developments in gender equality
initiatives and legislations may be making business case for an increased number of women into mine jobs, with the aim of changing the demographic profile of the mining companies. We admit this may be yielding fruits in some jurisdictions including Ghana. We hold a strong conviction that with effective implementation of gender equality initiatives and legislations will provide fertile sheltered environment and a realistic interface between career choices and working life of women, and thereby increasing their numbers further within the mining industry. We hereby recommend affirmative action plan across all levels of mine work planning and decision making. Also, industrial support programs for women is highly recommended, such programs may offer alternative network developments that work to encourage women to support each other, gain insight into common problems confronting their careers. Women miners could also explore alternative mentorship programmes through formation of peer mentoring groups, meet on regular basis to mentor each other, share ideas on best practices in the world of mines. Indeed, e-mentoring is another option, where young females identify and connect with professional women miners elsewhere for expert advice. Mine work organizations can equally schedule meetings and public lectures and make information available on successful women through employee newsletters. All these aim at deconstruction of gender and work towards promotion of gender democracy in Ghanaian mine work organizations. A practice that will lead to an all-inclusive mine work participation, bringing about sustainable mine work development, trigger poverty alleviation results among women and above all, achieving gender-equality in Ghanaian mine jobs.

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Beyond the Barriers: Witnessing Shifting Gender Dynamics in Multinational Ghanaian Mine Jobs

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Abstract

Gender and technology are central to socioeconomic development and corporate innovation. However, the multinational Ghanaian mining is dominated by men and masculinity cultures. The current paper therefore understudy the Ghanaian mines, expose their homogeneous scope, and examine the sociocultural barriers constraining effective mine work participation of women. The paper also explores the transformations that have occurred, occasioning a shift in gender dynamics, leading to an increasing number of women participation in the mines. Deploying a multiple case study, qualitative research design, and meta-narratives of the respondents. The results point to the common prejudices, perceptions and implicit stereotyped notions of gender roles in the mines as noted sociocultural factors constraining effective participation of women in mine work. However beyond barriers, the paper intuits a phenomenon of a “women revolution” in the mines, witnessing collective efforts from mining companies and allied institutions adopting gender strategic measures, such as the “ore solidarity” gender mainstreaming in admission programs as well as “gender-driven mining” initiatives aimed at re-engineering a shift in gender dynamics in the mine jobs of Ghana. These change regimes among the mines implies inclusivity, defeminization of poverty, towards achieving organizational modernization, competitiveness and an assurance for gender driven social innovative mining.

Keywords: Sociocultural, barriers, male-dominance, Shifting gender dynamics, Ghanaian mines
Introduction

This study explores the multinational Ghanaian mines, questions their long standing male-dominance and masculinity cultures with consequential effects of women facing the realities of participatory barriers. This phenomenon is critically problematized by the current paper. For a scientific comprehension of this circumstance, however, it is prudent to delve into the gendered organizational nature of mine work. This work, therefore, aims at reflecting consciously upon the sociocultural barriers affecting effective participation of Ghanaian women in mine jobs. Beyond the barriers, nonetheless, the study unmasks current changes that have occurred, stimulating a shift in background dispositions and gender dynamics, leading to the participation of an increasing number of women in the industry. The paper by structurally discusses the study context for a full grasp and comprehension of relevant issues pertaining to organizational gender perspectives. The method and material used is equally explained to provide an account of the process under which data was collected. A summary of the theoretical framework used to provide the scientific basis, explanations and discussions of the results.

Ghana is a major player in the gold mining industry; globally ranked among the top ten, and placed second to South Africa in the Sub-Saharan Africa (AGS, 2010). Gold is currently mined in commercial quantities across six out of Ghana’s ten administrative regions. Other minerals being mined include diamond, manganese, iron, bauxite, natural gas, petroleum, salt, cement, and silver. The gold mining industry in Ghana is characterized by a hybrid of practices, policies, and procedures; with economic and socio-structural ramifications, in areas of job creation, GDP growth, royalties, and revenue mobilizations to the state (Kilu, Andersson, Sanda & Uden, 2016). But still, the mining industry is characterized with gender inequalities, constituting participatory barriers that this paper put under lens. And through this gender inequality lens, we view the multinational Ghanaian mines emerge gendered spaces, while mining authorities emerged visibly gendered actors in violation of conventional history of industrial world of mine work. The current paper therefore seeks to identify the sociocultural barriers affecting effective mine work participation of women, and beyond the barriers; to explore the transformations that have occurred, occasioning a change in gender dynamics, leading to increasing number of women participation in Ghanaian mines.

The mining industry globally is a classic male-dominated sector (Benya 2009; Lahiri-Dutt & Macintyre 2006; Andersson, Faltholm, Abrahamsson & Lindberg, 2013). A profile of gender representation proportions to create a sense of sex composition among employees from four understudied mining companies was done in Ghana (Kilu, et al, 2016) featuring statistical data sourced from various Human Resource Managers aim at explaining employees’ status by gender in those companies. The statistical figures showed that majority of employees in multinational Ghanaian mines are men. Suggesting an average between 85-95% of the workforce being men across management, supervisory, core operations and ancillary work positions.

Similarly, among the mine business partners, nearly all workers are men (Kilu, et al, 2016). The paper speaks here of contractors, consultants, transportation companies, manufacturers and suppliers engaged to provide civil engineering works, the supply of hard and soft mining packages,
drilling, blasting, crushing and grinding. Another critical agent in the mine work political structure is the Ghana Mineworkers’ Union of Trade Union Congress. Membership of the unions across the mines, both senior and junior member categories, weigh heavily towards the men. Also, the leadership is male. The concerns being raised in the current work against male-dominance cultures supports research in Swedish mining industry by Abrahamsson (2008) and Andersson et al (2013) where concerns are expressed that though the mining industry may have evolved in many respects, old beliefs on the close relationship between mining and masculinity still exist: an idealization of a certain type of miner masculinity deep rooted in the old manual, heavy and dangerous mining work, characterized by macho masculinities. Olofsson (2010) added some male mine workers may view new technological inventions such as automation, computerization, and robotization as a feminization of their perceived male work, breeding an attitude that may manifest as a direct resistance to women and gender equality. Then Ahmad and Lahiri-Dutt (2006) in Asia Pacific described how large scale mining projects are being characterized with physical demands, capital intensive, production driven, and mostly associated with masculinity. Her concerns do not only bother on overt visibility of men but a taken for granted conflation of men, with institutionalized authority expertise and prestige, institutions, laws, and structures of governance that do not favor gender neutrality. Hence the mine job is often viewed a macho space, where masculinity takes a center stage.

In the continent of Africa, Benya (2009) studied the platinum mines near Rustenburg in South Africa to explore the masculine occupational culture in underground work in the mines. The work showed that women were perceived as lazy individuals who slowed down the work processes. In a similar vein, Amutabi and Lutta-Mukhebi (2001) in Kenya examined the role of women in mining compared to that of men. The results showed that women in mining had not been thoroughly researched and documented, and that women’s mine work contribution is often not acknowledged. These South African and Kenyan cases are yet other wild perceptual and stereotype notions against women. Arguably, this universal male-dominance has become phenomenal in the mining sector, presenting a situation which in the view of the author requires a holistic approach, hence the need for this current study.

Relative to the observed global problematic male-dominance in mine works, Ghana’s storyline is generating research interest on grounds of literature and knowledge gaps. Certainly, extant literature and empirical studies do exist on mining, technology and organizational gender perspectives; more especially on women in mining. But the geographical context of such works are mostly limited to Europe, Asia, United States and Australia, among others. Studies on Africa are woefully scarce, and Ghanaian ones very few. This work attempts to set the stage for the contemporary study into the area.

This could be contemplated as a ‘doing gender’ of a sort, practices where virtually every activity is being socially assessed as to its manly or womanly nature (West & Zimmerman 1989). Doing gender is structural and cultural. It bothers on binary oppositions and hierarchical privileges. The binary oppositions are; male-female, masculine-feminine, boy-girl and man-woman. And the hierarchical privileges juxtaposes how the former dominate and occupy a commanding position over the later (Levi-Straus, 1973). Doing gender means creating differences between girls and boys or men and women. Differences that are not natural, essential or biological, but sociocultural driven differences; and this theory is popular in creating understanding as to how societal and
organizational gendered natures have been socially constructed and sustained. For West and Zimmerman (1987) gender analysis is a distinctively sociological understanding of routines, methodical and recurring accomplishments under taken by both men and women, whose competences as members of society is hostage to its production and reproduction. In this sense, it might be fair to acknowledge that modern work organizations like the mines are microcosms of modern societies, and so far as almost every activity in society is partitioned on the basis of gender, doing gender might be unavoidable in the mining industry as well.

**Theoretical Framework**

There are growing attention to ‘doing-gender’ and ‘undoing-gender’ through and within the respective broad structuralist (Levi-Straus, 1973) and poststructuralist (Derrida) approaches. And within these broad theoretical areas, this work specifically applied the ‘doing gender’ (West and Zimmerman 1987) ‘undoing gender’ (Butler 2004; Deutsch 2007) and ‘the new social movement’ (Melucci, 1997).

Doing gender is an applied theory in work and organizational studies, which demonstrate how gender is constructed through interactions in organizations. Recent studies have also started looking at how gender can be undone. The doing gender approach mostly is drawn upon by organizational researchers to explain the fluidity, and changeable nature of gender, and something that is flourishing in organizational research (Linstead & Pullen 2006; Poggio 2006). While doing gender is an approach regularly drawn upon by organizational researchers, the question of how gender can be undone is equally featuring in organizational researches (Linstead & Pullen 2006; Poggio, 2006). Doing gender approaches have been useful to show that gender is not a property of person but a process that people enact in everyday situations (Linstead & Pullen 2006; Poggio, 2006). And once doing gender is understood and undone, the end product is a change; hence the new social movement theory with its change functionality being discussed alongside. This paper thereby examines gender, and how gender is done in terms of participatory barriers. The paper beyond the barriers, explores how gender is being undone to illicit change regimes among the multinational mine work organizations in Ghana.

West and Zimmerman (1987) further posits doing gender as an accomplishment, an achieved property of a situated conduct of a sort, and an emergent feature of a social situation, capable of triggering attentional shift from internal matters of the individual to focus on interactional and ultimately on institutional arenas. That in one sense, it is individuals who do gender, but a situated doing gender type, carried out in virtual or real presence of others who are presumed to be oriented towards its production and reproduction; a practical means of legitimizing the fundamental divisions of society. West and Zimmerman (1987) reiterated that doing gender involves a complex socially guided perceptions and stereotypes, as well as interactional and micro-political activities that cast and labels certain particular pursuits and roles as masculine and feminine. Acker posits much ‘of the social and economic inequalities in the USA and other industrial countries originates from organizations, in their daily activities of working and organizing the work.’ And this is what activists as well as feminist and civil rights reformers have based their actions on (2006, p. 441). Abrahamsson (2014) argued that gender equality could be seen as a prerequisite, or perhaps, even
side effect of modern organizational concepts, and that work organizations may be more or less
gendered in different ways, and that the gendering concept may affect individuals’ possibilities, as
well as organizational functionality in both short and long term.

Indeed, in sync with doing gender, gender division of labor has become real across Ghana, which
manifests inter alia in women being given primary responsibilities like care giving, emotional
management and maintenance of routine order, while in the public sphere men are given privileged
access to what is described as the locus of true rewards of social life - money, status, power,
freedom, opportunities for growth and self-worth (Apusiga, 1987). The Ghanaian society also
exhibits several complementarities between men and women’s roles. Men as a group enjoy more
rights, power and privileges than women. Just as Ampofo (2014) argued that in many cases in
Ghana, women’s rights, power and enjoyment of privileges are tied to men as fathers, husbands
and brothers. And certainly, women in Ghana suffer from greater inequalities than men. This is
not by virtue of inherent deficiencies but because society is structured in ways that privilege men
over women. It is therefore fair to argue that differences in gender and its implications for socio-
economic development exists in the Ghanaian society, and many institutional practices and
processes, though may not overtly express discrimination against women, but they are not gender-
neutral, as the case may be in the Ghanaian mine jobs.

Yakovleva (2007) in Ghana, conducted a study to measure female participation in Ghanaian mine
jobs. The results showed sociocultural taboos, domestic and family commitments impose heavy
burden on women, hindering their independence and effectiveness to participate in mine work.
Also, Alexander (2007) compared reasons why in the first three decades of the twentieth century,
women worked underground in Indian mines but not in those of South Africa. Results suggest
there was opposition to the employment of women in South African mines due to Africans
dependence on women for both production and reproductive functions. Similarly, Amutubi and
Lutta-Mukhebi (2001) in Kenya examined the role of women in mining, compared to that of men.
The results showed that women in mining have not been thoroughly researched and documented,
and that women mine work contribution is often blanketed together with that of men. Certainly,
the knowledge of the fact that these mine work gendered practices and processes have wider range
of variations, both from within and among cultures, and are as well subject to change, motivate
counter arguments and propositions for deconstruction and undoing gender.

The current paper in its organizational gender and change orientations, is consistent with the
undoing gender and the neoliberal social movement propositions. Butler (2004) believed the terms
by which we are recognized as humans are socially articulated and are changeable. That the phrase
“undoing gender” implies social interactions aim at reducing gender differences or behavior
patterns in opposition to gender stereotypes. In other words, avoiding the use of stereotypes in
evaluating others are actions directed at dismantling gender barriers. Similarly, in recognizing that
language and words usage shape what our minds are drawn to, Deutsch (2007) posits we need a
paradigm shift from talks on ‘doing gender’ to illuminating talks on how we can ‘undo gender.’
And in common parlance, ‘undoing gender’ evokes collective resistance instead of conformity to
acts of ‘doing gender.’ Deutsch assumptions dovetails with those of other feminist theorists who
articulate hopeful visions of change and the possibility of gender equality. For instance, Lorber
(2000) notion of “degendering” and Risman’s (1998) conception of “gender vertigo” both speak to
the need to dismantling of gender, through putting in place policies, systems, structures and
programs. Of course, it may take a lot more than changing terms to understand how to eliminate the structural gender systems. But at least paying attention to how we can undo gender, may keep us focused on how we can dismantle the gender system to create real equilibrium between men and women in work organizations.

The current paper also applied the neoliberal theory by Harvey (2005) which centered on collective actions for transformations towards achieving societal values. Thus, individual liberties, equality regimes, freedom and justice. Within the broad neoliberalism is the new social movement version, associated with theorists such as Touraine (2002) who focuses on the experiences, values, affiliations and actions of women involved in non-social movement organizations such as the multinational Ghanaian mines, and in my estimations, the present processes of change featuring the mining industry, come more clearly into view. The theory argued that attempts to understand social change hugely depends on key assumptions about the notion of change itself: firstly, that change should emanate from above; and, secondly, that change can best be understood when viewed at specific moments in time. That the theory looks beneath the surface of the observable to the invisible social linkages and subterranean networks of those with like mind who oppose the status quo. Certainly, the individuals, groups and organizations involved do not carry movement membership cards, but they do act collectively as well as separately. They unanimously share an orientation and values that oppose the status quo and those with power in order to render it visible and thereby negotiable. For Melucci (1995) involvement in social movement networks is sufficient in itself to provide purpose and meaningful identities for the participants who might, for example, choose to identify themselves with the women’s movement or the environmental and ecological movement, or both of these. From this vantage point, the values and affiliations of movement supporters become significant, providing an impulse for the repositioning of those involved (Barry, Berg & Chandler, 2007).

Advocates of this new social movement approach according to Barry, Berg and Chandler (2012) focused on examining the ‘why’ of a change, detailing the observable organizational characteristics, the submerged networks, affiliations and symbolic challenges to the dominant order. And of course the common purpose and ultimate goal of this theory, centered on the processes of action towards bring about a change, or some degree of reformism, suggesting that action and change take place along a continuum and attract a broad base of appeal as a result. The apparent characteristics of the new social movement theory are; first the members act collectively as well as separately, sharing values and orientations that are oppositional to the status quo. Secondly, the manner in which the members emerge is so spontaneous, suggesting the right time to step forth into brave new world of solidarity. And thirdly, the theory postulate social movement formations with members’ collective values and orientations permeating into the fabric of social institutions, through a complex web of interactions Touraine (2002). This dominant new social movement, though originated from Europe in the 1960s, by 1980s, spread to the third world countries, making women’s voices and experiences part of feminist knowledge production; and such movements spread across Africa by 1980s.

Ghana joined the new world order, witnessed formation of some feminine social movements of both local and international orientations. For instance, the 31st December women’s movement for example was formed in 1982. A local women’s movement with branches across all the ten regions of Ghana. This movement, developmental oriented, founded with the goal of mobilizing women,
both from rural and urban Ghana, aim at sensitizing women to understanding the governance of the country and wanted women to be part of the participatory democratic system, since women form majority of Ghana’s population. The movement supported and promoted activities of women through education and capacity building. The movement also mentored women to enter mainstream political activities and many women are now Ministers, Party Functionaries, District Chief Executives, and Constituency Executives. The movement equally confronted family poverty issues, social exclusion, women's empowerment initiatives and championed promulgation of several laws to protect women and children’s rights in Ghana. Example, they spear headed and got the Intestate Succession Law passed into PDNC Law 111 in 1985. The marriage and divorce registration Law, PNDC Law 112 which benefited all Ghanaian women. The movement also established day-care centers and nurseries, bakeries, fishing cooperatives, food-processing factories, and a host of socioeconomic programmes for women’s empowerment. In light of this, the current paper argues that Ghana has long since, been familiar with, and adopted the ‘new social movement theory’ to fight issues of social inequalities, at the macro-political levels of the Ghanaian society. And now, we are witnessing a replica in adoption of this ‘new social movement theory’ at both macro-organizational and micro-individual levels to champion the course, interest, values and orientations of women in mining Ghana.

Methodology

Research design

To investigate the two research questions, a qualitative approach was deployed on grounds that, it allows for results that reflect the perspectives of those being understudied (Czarniawska 2002), and also make room for that which cannot be quantified or where being quantified does not yield any meaningful insight (Gioia & Chittipeddi 1991; Soderberg 2003). Stake (1995, p. 40) claims through qualitative research, we can gain vicarious experiential understanding of subjects understood. And that, unique experiences of subjects understudied in social science research is where a depth of understanding can be achieved, through analysis of commonality and divergence of the subjects.

The current study adopts the case study design to investigate the phenomenon of women in mining Ghana. According to Yin (2014) the case study method is particularly valid and appropriate when the research targets work organizations, studying subjects in real life situations, and working to answer research questions in the form of ‘how,’ ‘why’ and ‘what’ – similar to the questions in this study seeks to answer. Yin (2014) also justified utilization of case study in works where there is little control over behavioral events for the investigator; when the study focuses on contemporary phenomena (the case) in a real-life / world context, equally in line with the current study on women in mining Ghana. In the perspectives of Yin, the case study design provides rich description of the social scene, deep description of the study context, to further enable a deeper understanding and interpretation of the unique, typical experiences and circumstances of the subjects, and in this case the women miners. Yin (2014) reiterated that the case study method is multi-purpose in nature, global in outlook and used in many situations, both simple and complex to contribute to knowledge and deeper insight into individuals, groups, organizations and society, while still retaining a holistic and real-world perspectives. The examination of data is done within the context of its use or within the situation in which the activity takes place. Also Yin argued that inherent variations,
influential factors and differential collective approaches to case studies create room for both quantitative and qualitative analysis of data. The real-life nature of the current study, and its strive for deep understanding of mine work organizational gender perspectives, justifies the adoption of the case study approach. It is clear to me that, to understand a complex issue such as this, the case study research is necessary.

The thesis equally opted the multiple-case study approach over the single case. In this regard, as mentioned earlier, four multinational large scale Ghanaian mining companies and a university of mines and technology were understudied. This option draw into Eisenhardt’s (1989) argument in favor of multiple cases. Eisenhardt stated that between 4 and 10 cases usually work better. Eisenhardt (1989) emphasizes the use of contrasting observations from multiple cases to create and highlight theoretical constructs. Moreover, by using multiple cases, it’s possible to generate testable and generalizable theory. As Eisenhardt, states, multiple case studies “are a powerful means to create theory because they permit replication and extension among individual cases. Eisenhardt (1989) argues that, by using multiple cases, the researcher gets a wider view of the context, making it possible to generate testable and generalizable theory. That to build theory one must have in-depth understanding of the concerned phenomena in a “real-life” setting. The proponents for single-case studies however hold contrary views that, the more cases a researcher investigates, the less contextual insights he or she can communicate (Dyer & Wilkins 1991; Yin 2014). That less than 3 cases generate knowledge with more complexities and lacking convincing empirical groundings.

**Research Context**

This is a context-dependent paper, centered on organizational gender perspectives among multinational Ghanaian mining companies. Ghana is a historic mining country, positioned tenth in the global league of mining nations, and second to South Africa in the Sub-Saharan Africa (AGS, 2015). The understudied companies are situated within Tarkwa-Nsuaem Municipality in the Western Region of Ghana. The municipality forms part of the 22 Metropolitan, Municipal and Districts in the region. Geologically, the area represents part of the south western most extension of well-studied Ashanti Gold Belt that accounts for over 90% of gold production in Ghana (Akabzaa, Armah & Baneong-Yakubu 2007) hence justification for choice of the study area.

**Figure 1: geological map of the study area**
The area hosts the following understudied mining and allied institutions: Gold Fields Ghana Limited Tarkwa branch. A South African owned company, incorporated in 1993 as a legal entity, where the government of Ghana holds a 10 percent free carried interest, as required under the mining law of Ghana. Next is Anglo Gold Ashanti-Iduapriem mines, another South African owned company a 110 km square concession. Then comes the Golden Star Resources Ltd. in Bogoso, near Tarkwa. A Canadian owned company, incorporated in 1992. The Company holds 90% interest in both Wassa, Prestea and Bogoso gold mines in Ghana. Then comes the Goldfields Damang Ltd, established in 1997, and mining the tailings of the Abosso Gold Mines. And also University of Mines and Technology (UMaT), a public university established with the aim at producing professionals in the field of mining. It has the mission to promote knowledge through effective teaching, learning, active research and dissemination of information. Of course, choice of these five case units of analysis was also informed by Bent Flyvberg’s (2006) information oriented case unit selection strategy, centered at maximizing the utilization of adequate mining information from these units. According to Flyvberg, the information oriented selection, aim at maximizing the utility of information from samples. And that cases are selected on the basis of expectations about their information content, also information is obtained on the significance of various circumstances for case process and outcome.

Procedures, Recordings and Analysis

i. The field work span between August 24th to December 31st 2014, spending a period of 21 days in the field, in two separate field visits.

ii. In all, a total of 27 interviews were conducted, with three focus group discussions. Certainly focus group discussions have the strength of explicit use of group interactions to produce data and insights that would be less accessible if interviewing an individual (Morgan, 1997).
iii. Both the interviews and focus group discussions were conducted on some lecturers and students from University of Mines and Technology in Tarkwa.

iv. Interviews were conducted on people who held wide range of jobs in the mines; and the mining university, including some mining managers, mining engineers, geologists, mine planners, mineral processors, health, safety and hygiene personnel, environmental, community affairs and public relations officers, mining engineering lecturers and students.

v. Both men and women across the understudied mining companies and the mining university were interviewed at their work places.

vi. The interviews and focus group discussions, averagely lasted between 45-60 minutes each.

vii. A sense of ethical behavior, moral rules and professional codes of conduct were exercised in line with the demands of ethical legislations and requirements. It covered the whole research process, including defining contexts of the study, identifying the research population, sample determination, choice of method to gain access to informants, data collection, analysis, reporting and publication of results. This aimed at protecting interests of the key stakeholders – respondents and their companies or institutions. The conditions being that I sign confidentiality forms and receive training and orientation on basic security, safety and health. I accordingly, in September 2014 took the training, orientation and signed the confidentiality forms. Access to the mining companies was negotiated through their respective Human Resource Managers.

viii. The variables of analysis were a mining and technology university, and 4 multinational Ghanaian mining companies. Both men and women were interviewed; including managers, supervisors, staff, union members and contractors engaged to offer services.

ix. Voice recordings of interviews were done using a tape recorder. Recordings were further transcribed into themes, reflecting the research questions and objectives of the study. And as well, some company documents relevant to the study were sourced and studied.

x. Analysis of data was guided by both literature and aim of the study. All quotes were verbatim and approved by interviewees. Certainly results generated then provide illustrations, typifying the sociocultural barriers affecting women participation, and how dispositions have changed, occasioning shifting gender dynamics, witnessing women taking up Ghanaian mine jobs.

Results
Sociocultural Barriers Affecting Participation of Women in Ghanaian Mine Jobs

Regarding the sociocultural barriers, the paper found “common prejudices, perceptions and implicit stereotyped notions on gender roles” as noted participatory barriers to women.

Common prejudice and perceptions

A section of the Ghanaian society labeled and held the perception that men are able to endure difficult tasks, perform heavy duties and handle machinery better than their women counterparts, as was widely referred to and contained in these responses:

*People always say mining is a male job because it involves physical strength. ... 'my own mother sometimes scare me that I will die very early if I continue working in the mines. Instead, I should go for a nursing job.' (Alice, a female geologist 2014)*

And

*Hmm! These women, when you bring them here, and after sometime, some will go on maternity leave, others start complaining about abdominal pains, irregular menstrual cycles and miscarriages. The end result is that, production suffers. (Amankwa, a male mine manager 2014)*

Implicit stereotyped notions on gender roles

Cultural stereotypes are consistent in associating mine jobs to macho-masculinity. And since mine jobs are highly male skewed, the expectation that males are better miners is strongly and widely upheld in a section of the Ghanaian society. Regrettably, the stereotyped notions that, women lack the ability and strength to perform mine jobs dominated responses in the focus group discussions:

*The occupational risk is my major worry! ... and the long term effect of working with vibrations of machines for about ten hours on daily bases is not easy at all. So, we are here for them, and they should be home for us! Society also says 'mining ye bema juma,' literally means mining is a preserve of the men. ... so in the mines, equal opportunity may be given to everybody, but that everybody, not everybody can come because of the risks associated with the job (Ashraf, a male mine worker 2014).*

And:

*See! ...when I started work in the mines, people thought I was mad! They said 'mining is very physically challenging, it is tough, it is rough, it is not a natural environment, especially underground mining!' (Adjele, a female mine worker 2014).*

Shifting Gender Dynamics in Multinational Ghanaian Mine Jobs

Beyond the sociocultural barriers, the paper showcased change processes in background dispositions, witnessing a shift in gender dynamics with more women taking up mine jobs within the multinational Ghanaian mining industry. The observed change processes include – “‘the dawn of women in mining’” “towards a gender-driven mining initiatives” and “the ore-solidarity movement.”
The dawn of women miners

Established in 1952 as Tarkwa Technical Institute, affiliated with Kwame Nkrumah University of Science and Technology as Tarkwa School of Mines in 1976, subsequently assumed a full-fledged university status in 2007, now known and called University of Mines and Technology (UMaT). However, since inception, the university only admitted its first female student in 2000, and by 2014 over 20% of the total student population were women. Management of the university had this to say:

[...we have been making deliberate effort to encourage women to come, by giving them some leverage, for that reason we instituted what is called gender mainstreaming. This means the moment a woman gets aggregate 36, that is maximum aggregate or minimum point of entry qualification, and we see that she chooses mining related programme, we will give it to her! Whereas their male counterparts with aggregate 10 or 14 may not probably be considered (Management of UMaT, 2014)

The core competence and capabilities of women pursuing mining and mining related courses in the university were never questioned at all by the authorities, as captured in these responses:

[...the women we admitted over the years have proven us right, and performed very well! For the past two years running (2011/2012 and 2012/2013 academic years) female students have been picking the overall best student awards in this university (Management of UMaT, 2014).

And that:

[...] women engineers in this university are doing very well in industry, we have been receiving positive feedbacks on them, from their employers and in most cases they are being treated as expatriates (Management of UMaT, 2014)

Towards a gender-driven mining

The knowledge of the fact that making any business sustainable and relevant, you cannot cut out women, hence the Ghanaian mining companies adopt critical gender driven mining steps such as policies either on gender equality or women’s empowerment or diversity or sustainable management as captured in Anglo Gold Ashanti’s gender equality and women’s empowerment policy document which is a reflection of the other companies:

The main purpose of this policy is to serve as a tool and framework for enhancing gender equality in the workplace and to enable the company to integrate gender into key organizational practices. Further, it suggests the development of specific interventions to meet the practical and strategic needs of women in order to ensure the empowerment of women as a step towards gender equality (2015:1).

Also:

I have been here for 9 to 10 years, and from my personal experience, we gave females the opportunity to work in various areas, including being trained to use dump trucks. For example, we recruited and trained about 15 women around 2008/2009. And this among
other reasons, was to encourage the women living around this community to take up mining professions to rub shoulders with the men (Ishmael, a male mine manager 2014).

And that:

[...] there has been shifts from underground to open pit method of mining, which is an excavation at the surface of the ground for the purpose of extracting ore. The open pit mining does offer some advantages: more cost effective, safer working conditions, no risk of cave in or toxic gas, and more and more women attracted as a result, leading to improve our women recruitment and retention drive (Frema, a female mine PR manager 2014).

The ore solidarity

The ore solidarity epitomizes Women in Mining Ghana (WIM), an organization founded and composed of all Ghanaian women employed and working in the mining industry. In a focus group discussion, individual members had this to say, which reflected the entire groups’ expectations, aspirations and orientations:

Our numbers are low, this is historical, not beginning today, so we are playing a catch up! It is not about a man is better than a woman or a woman is better than a man! It is about making money, if the guys are working there, why we can’t apply to get jobs there!

[...] by so doing, we want to encourage more women to work in mining, we also work to encourage those women who are already working in the mines. We are a deep voice for them, we helping each other because it is tough as well, especially those who work at site, due to our natural and first jobs as being mothers, sometimes it is a bit difficult for women to work in the sector as well, and so we need solutions.

[...] of course the commodity prices are really bad…the word out there is sustainability, and to make any business sustainable and relevant, you cannot cut out women! You know, in Africa women make up 70% of the total population and in Ghana, 51% are women. Why? Why don’t you want to employ the women!

And that:

I don’t want to believe in limitations, neither do I believe in a man’s world or a woman’s world, I believe in people’s world!

Discussions

Sociocultural Barriers Affecting Participation of Women in Ghanaian Mine Jobs

The discussion opens and done, first within the context of sociocultural barriers affecting effective mine work participation of women. The paper found ‘common prejudices, perceptions and implicit stereotyped notions on gender roles.’ This outcome supports Yakovleva (2007) in her earlier work that measured women’s participation in Ghanaian mining industry. She identified sociocultural barriers and family commitments imposing heavy burdens on women, hindering their independence and effectiveness to participate in mine works. This further resonate in the structuralists’ theory bothering on binary oppositions and hierarchical privileges. A perceived unjustifiable privileges that juxtaposes how the former dominate and occupy a command over the
later (Levi-Straus, 1973). And a classic demonstration of ‘doing gender’ and how societal and organizational gendered natures have been socially constructed and sustained as posited by West and Zimmerman (1987).

The paper further shows how sociocultural barriers grow to influence and cause organizational barriers. Regard the expression that “my mother says I should have opted a nursing profession...that I will die early if I continue working in the mines.” This is a typical demonstration of how global problems become local; and how societal problems diffuse into organizations. In this paper, this occurrence is termed ‘socio-osmosis’ – defining a gradient diffusion and movement of sociocultural beliefs into the basic fabric of the mine work organizations. These set of sociocultural barriers in the form of implicit stereotyped notions, though they may appear unfounded but could carry negative effects on women’s mine work participation. In line with the doing gender theory of West and Zimmerman (1989). These designated preconceived gender roles and uninformed professional identity judgements, are characterized by preclusionary or exclusionary claim on sociocultural attitudes of preventing individuals, in this case, women, from pursuing their life time career interest further.

Admittedly, the sociocultural barriers also fall under the category of informal barriers, which are sometimes very difficult to break, though many of the formal barriers may have been broken (Andersson et al2013). Andersson et al however reiterated – “with perseverance, everything is possible!” In response to this ‘perseverance call’ this paper observes stakeholders in Ghanaian mines repositioning themselves, making continuous commitment, with adherence to beliefs and course of actions leading to gender equality awareness in the mines. And certainly, results from the current study shows the image of the mining industry of Ghana is changing, the goal poles are shifting, witnessing gradual lifting of some of the barriers, with bridges being built, and more women are now taking up mine jobs. Synonymous to West and Zimmerman (1987) who foreground potential changeability claim on sociocultural attitudes between women and men with wide variations within and among cultures.

**Shifting Gender Dynamics in Multinational Ghanaian Mine Jobs**

This part of the discussion centres on the change regimes among the multinational Ghanaian mines, taking into account – “the dawn of women miners” “towards a gender-driven mining” and “the ore-solidarity movement.” Regarding the dawn of women miners, evidence abound in academia, where a Mining and Technology University in Ghana, has introduced set of initiatives, practices and policies in the form of quota systems, and gender mainstreaming in their admission programs, aim at augmenting women enrolments into the university, after it has been ‘doing gender’ over four decades in its admission regimes. This affirmative stance of the university corroborates the Science, Technology and Mathematics Education clinics, instituted in Ghana in 1987, aim at promoting and popularizing science and technology education among girls. The gender equality policy interventions, as instituted by the university, equally resonate with ‘undoing gender theory’ of Butler (2004), Lorber’s (2000) notion of ‘degendering’ and Risman’s (1998) conception of ‘gender vertigo’ all of which argued in support of dismantling gender by putting in place policies, systems, structures and programs aim at deconstruction of gender in the world of work.

The paper also show-cased ‘the towards gender-driven mining initiatives’ witnessing the mining companies put in place set of policies on gender equality and women’s empowerment, diversity or
sustainability management. Their recruitment efforts targeting women, women network groups springing within the mines, and skills development programs being organized for women. This result supports (Butler 2004; Deutsch 2007) and the undoing gender theory, which proposed a paradigm shift from ‘‘doing gender’’ to illuminating social interactions and organizational policies, processes and practices that reduce gender differences, and avoiding the usage of stereotypes in evaluating women. Though the mining companies are making frantic effort towards achieving gender equality in both admission and recruitment programs, the impact remains qualitative, as quantitatively women representation is still low. The implication of this being a ‘continuous culture of preserving gender patterns, what Abrahamsson (2014) suspects could lead to a less productive work, as well as a problematic work environment.

Then comes the golden age of ‘ore solidarity movement’ witnessing the formation of Women in Mining–Ghana. An organization composed of women employed in the Ghanaian mining industry. Of course, being in a male-dominated setting, against the knowledge of the fact that ‘in numbers lie strength’ these women felt their purposes, values and orientations could best be served via self and resources mobilization. Hence, the formation of the ‘ore solidarity’ a vanguard, which works to instituting and promoting ‘‘barrier breaking’’ and ‘‘boundary crossing’’ moves such as educational, scientific, legislative, career development and other programs as will foster gender awareness as well as ensuring gender equality in the mine works. Certainly, this ore solidarity movement bears both functional and structural similitude with the new social movement theory as discussed earlier in (Touraine, 2002; Melucci, 1995; Braig & Wölte, 2002; Barry et al, 2012). First and foremost, the women in mining Ghana were observed acting collectively as well as separately, sharing common values and orientations that are oppositional to the status quo of women in the mine jobs of Ghana. This function affirms the prime feature of the new social movement theory. Secondly, the ore solidarity movement emerged in a grand style, spontaneously judged the time was due to step forward, in expressed dissatisfaction with the long standing masculine dominant cultures in the mines, with its associated gender inequalities, hence a desire for change – in terms of recruitment policies and practices that are gender balanced in the world of Ghanaian mine jobs. And thirdly, the ore solidarity was formed, with its core values and orientations permeating the social fabric of mining and allied mining institutions through complex web of interactions.

The women in mining Ghana equally explore available platforms, with deep voices, deploying networks of civil society, political think tanks and the offices of Ghana Chamber of Mines to advocate, lobby and exchange ideas towards a gender neutral mining. Even in Europe, where the new social movement approach originated, studies have confirmed their processes of networks and collective orientations (Melluci 1995). Other studies also examined women movements as worldwide phenomena (Braig and Wölte, 2002; Acker, 1992) drew attention to their historical significance in helping to facilitate the advancement of women in men-dominant settings in the mist of the masculine cultural dominance.

Implications and Conclusion

Results from the current paper suggest an existence of sociocultural barriers, notably common prejudice, perceptions and implicit stereotyped notions on gender roles in the mines. This development has practical implications for practice: first it infuses uninformed professional
identity judgements, characterized with exclusionary effect of preventing women from flexible pursuance of their life time career interests, hence hindrance to their self-actualization drives especially in mine jobs. This will equally imply a continuous perpetuation and conservation of dominant masculine cultures in mine works of Ghana. A phenomena that questions the mining companies’ modern organizational status. Also, the prejudices and stereotypes equally implies increased casualization of women workers in the mines, with consequential effect of feminizing poverty, since the mines are among the top high paying jobs in Ghana. Therefore, goals on gender equality, and women’s empowerment attainment becomes very difficult in the world of mining.

Contrarily, the gender equality effort among the mine work organizations implies their huge subscription to modern organizational models, with high propensity of effecting organizational change, and possibilities of creating effective and good work environment for both men and women. This will also promote diversity and inclusivity in the mine works of Ghana, a prerequisite for high mine work productivity. And of course, gender equality in the mines may also well connect to a good corporate governance and a gender-driven social innovative mining.

In conclusion, results from the current study suggests an existence of sociocultural barriers, notably common prejudice, perceptions and stereotype in the mines. This proffer an answer to the first research question: what are the sociocultural barriers affecting participation of women in multinational Ghanaian mines? Also, the paper identifies a regime of change in background dispositions, witnessing gender mainstreaming in admission programs, and mining operations, the dawn of women miners, towards a gender driven mining initiatives and the ore solidarity agenda, suggesting a shift in gender dynamics of the mine work profession in Ghana. This resonates well with the ‘undoing gender’ and ‘the new social movement’s theories’ juxtaposing the processes of change in the world of mine work, especially with changes emerging from organizational gender perspectives, witnessing women in active, politicized and solidarized moves as weapons of the weak and little winds. Working alongside the mining companies and allied institutions, deploying modern organizational models, aim at dismantling self-seeking interest in pursuance of collective values and orientations in the form of a progressive but slow moves toward achieving gender equality in the mines. This equally provides an answer to the second research question: beyond the barriers, what changes have occurred, witnessing more women taking up mine jobs within the multinational Ghanaian mines? The current study by design is limited to large-scale Ghanaian mines, against the knowledge of the fact that, artisanal and small scale mining also do exist. And while the former is formalized in terms of hierarchal authority structures with well-functioning human resource outfits, the latter is characterized with informalities. And certainly, it would be of future research interest to design a comparative study to establish the contrast on mine works gender perspectives between large-scale formal and small-scale informal mines.

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GENDER, COMMUNITY AFFAIRS AND PUBLIC RELATIONS PRACTICE IN GHANAIAN MINES: A SOCIO-LINGUISTIC STUDY OF GENDER AND LANGUAGE NUANCES

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ABSTRACT

Community affairs and public relations practice in Ghanaian mines has been dominated by females. To gain adequate understanding of this phenomenon, it is prudent to explore its gendered nature. Literature from feminist theorists draws collective attention to the centrality of gender in shaping social relations, pointing out that gender is one of the central organizing principles around which social life revolves. However, the field being feminized faces the realities of gender-bias, glass ceiling effects, dwindling fame, status and lack of influence within the sector. This paper explores the community affairs and public relations practice as well as the phenomenon of engendering their roles in Ghanaian mines. The study was a phenomenological inquiry which adopted qualitative approaches, and conducted in-depth interviews with respondents in three mining companies. Discourse analysis was employed in analysing the statements of the respondents. Results show that community affairs and public relations officers from the mines function as the face of the mining companies in the communities in terms of engagements and communications. Results further indicate that culture, customs and traditions temper the language and posture of the mining communities making it very difficult for them to be aggressive, tough and rough towards female community affairs and public relations officers. Thus, female community affairs and public relations officers serve virtually as shields against the venoms and darts of anger emanating from the occasional embittered community members. The paper has social and practical implications for ensuring diversity management and gender equity in Ghanaian mining environments.

Keywords: gender, community affairs, public relations, communications, language nuances, engagements, Ghanaian mines.
1.0 INTRODUCTION

The practice of Public Relations (PR) has received much attention dating back to the 20th century (Umeogu & Ifeoma, 2012; Zaretsk, 1996). From the perspectives of practitioners, ‘public relations’ refers to the management function that seeks to establish and maintain mutually beneficial relationships between organizations and their stakeholders through a two-way symmetrical communication module. Public relation has both philosophical and pragmatic roots traced throughout civilization. Indeed, leaders of ancient civilizations such as Babylonia, Persia and Assyria used poems and other writings to promote their prowess in battle and politics. The public relations practice was introduced into Ghana by the British colonial administration, and after independence, the Ghana Institute of Journalism was established with the aim of training public relations professionals in 1971 and in 1972 the Public Relations Association of Ghana (PRAZ) was formed.

Public relations is said to be a gendered field according to studies conducted in Canada, Australia and the United States of America (Rea, 2007). Other studies found that women dominated or outnumbered men in PR practice (Schuebel, 2009; Janus, 2008). Another study conducted into membership structure of all central public relations unions in Finland in 2013 showed that up to 89.2% of the operators in the industry were women. In the light of these results, Finland has the most female-dominated public relations field of all Nordic countries. In Sweden, the share of women membership in their union is around 80%. In 2013, a total of 792 people, of which 612 were women, applied to the University of Helsinki to study Media and Communication. Similarly, in the United States, the domination of the field by women is a significant phenomenon, where in 2011 the share of women in the Public Relations Society of America (PRSA) was 71%. Also, in Germany, the field has gradually become dominated by women, though the figures from 2009 indicate that there were still 10% more men than women in PR-related jobs in Germany. This trend has brought about certain side-effects which have been the aim of this research, as the trend in the dominance of females in PR practice has not been previously studied properly as a sociocultural phenomenon.

Fuller (1998) explained that, for good corporate governance in any economy, we need such female virtues like cooperation, caring, pacifism and their nonviolence nature to promote peaceful coexistence in industrial organizations. There is also the growing recognition that females are endowed with classic style of communication which appears to be vital in corporate entities, placing them in solid public relations portfolios, with absolute responsibilities of linking corporate bodies to both internal and external environments, such as financial institutions, employers’ associations, trade unions as well as state departments and agencies (Aboagye, 2003). In seeking to bring about positive industrial change, industrialists are of the view that women’s ways of being must be recognized as viable alternative to male modes in public relations practices and that public knowledge, academic scholarship and organization of social life should be adjusted to take serious account of female recruitment into public relations portfolios (McFadden, 1989). As many scholars have noted (Ampofo, 2014; Agyepong, 2010; Lee, 2000), there is little academic research on this subject. Fewer women are attracted into the study of mathematics and engineering due to socio-cultural and other factors (Ampofo, 2014). That same reason may be motivating women to pursue educational tracks in public relations and communications which are perceived as more liberal and feminine. It is against this background that this study seeks to ascertain the reasons for the dominance, and the roles of women in Community Affairs and Public Relations Practice in Ghanaian mines.

Gender division of labor is real across the country. This manifests, inter alia, in women being given primary responsibilities like care giving, emotional management and maintenance of routine order, while in the public sphere men are given privileged access to what is described as the locus of true rewards of social life - money, status, power, freedom, opportunities for growth and self-worth (Gender Policy for Ghana, 2011). Though women are the majority of the Ghanaian population per the 2010 Population and Housing Census, they are underrepresented in mining exploration, underground mining and mineral processing. The 2010 population and housing census figures on gender participation and proportion in mining stood at 0.6% for females as compared to 2.0% for males. This picture depicts the general perception that some category of
work is considered appropriate for men while another category is for women because of their orientation and socialization. As Bekoe (2012) observes, "society is still not quite gender-sensitive. Chances are that a man would be chosen if the opportunity came to give a responsible position to both sexes" (p.16). The public relations industry has been dominated by females in the last two decades in Ghanaian mines. Their growing numbers alone has created opportunities for themselves in the industry; and women do, indeed add value to the field of public relations practices (Frederick, 2003). Also, public relations scholars prescribe four roles for PR practitioners: the expert prescriber, the problem solver, the communication facilitator and the communication technician (Schuebel, 2009). These roles are further classified into two broad roles namely: the technician role, where the majority of females tend to group; and managerial roles, where majority of men tend to hold jobs (Schuebel, 2009). The technician role requires journalistic skills like writing and editing while managerial roles involve decision-making and management (Frederick, 2003).

However, any field suddenly becoming feminized or even speculations of a paradigm shift to a female majority may be facing the realities of gender-bias, glass ceiling effects, dwindling salaries, fame, status, influence, sociocultural and organizational barriers (Schuebel, 2009). These consequences make the story of women in public relations in the Ghanaian mines an important one to tell. Many of the studies done on gender in mining were foreign in nature, with a relatively few works done in Ghana (Kilu, Anderson & Sanda, 2014). The few works done however are characterized with research gaps (Knobloch-Westercwick & Alter, 2007; Kilu, Anderson & Sanda, 2014). Some studies employed purely the survey technique, which is limited in providing in-depth understanding of issues pertaining to mine-work culture, gender as well as community affairs and public relations. On research design, some of the works fall short in the provision of adequate information to permit replication of such studies, while in some cases sample selection procedures were not clearly defined, making room for potential sample biases. This, then, constitutes a research gap to be bridged by this paper using the qualitative approach. The study seeks to answer the following questions:

i. What are the roles of Community Affairs and Public Relations’ Practitioners in Ghanaian mines?

ii. Why are women dominating the field of Community Affairs and Public Relations in Ghanaian mines?

Ghanaian societies exhibit several complementarities between men and women’s roles. Men as a group enjoy more rights, power and privileges than women. Indeed, in many cases in Ghana, women’s rights, power and enjoyment of privileges are tied to men as fathers, husbands and brothers (Ampofo, 2014). Some women in Ghana suffer from greater inequalities than men, not due to some inherent deficiencies but because society is structured in ways that privilege men over women – an environment of patriarchy. The concept of
differences in gender and its implications for socio-economic development exists and many institutions, policies, practices and processes in Ghana, though may not overtly express discrimination against women are not gender-neutral. This then calls for Ghanaian institutions like the mining companies to be gender mediators of development policies and practices. Relative to men, women are still under-represented and under-acknowledged in the modern economy of Ghana. Most women in Ghana are still clustered at the bottom of most establishments in semi-skilled, poorly paid jobs that reflect historical barriers, in terms of educational qualifications, colonial reinforcement of a culture of domesticity for women, and cultural prejudices to women entering into a number of occupations. Their predominance is in the following subsectors: trade, small scale manufacturing and food processing (Anpofo, 2014; Amu, 2005).

In the area of education, disparities can be found not only in terms of access but also in terms of completion rates, attainment levels, and stereotypes in the curriculum contents. The female enrolment rates as a proportion of total enrolment figures in the 2005/2006 academic year, stood at 68.7% at Junior High School level, 43.4% at Senior High School level and 33.0% at the tertiary level. In the 2009/2010 academic year, total completion rate at primary level stood at 87.10%, with a male completion rate being 89.70% while female completion rate stood at 84.30%. At the JHS level in the same year, total completion rate was 66.00%, out of which male completion rate stood at 70.10% with the female completion rate being 61.80% (Research Outcomes to Education (RECOUP, 2008). Specific factors that exacerbate educational problems for girls include early marriages, teenage pregnancies, discriminatory punitive practices, expulsion or transfer of pregnant school girls while boys who father such children are not held accountable as well as sexual harassment by teachers and other educational staff. Regrettably, in some families where incomes are not enough, only the male child is given the priority to education (Apusiga, 2006).

After the Beijing conference in 1995, many countries including Ghana adopted gender awakening programs and a search for tools to bring about gender equity. The Beijing Platform of action in itself is an agenda for action that various parties including national governments, international agencies, NGO’s, civil society groups and individuals have been invited to act upon to make gender equitable development a reality. Indeed, promoting gender equality and women empowerment in its broader scope is a key objective of the Millennium Development Goal 3. Gender in public relations practice will lead to increase in productivity that will in turn lead to national economic growth. Indeed, growth in national economy will lead to mobilization in national resources that will finance improvements in people’s health and education, and further raise productivity (HDR, 2003). Gender in PR is therefore central in these synergies because gender is a critical agent of national development. This study looks at gender, community affairs and public relations practices in Ghanaian mines; women dominance and the unique roles they play in the prevailing masculine and ‘macho’ culture that exists in the mines.

2.0 LITERATURE REVIEW

Theoretical Literature

Social constructionism is a sociological perspective of knowledge that considers how social phenomenon or objects of consciousness develop in social contexts. It is a domain which has been explored not only by sociologists but also scholars in language and gender such as Kendall (2003), Coates (1995) and Poynton (1989). The world, being socially constructed, functions by distributing access to roles and activities in relation to what are regarded as relevant social characteristics such as age, gender, class, etc (Poynton, 1989, p.56). Besides, ‘where such restriction of access to fields exists with respect to any social characteristic, then one can expect this to show linguistically in terms of differences in what people talk about and in differences in how people are talked about’ (Poynton, Ibid). Hence, in the mines how women are talked about can convey some language nuances as far as gender is concerned.

The social constructionist school of thought emerged as a critique of the objectivism assumed by the positivist concepts of knowledge (Gergen, 1985). Some versions argue that the differences in behavior between men
and women are entirely sociocultural conventions, meaning that society and culture create the roles, duties and responsibilities of individual genders, and that these roles are generally considered ideal or appropriate behavior for a person of that specific gender. Whereas other versions believe that behavior is defined by biological universal factors and other versions claim that there are more genders than just the two most commonly accepted (male and female). For instance, Poynton (1989) stated that ‘ideological structures are merely formalizations of patterns of behavior characteristic of a particular society’ therefore, ‘as long as individuals participate in the institutions of that society they must perform act ideologically’. She argues further that ‘as long as the four key structures of women’s institution – production, reproduction, sexuality, and the socialization of children remain substantially unchanged, the ideological meanings of man and woman will remain unchanged’ (p.20). The focus of the gender debate is to uncover the ways individuals and groups participate in the construction of their perceived social reality, and how social phenomena are created, institutionalized, known, and made into customs and traditions by humans.

Alsop, Fitzsimmons and Lennon (2002) noted that the constructionist accounts of gender creation can be divided into two perspectives, namely, the materialist perspective, which underlines the structural aspects of the social environment that are responsible for perpetuating certain gender roles; while the discursive perspective focuses on the creation, through language and culture, meanings and understandings associated with gender. The sense of one’s gender identity is acquired through the internalization of external knowledge. However, it is in fact never fully acquired; it has to be constantly performed and re-enacted in social interactions. Alsop et al.(2002) argued that, ‘gender is part of an identity woven from a complex and specific social whole, and requiring very specific and local readings’ ( p. 86). Thus, gender identity can be viewed as part of socially situated understanding of gender and scholars in language and gender have acknowledged that social life, as far as institutions and roles are concerned, is socially constructed (Kendall, 2003; Cotes, 1995; Poynton, 1989). Language is a major means by which concepts are concretized and transmitted; hence, as Poynton (1989) notes, ‘the particular facts of this social construction are, to a considerable extent, named (lexicalized) and those ‘facts’, as ‘meanings’, become part of the language used by members of that society’. Poynton (Ibid) observes further that ‘this naming takes place not in isolation from, but in the context of, a socially constructed understanding of the relations between ‘things’ (including people, objects, and ideas)… which also become part of the language’ (p. 55). Thus, the name ‘man’ connotes superiority while the name ‘woman’ connotes a subordinate and a weaker sex.

Organizations vary in practices and processes that are used to achieve their goals and these processes and practices may produce gender inequalities. Considerable research exists exploring how gender inequalities are produced both formally and informally, as work processes are carried out (Acker, 1990). The gendered and embodied nature of work has been explored by writers such as Acker (1990) who articulated new ways of looking at both organizations and the gendered processes embedded in them. Most feminists writing about organizations assume that organizational structure is gender neutral; on the contrary, assumptions about gender underlie the documents and contracts used to construct organizations and to provide the common sense ground for theorizing about them. Their gendered nature is partly masked through obscuring the embodied nature of work.

From the theoretical literature, the four themes characterizing gender inequality according to Ritzer (2000) are: first, human beings being situated in society not only differently but also unequally. Specifically, women get less of the material resources, social status, power and opportunities for self-actualization than do men. Secondly, this inequality results from the organization of society and not as a result of any significant biological or personality differences. Thirdly, though individual human beings may differ somehow from each other in the profile of their potentials and traits, no significant pattern of natural variation distinguishes the sexes. Fourthly, all inequality theories assume that human beings, irrespective of their gender respond similarly, fairly easily and naturally to social situations. Liberal feminists also believe that all human beings have certain essential features, namely capacity for reasoning, moral agency and self-actualization. The exercise of these capacities can be secured through legal recognition of individual universal rights. Liberal
feminists further hold the opinion that the gender inequalities are socially constructed, having no basis in nature; that social change for gender equality can be achieved through organized and reasonable appeal to the public and the state (Philip, 1993).

Empirical Literature

This section reviews work done on gender in Ghanaian mines as well as examples of what has been done in some other countries. From the available literature, it appears not much work has been done on gender, community affairs and PR practices in Ghanaian mines though there is some work generally on female employment in the mines. Some of the earlier publications were on gender disparity in the mines. In a paper presented by Kwami (2007) at the first National Conference on HR Management in the Mining Industry held at Tarkwa in the Western Region of Ghana, the author addressed the issue of disparity between the roles played by men and women in the mining industry. According to her, ‘women in mining face similar problems as women in any other technical industry’ due, particularly, to lack of skill resulting from sociocultural factors which compel women not to go for some challenging jobs. She attributed the lack of skills ‘partly to lack of interest, prejudice, cultural restrictions’ (2007,p.1) which combine to rob the nation of a huge ‘chunk of the nation’s human capital from development and application.’ The author observed that since 1897 when the Obuasi Gold Mines (now AngloGold Ashanti) started, the managers of the mines were all men. She noted that this state of affairs continued for a long time, and even as at 2007 women could be seen employed as porters or carriers in, especially the construction areas of mining.

As Kwami (ibid) rightly observes, the Ghana Labor Act, 2003 (Act 651) contains several provisions which favour women. These provisions, which include Sections 10, 55, 56, and 57, are intended to promote women and enhance their productivity. Section 10 provides for the rights of the worker and Section 10 (b) particularly provides that a worker shall ‘receive equal pay for equal work without distinction of any kind.’ Hence, discrimination against women is outlawed by this provision. Sections 55, 56, and 57 provide among others, that a pregnant woman shall not be engaged at night or overtime and that a woman shall be entitled to maternity, annual and sick leaves. Kwami (ibid) observes that in spite of these provisions in the Labour Act, women do not seem to be interested in taking up mining as a career. In fact, it is not just a lack of interest in mining but also mining related jobs. Hence, in view of the foregoing, the influx of women into the area of community affairs and Public Relations in Ghanaian mines is a new development which this current work seeks to examine.

In Nigeria, in a study conducted by Umeogu and Ifeoma (2012) it was found that ‘even though there are fewer men in number, the males have more power than their female counterparts in PR practice.’ The study inter alia tried to determine the gender distribution in PR practice in Anambra State of Nigeria. They reiterated a statement by Robinson (2005) that gender does play a crucial role in everyday life as well as in the ways in which culture and language affect professional behaviour. Umeogu and Ifeoma (2012, p.153) conclude that ‘while women dominate in number, the men dominate in power.’ Thus, their study was not focused on why women were entering the PR profession nor did it have anything to do with mining.

In Australia, as recorded by Lenore Layman in the Encyclopaedia of Women and Leadership in the Twentieth Century, the involvement of women in the mining industry before the 1970s was an exceptional occurrence. However, the change came in the late 1960s and early 1970s ‘when barriers to women’s employment in mining began to fall.’ This change was the result of pressures which included the Australian government’s drive to promote equal employment opportunities and the campaigns of women’s movements against ‘sex segmented labour market and gender discrimination’. Though this report deals with women in the mines, it did not throw light on women’s involvement in community affairs and PR practice in the mines which is the focus of this current work in Ghanaian mines.

Other scholars who have researched into gender issues in Public Relations appear to have focused on feminisation and gender disparity. For example, Geyer (2009) explores the issue of gender disparity prevalent
in the discipline of Public Relations specifically, issues arising from the pedagogy of the discipline, to the professional practice of public relations. Secondary research that has emerged over the last 25 years is analyzed by discussing the feminization and perspectives of gender influence on the discipline of public relations. The Public Relations industry has therefore been likened to the nursing career which is considered a feminized career. There has also been the concern that ‘although women are the majority in the public relations profession, they continue to be the minority in holding executive or management positions’ (Geyer, 2009, p.8). Broom and Dozier (1986; as cited in Geyer, 2009) established an alternative to the popular glass ceiling theory. Broom and Dozier (ibid) postulate that the difference in pay and power between men and women in public relations exists because of the role women play, being mainly technician as against managerial positions mainly held by men. According to them, ‘women did not aspire to possess managerial roles and were more content in the role of public relations technicians. Based on their study, Geyer (ibid) observed that ‘women are content in the tasks they perform in the public relations field and lack interest in the tasks of more managerial roles’ (p.8).

The International Association of Business Communicators Research Foundation commissioned two professional research reports in 1986 and 1989 to assess the impact of feminization of communication. The first report released, The Velvet Ghetto (Cline et al, 1986) focused on why women were not in managerial roles in public relations. The results of The Velvet Ghetto (Cline et al., 1986) reiterated Broom and Dozier’s (1986) study. Women were relegated to the role of technicians; yet, women were relegated to this role, because of the social perceptions that women were poor managers (Cline et al., 1986). The Velvet Ghetto (Cline et al., 1986) contended that women self-select themselves into technician roles. In the second report, beyond the Velvet Ghetto (1989) results repeated similar findings from the initial report, but also gave recommendations for future public relations practitioners; the latter report suggested that women should accept the reality of the velvet ghetto and adjust to its existence, in order to succeed (Toth & Cline, 1989).

Some scholars have focused on the image of female PR practitioners and have blamed the media for contributing to the stereotyping of women. According to them, the media have created and reinforced stereotypes through simplified and biased representations of social groups differentiated by characteristics such as sex or race (Lippmann, 1922, as cited in Knoblochh-Westerwick & Alter, 2007). Andsager and Hust (2005) claimed that women have entered public relations at a much faster rate than men over the last two decades. This was the result of a survey conducted with PR students to determine, inter alia, whether certain areas of specialization are perceived as gendered. They found out that differences between female and male specialties with their associated characteristics and supporting values delineated in the feminist theory of public relations. Their studies also indicated that students would consider gender orientation before selecting career paths.

Thus, in summary, there have been some studies on gender disparity in the mining industry in Ghana but these did not focus on Community affairs and public relations practice. In Nigeria, studies conducted indicate that though women outnumbered men, the men dominated in power (Umeogu & Ieoma, ibid) while in Australia the increase in female numbers in the mines was due to the government’s efforts to promote equal employment opportunities (Layman, ibid) but none of these studies and other studies discussed above focused on women’s involvement in Community Affairs and Public Relation practice in the mines.

3.0 METHODOLOGY

The researchers adopted the phenomenological and integrationist approaches, both derivatives of the qualitative technique of research, to inductively study and understand the experiences of women in community affairs and public relations practice in Ghanaian mines. The adoption of a qualitative approach was justified on grounds of universal acceptability of studying and understanding such critical subjects like gender, community affairs and public relations practices in work organizations. Also, qualitative studies are able to embrace complexity and diversity in both the research process and the findings that are uncovered. Daymon and Holloway (2011) noted that qualitative researchers seek to uncover the views and meanings
held by research participants, to understand the world in their terms and therefore to take account of the many changing ways of understanding social phenomena.

The study conducted in-depth interviews on twenty respondents, both male and female staff including managers of community affairs and public relation practitioners from three mining companies in Ghana. The study solicited their perceptions, personal views, experiences and opinions regarding their respective gender compositions, and public relations and community affairs practices. Key informants were selected using purposive and convenient approaches. The purposive method was used because key informants typified the true features of the community affairs and public relations practitioners; while the convenience method was used to select those who were readily available and agreed to be interviewed. A semi structured interview guide was developed, pre-tested and used to conduct the interview sessions. Responses were recorded and subsequently transcribed and organized into themes for analysis, reflecting the objectives of the study. Analysis was done using discourse analysis, logical conclusions and thematic analysis to generate the findings, which were discussed and conclusions drawn on the subject matter.

4.0 RESULTS

Community Affairs and Public Relations’ Roles in Ghanaian Mines

In the Ghanaian mines, PR practice is generally titled, ‘Community Affairs and Public Relations.’ The study observed that the Community Affairs and Public Relations outfit of Ghanaian mines is dominated by females who are responsible for the maintenance and provision of the needs of communities in which the mines operate. This phenomenon of female dominance in PR practice is in tandem with findings in Canada, Australia and the USA (Rea, 2007). However, the factors which account for the female dominance in the aforesaid research and other similar studies mentioned above (Schuebel, 2009; Janus 2008; Rea, 2007) are not the same as the pull factors regarding female dominance in community affairs and public relations practice in Ghanaian mines. Indeed, mining occurs in quite populated areas and so, mining has a lot of impact on the environment and the people who live around the mines. So, community affairs and public relations officers are tasked to ensure that they mitigate the negative effects of the mining operations. This crucial role requires a certain calibre of Community Affairs and Public Relations’ officers.

The mining activities have led to several environmental hazards and discomfort to the mining communities. The following extracts of dialogues recorded during the study seem to explain the gravity of harm being caused by the mining companies:

*We do blasting that generates dust, noise and emission of chemicals. Our vehicles ply the local roads and generate a lot of dust; sometimes, we have excesses from our operations in the form of spills that are harmful to human life, wild life as well as aquatic life. In view of some of these bad things, it has become an obligation to mitigate their negative effects.*

Also, Community Affairs and Public Relations Officers in the mines are responsible for social investment contributions; being what the companies give back to society in the areas where they operate. If mining operations lead to negative effects, then of course their existence should bring positive effect for the benefits of the communities. The brunt of mitigating the socioeconomic cost of mining falls on the mining companies and the liaison between the embittered communities and the mining companies is the Community Affairs and Public Relations Officer. This role is underscored by one of the community affairs and PR officers thus: ‘As community affairs and public relations officers, we are responsible for ensuring that the mining companies are in constant interactions, in good relations and at peace with the communities.’ The community affairs and public relations officers further have the responsibility to implement complaint and grievance systems with the communities so that they are always at peace with the community because, as noted by this respondent, ‘it is better to be a good neighbour and build a good relationship with the people you live with.’

Again, a community affairs and public relations officer has this to say:
As community affairs and public relations officers, we function as the face of the mining companies in the communities in terms of engagement, and in terms of communications. Because the nature of our operations demands we have to be in constant touch with the people around us to create the understanding of our operations, so that when issues come up, we are able to handle them smoothly.

This statement underscores the fact that the facilitating role of ‘public relation helps an organisation and its publics adapt mutually to each other’ (Seitel, 2001, p. 9). Internally, the Community Affairs and Public Relations Officer in turn, promotes the views of the communities to other departments of the mining enterprise to understand the effects of their operations on the communities, and then to be conscious about their existence, so that in everything that any one does they must have the community at heart. A respondent has this to say:

We are promoting the mine-work brand. Our progress depends on having our smooth operations and successes depend on good community relations.

The foregoing statement is in tandem with PR practice today which deals with several functions - ‘it manages corporate relations and ensures quality management for a good corporate image’ and also ‘manages crisis and issues, which always come up and should be handled professionally’ (Seital 2000, pp. 10-11). Similarly, the statement is in line with the definition of PR by Cutlip and Broom (1974) (Cited in Bekoe, 2012, p.8) which states that PR is ‘a management function that identifies, establishes and maintains mutually beneficial relationships between an organisation and the various publics on whom its success and failure depend.’

Female Dominance in Community Affairs and Public Relations in Ghanaian Mines

The Community Affairs and Public Relations Practice in Ghanaian mines is dominated by women but the following statement by a community affairs and public relations practitioner is a pointer to the peculiar reason why females dominate as Community Affairs and PR Officers in Ghanaian mines:

You know as women, by nature we are more tolerant, and the communities, when they are coming to lay complaints or grievances, they sometimes come very annoyed, aggressive and shouting all over. However, when they come to meet you as a woman, because our culture and traditions emphasize values like respect for women, it is difficult for the communities to be aggressive towards you as a female community affairs and public relations manager; therefore, they calm down.

The statement that ‘by nature we are more tolerant’ implies that women have certain inherent tendencies which place them above men in some circumstances such as the practice of PR in the Ghanaian mines. Besides, the statement evokes nuances about gender because it foregrounds the Ghanaian traditional perception of women as soft and tender and, hence, the need for them to be protected. This traditional perception, ironically, becomes the strength of women in PR practice in the Ghanaian mines.

In a question to further create an understanding of the phenomenon of engendering community affairs and public relations practices in Ghanaian mines, a respondent said:

From my own personal experience, I worked in ‘Ahyeanfre’ community, a very aggressive community. The local people will come, shouting, and shouting. When they enter and see you as a ‘woman or female’ community affairs and public relations manager, they will say: ‘hmmm! You are lucky to be a woman; and being a woman, you are like our mothers or sisters or wives. If you were a man, the noise we would have made here.’

This statement supports (Aboagye, 2003) who made earlier submissions on the growing recognition that females are endowed with a classic style of communication which appears to be vital in corporate entities, placing them in solid public relations portfolios, with absolute responsibilities of linking corporate bodies to
both internal and external environments. Similarly, Fuller (1998) posits earlier that, for good corporate governance in any economy, we need such female virtues like cooperation, caring, pacifism and their nonviolence nature to promote peaceful coexistence in industrial organizations.

The following extract from the statement made by the respondent above can be broken into three clauses and each clause examined for its language nuances or implications as regards gender:

‘hmmm! You are lucky to be a woman; and being a woman, you are like our mothers or sisters or wives. If you were a man, the noise we would have made here’

The expression, ‘hmmm!’ is a grunting sound which connotes disappointment or pain. Hence, when the community residents make such an expression it implies they feel pain and disappointment that they cannot show their vengeance in whatever manner they had anticipated. Thus, the posture of a woman even without words communicates symbolically to the community residents. It also depicts a presupposition that even though the woman has not spoken the residents could imagine the soft-spoken manner in which she would communicate to them. This is because ideological structures are ‘formalisations of patterns of behaviour characteristic of a particular society. As long as individuals participate in the institutions of that society, they must perform act ideologically’ (Poynton, 1989, p. 20).

Also, the statement, ‘You are lucky to be a woman’ may have two implications. On the one hand, it could be an allusion to the ‘institutionalised inequality/ inferiority of women, where they have been denied the right to engage in certain activities – to be certain kinds of people – and their activities and their very selves denigrated and trivialised’ (Poynton, Ibid, p. 20). On the other hand, it implies the revered position of women in the society as people who should not be tampered with. This latter meaning is what underlies the next clause, ‘being a woman, you are like our mothers or sisters or wives.’

Furthermore, the next clause, ‘If you were a man, the noise we would have made here’ alludes to the fact that women are not expected to involve themselves in open fighting. As Coates (1995) observes, ‘there is a great deal of evidence to suggest that male speakers are socialised into a competitive style of discourse, while women are socialised into a more cooperative style of speech’ (p. 13). These foregoing statements buttress the significance of having women as Community Affairs and Public Relations practitioners in Ghanaian mines. In all, the female community affairs and PR practitioners, by virtue of their soft cooperative inclinations, serve virtually as shields against the venoms and darts of anger emanating from the occasionally embittered communities.

5.0 CONCLUSIONS AND POLICY IMPLICATIONS

In this study, we discussed gender, language nuances with regard to gender, community affairs and public relations in Ghanaian mines. How the mines have succeeded in redefining the gender roles of Community Affairs and Public Relations practitioners. Based on our results, it is evident that the community affairs and public relations departments are dominated by females. Their core mandates include mitigation packages in compensation for causing harm to local communities in the course of mine work operations. They are also responsible for social investment contributions to local communities in the form of scholarship packages to brilliant but needy students, establishment of farms of palm trees for women in the local communities, construction of schools and hospitals, formation of football clubs as well as the establishment and development of sports infrastructure. The Community Affairs and Public Relations Officers are equally responsible for the maintenance of peace and harmony between the local communities and the mining companies, as well as maintaining long standing workable complaint and grievance systems with the local communities, since their operational successes depend on the local people on whose land the mineral is mined even though the government is the custodian of the gold resources per the Minerals Act and the Constitution.
The research found that the gender role of Community Affairs and Public Relations outfit of the mines has been defined based on grounds of community engagements, where the females are diplomatic and soft-spoken. Above all, the psychosocial and cultural values of the local people abhor one being harsh and aggressive towards females as mothers, sisters and wives. Thus, though ‘the feminist stance, speaking on behalf of women, has been highly critical of contemporary society’ and ‘feminists have seen women’s interest as consistently subordinated to those of men’ (Poynton, Ibid, p3), women in the Ghanaian mines who practise as Community Affairs and Public Relations Officers are accorded appreciable recognition by the community and their colleagues.

The researchers are of the view that feminine participation in the Community Affairs and Public Relations practice of the mining environment is gaining acceptance as a viable alternative to male modes. Therefore, organizational designs, psychosocial engagements, public and academic discourses must be adjusted to take serious account of female recruitments into the community affairs and PR practices in Ghanaian mines. The study, however, was limited on grounds of using mainly qualitative methodology which is characterized by lack of objectivity and generalization. Therefore, the need for a future research using the mix methodological approach is useful.

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Mining in Green Technology Space - Perspectives of Multinational Mining Companies in Ghana

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Abstract
This qualitative study explores the motivation for and trends in the adoption of green technology among multinational mining companies in Ghana. Multinational mining companies are noted as massive waste generators and energy consumers. As mining activities increase, the risk of greater environmental pollution and degradation also looms. However, a green mining technology across mine life cycles emphasizes the need for judicious utilization of resources and reduction in the effects of mining activities on communities. The adoption of green technology processes and procedures in mine work environments, constitute greater effort towards achieving a more sustainable and environmentally friendly mining practices. Drawing on a qualitative case study methodology, primary data were collected from selected officials of multinational mining companies in Ghana using in-depth interviews. The paper documents green technology awareness messages across various mines and explores the motivating factors for adoption of green mining technologies. The paper also provides an understanding of the fad of green technology adoptions among the multinational mines, which contributes to reduction in the effects of mining operations on mine workers and local communities. The paper has practical implications on grounds of highlighting sustainable mining, a reduction in pollution and degradation of the environment, promoting awareness on safety and health among individual mine workers, and mining communities. The work recommends green technology adoption as a priority to leverage lean production across the multinational mines in Ghana.

Keywords: Green technology, sustainable development, multinational mining companies, health and safety, Ghana.
1.0 BACKGROUND TO THE STUDY

The terms green technology, clean tech, sustainable technology, renewable energy are often used as synonyms for a common sector, that is currently a major focus of public, political, economic and research interest, because global warming and climate change, coupled with limited availability and rising cost of energy have become major concern for the global economy. Green technology is increasingly regarded as a "silver bullet" for achieving sustainable development without harming economic and social welfare. The term "sustainable development" was first established at the United Nations Conference on the Human Environment in 1972. The term gained prominence through the publication of the Brundtland report in 1991, titled "Our Common Future" which was presented to the United Nations by the World Commission on Environment and Development. The concept of green technology does not only serve as a major tool to support sustainable development but also seeks to achieve its goals by leveraging renewable resources and increasing their regeneration capabilities, as well as excluding non-renewable resources from current consumption patterns. It is evident that fighting environmental problems necessarily involves the rigorous application and diffusion of technologies (Grubb, 2004; Huber, 2004; Hoff, 2012). Consequently, many authors advocate the benefits of green technology by outlining its potential for creating ‘green jobs’ and wealth creation, coupled with the ability to simultaneously reduce negative environmental externalities (Büchele, Henzelmann, Hoff and Engel 2009; Stern 2008 and Kachan, 2013). Green technology is also expected to satisfy the three dimensions of sustainability, namely; social, environmental and economic.

Historically, environmental degradation is an unavoidable by-product of wealth generation. Recent studies and practices have integrated environmental and business-related aspects, showing that economic growth and the reduction of negative externalities can be achieved at the same time (King& Lenox, 2002; Rivera, 2001). One specific field in this line of thought is the concept of ‘green technology’ which is considered a sub-category of literature on environmental and ecological innovation. According to Rennings (2000), green tech comprises an emerging technology-oriented industry that generates economic rents, by developing and selling technologies or services that reduce or eradicate negative environmental impact, with continuous production, distribution and consumption.

Therefore, an increasing number of businesses including mining companies are undertaking initiatives aimed at reducing their environmental footprint and improving their “green” portfolios as pressures mount from green movements and regulators to check their environmental impacts (Molla, 2008). Such initiatives include an adoption of organizational culture for environmental awareness and stewardship. Others are adoption of green technologies and best practices in mine work processes. These are implemented as means for reducing environmental impacts associated with extraction and processing of metals and minerals. Olson (2008) refers to these and similar initiatives as “enterprise level green strategies” and argues that such strategies have potential positive impacts on the environment. As important as mining is to society, economic growth and humanity; it is worth studying the technologies, techniques and equipment used in the mine work environment. Mining is portrayed as a high risk profession. Further it is considered as a hard labour activity which is done under conditions of extreme discomfort, deafening noise, intense heat, humidity and cramped space. The activity is usually exacerbated by tension stemming from the need to watch constantly for signs of potential hazard and danger (Benya, 2009).
Mining is now being revolutionized by emerging breakthrough green technologies (Hoff, 2012; Kachan, 2013). Such breakthrough green technologies make mining more profitable, safer and better for the planet (Rao, 2004). Globally, green mining technologies are gaining acceptance speedily among mining companies. These companies are using the technologies to satisfy aspirations, needs and expectations of stakeholders such as; shareholders, regulators, contractors, customers and communities. These green mining technologies according to (Davis 1989) are designed to manipulate, maneuver and negotiate core mining activities and operations, offering superior environmental benefits in the form of reduced waste, increased energy efficiency and decreased release of toxic emissions. The mining industry is also considered to be championing the provision of accurate, valid and independent evaluation of public disclosures about environmental preservation, economic growth, sustainable development and social performance. The strategic plan for improving efficiency and decreasing environmental impact of mining is made up of shutting down illegal and unregulated mines, choosing eco-friendly mining processes, implementing recently discovered green mining technologies, cleaning up the sites of shut-down mines as well as developing green mining technologies (Lai, Dahui, Wang & Hutchinson, 2006). Indeed, technological advances function to improve the mine work environment, reduce heavy manual works by using new automated machines (Sanda, Abrahamsson, Johansson & Johansson, 2011).

The practical importance of green technologies are extraordinarily great, since they offer the means to achieve sustainability while at the same time generating wealth and economic growth. Green mining adoption among Ghanaian mines has equally become an important mechanism for mining companies. It enables the companies to demonstrate renewed commitment to improve environmental and social performance, with the aim of improving the industry’s reputation. Despite the promise that the green technology industry holds for sustainable development, research is still quite rare in the Ghanaian context. Most existing research on the subject matter are dominated by studies from the West and adopted the perspectives of the policymakers’ assessments on effectiveness of support mechanisms in the green technology landscapes (Enzensberger, Fichtner & Rentz, 2003). Against this background, this paper seeks to increase knowledge with respect to creating understanding of green technology adoptions among multinational mining companies in Ghana. In attempt to achieve this purpose, the following research questions guided the approach to the study: what are the green technology awareness strategies among the multinational mining companies in Ghana? What are the motivating factors for the adoption of green mining technologies? Finally, what are the green technology adoption trends and the implication on land use among the multinational mining companies?

1.1 Research Objectives

The paper seeks to achieve the following specific objectives:

- To ascertain green technology awareness strategies as being designed and implemented by the various multinational mining companies in Ghana.

- To identify the motivating factors underpinning the adoption of green mining technologies across the multinational mining companies.
To examine green technology adoption trends among the multinational mining companies in Ghana.

2.0 LITERATURE REVIEW

2.1 Technology Acceptance Model as Analytical Approach

This paper is situated within the context of Technology Acceptance Model (TAM) as propounded by Davis (1989). The model explains how users come to terms, accept and use a particular technology. The model also predicts acceptability of a technology, and to identify the modifications which must be brought to the system in order to make it acceptable to users (see figure 1). Davis (1989) describes acceptance as “users’ decision about how and when they will use technology”. The initial use (acceptance) is the first critical step toward adoption, while sustainable success depends on its continued use (continuance). According to Davis (1993, p.1) “user acceptance is often the pivotal factor determining the success or failure of a technology system”.

The model further suggests that the acceptability of a technology is determined by two main factors: perceived usefulness (PU) and perceived ease of use (PEOU). The term external variables include all the technology design features. These features have a direct influence on perceived usefulness and perceived ease of use, while attitude toward using has an indirect influence on the actual system use. PEOU is defined as “the degree to which an individual believes that using a particular system would be free of physical and mental effort” and PU as “the degree to which an individual believes that using a particular system would enhance his/her job performance, and productivity (Davis, 1993, p. 477).
In aligning the TAM to the mine work environment, and its green mining technology adoption regimes, the researchers explore how the external variables or the green technology feature motivates the use of the technology and how the motivation further informs change of attitudes and behaviour of the multinational mining companies towards the adoption of green mining technology systems (Davis, 1989).

2.2 Green Technology in the Mining Sector

Danelski (2009) argued that, as the world's population increases, demand for resources and infrastructure equally increase. The adoption of green technologies and sustainable development practices enable companies meet their current demands and support economic growth without compromising the ability of the future generation to satisfy its needs. Regardless of the view that is closer to the truth, there are ultimate implications that cannot be avoided. First, green technology has the long-term potential to fulfill the three dimensions of sustainability (social, environmental and economic). Further, radical innovation seems necessary because the technologies available today can only reduce but not eliminate environmental degradation. Some of the steps towards sustainability in the mines include sharing of knowledge with stakeholders, providing educational materials and tools needed for improving operations, training of employees, promoting the industry and teaching others about the importance of mining to the world. The green mining commitment of mining companies is paramount because it can make the companies profitable without necessarily harming the environment and the people (Mathur & Mathur, 2000). Olson (2008) opines that green initiatives take longer period to break-even and are likely to be motivated more by softer benefits such as employee morale and good corporate citizenship than monetary gains.
Mining service providers are also committed to helping mining companies create awareness under green mining dictates and protecting people. So products are designed and systems integrated with safety features that keep people safe whenever they are operating the equipment (Paul & Campbell, 2011). The providers are equally committed to leveraging technology and innovation to help customers increase efficiency and productivity with less impact on the environment and the communities in which they operate (Mines, 2008).

A Molycorp Annual Report (2011) in USA indicates that mining industries use up to almost 20% of the world's water supplies. The report clearly states the urgency to cut back on current water usage to reduce the environmental footprint that mining creates. One of the key recommendations of the report is to employ real-time calculations on water usage because many mining companies tend to overuse water since they merely utilize averages and estimates for measuring how much water is needed. The trend has been to use precise water requirement calculations to end this wasteful habit.

Further, a study conducted by Kachan in 2013, indicates that at the end of the utility of a mine, it is eventually closed off and the area is then restored by the company. However, when mine closure is done haphazardly, the area can become an environmental and safety risk for the communities close to the mine. As a result, it was recommended that green mining technologies be adopted to inculcate the culture of smart and effective closure and the rehabilitation of utilized mine pits. Consequently, fertile soils may be recovered for trees to be planted on the land.

Similarly, the innovation and diffusion process for products and technologies has for many years attracted considerable attention in academic research (Rogers, 2003). Many scholars have adopted an evolutionary perspective to analyse innovation and diffusion trends (Balachandra, Kristle Nathan & Reddy, 2010). Indeed, the perception that green technologies evolve by means of a time-dependent process seems to be commonly accepted. Within this process, technologies achieve or pass certain stages of development such as research and development, commercialisation and diffusion. Although literature provides no mutually exclusive, collectively exhaustive and widely agreed definition of these stages, there seems to be a consensus that the stages exist and that they characterize a certain development situation in a given technology trajectory. The commonly held belief is that, from the moment of initial innovation, technologies undergo a process of learning and optimization, gradually gaining market acceptance and, hence, market share. This process is not necessarily linear and may well alternate between steady incremental improvements and disruptive changes (Lund, 2007).

Green technology innovation and diffusion involves the support of various stakeholders that oppose the existing lobbies, whose preferences lie with conventional technologies. This means green technology innovation and diffusion implies the co-evolution of socio-technological systems, as well as certain social and cultural factors (Brechin & Steven, 2003). The socio-technological system involves all direct stakeholders, such as governments, educational institutions, mining companies, distribution channels, etc. These stakeholders have strong impact on technology development by supporting or ignoring technologies that enter the market space. The socio-technological system is to some extent, influenced by social and cultural factors that are reflected in the public opinion and perceptions of the environment and the economy.
2.3 Implications for Green Technology Adoptions

Two main implications can be derived from existing research into green technology innovation and diffusion. First, different green technologies have currently reached different stages of innovation and diffusion; and these stages determine their respective characteristics and development paths. Second, in the case of green technologies, free market mechanisms are weak and may not be sufficient to overcome persisting structural barriers. Therefore, policy action is required to deal with market failures, overcome barriers to innovation and diffusion and thus shape the socio-technological system.

In this regard, Hall (2007) identifies two fundamental assumptions underpinning technology adoptions: (1) user homogeneity and (2) user heterogeneity. The basic implication is that adoption depends either on how information is distributed or on the characteristics of the individual adopter. The models that assume user homogeneity are often called epidemic models. The thinking behind them is that every potential adopter has the same utility function. Given perfect information, all potential users would adopt a particular technology at the same time, assuming that performance of this innovation is superior to that of existing substitutes. The factor that drives diffusion is therefore the availability of information. Models that assume user heterogeneity take a different approach, requiring examination of the decision to adopt or not to adopt a particular innovation at the individual or the firm level. The fundamental belief here is that potential users have differing utility functions, and they adapt in line with changes in the characteristics of innovations or in the related environment. The logic of adoption is summarized by Hall (2007) that, adoption takes place when the expected benefit of the innovation exceeds the investment or cost involved.

3.0 RESEARCH METHODOLOGY

Green Mining Technology Adoption studies are invariably subjective realities; hence the subjectivists’ ontological position, a derivative of qualitative approach was deployed to achieve our research objectives. Epistemologically, the study adopted the interpretivist approach, where we draw knowledge on Green Mining Technology Adoptions, through interactions with key respondents, and personal observations, as well as interactions with visible green mining technologies at various mine sites. The qualitative research strategy has been adopted because it allows the researcher to go beneath the surface to provide insights into behaviours, emotions and motivations (Creswell, 1994; 2013). Most importantly, this strategy allows the achievement of understanding in real life through personal interaction with respondents. Also qualitative researchers hold high faith in utility and credibility of qualitative studies on grounds that they are heavily embedded in real-life situations, settings, circumstances and context, making them more reality-based than the more traditional, tightly controlled experimental-type designs. It is further observed that qualitative studies possess greater internal and external validity, thus, providing enough rich, and thick description regarding the setting, program, subjects, procedures, and interactions (Glesne & Peshkin, 1992; Melloy, 1994).

In this paper, the researchers studied four mining companies in, and around Tarkwa in the Western Region of Ghana. Tarkwa is a well noted mining town, hosting several mining companies and mining activities, giving out thousands of tons of gold annually. This justifies the choice; Tarkwa as the study area. The four understudied mining companies include the following: Gold Fields Ghana Limited, Tarkwa branch; Anglo Gold Ashanti-Iduapriem mines; Golden Star Resources Limited in Bogoso, near Tarkwa and Gold Fields Ghana Limited, Damang. Access to these four
organisations was negotiated through the respective human resource managers with the aim of satisfying basic ethical requirements in research.

The data reported in this paper were derived from self-conducted interviews with engineering managers, sustainability and environmental managers, community affairs and public relations managers, human resource and people services managers, mine managers, procurement managers as well as mine equipment and machinery suppliers from selected mining companies in Ghana using purposive and convenient sampling techniques. The purposive method was used because key informants possess adequate knowledge on green mining technology adoptions in their respective mining companies. The convenience method was used to select those who were readily available and accepted the offer to be interviewed. The in-depth interviews were supported with reviewed documents on green mining technological adoptions among Ghanaian mines. These documents were prepared by Caterpillar Equipment Company Ltd.

An interview guide was developed and used to conduct the interview sessions. In all, ten interviews were conducted as follows: two interviews from the sustainability department, two from the environmental department, two from community affairs department, two from engineering as well as two from mining managers. Responses were recorded and subsequently transcribed and organized into themes for analysis, reflecting the research questions. Thematic and content analysis were used to generate the findings. The findings were subsequently discussed and logical conclusions drawn on the subject matter.

4.0 RESULTS AND DISCUSSIONS

This section presents results of the study on mining in green technology space among the multinational mining companies in Ghana. It uses Davis’ (1989) Technology Acceptance Model as analytical framework as captured in Figure 1. The section begins with the concept of ‘external variables,’ as captured in the model, which refers to the features or profile of Green mining technologies, characterized by best practices in the world of mine processes that are implemented as a measure to reduce the environmental impacts associated with the extraction and processing of metals and minerals.

4.1 Green technology awareness across various mining space

It was a common practice to see and read green awareness posters, and messages across the various mine work environments. These messages have been arranged in a pyramid form below and they reflect the awareness of green technology created among the four mining companies:

‘Pollution prevention pays.’

‘Zero tolerance for fatalities.’

‘Zero tolerance for violations.’

‘Think green and save the environment.’

‘Clean up spills immediately, because good housekeeping practice pays.’

‘Zero reportable environmental, community and personal accidents and injuries.’
In Anglo Gold Ashanti Iduapriem Ltd, for instance, common awareness responses were: ‘pollution prevention pays.’ ‘Think green and save the environment.’ ‘Zero tolerance for fatalities.’ and ‘Clean up spills immediately, because good housekeeping practice pays.’ It was evident from the study that injuries and accidents have been on the decline and mining fatalities fell to an all-time low for the tenth straight year in the company due to the core emphasis on safety culture. In Gold Fields Tarkwa Mines Ltd., awareness messages read; “Think green and save the environment.” “Zero reportable environmental, community and personal accidents and injuries.” It was clear from the study that pain and loss occurring by injury becomes a moral issue that the only acceptable number of injuries is zero. In connection with this, a supervisor from Goldfields Tarkwa mines said:

A prudent supervisor should do everything in his/her power to eliminate at-risk situations that could lead to incidents that cause pain, suffering and losses to individuals and to the company. Indeed, safe work is the plan, zero injury is the goal.

It was realized that these initiatives are equally working to perfection, building a strong bond of friendship between the communities and the company. In Golden Star Resources Ltd., common messages include; ‘Zero tolerance for violations.’ ‘Think green and save the environment.’ These responses appear to be effective in the company, holding on to a culture of zero tolerance for violations, where protective rules on hygiene, safety and health were strictly applied during operations.

The most common green practice awareness campaign message running through all the three companies is ‘think green and save the environment.’ This implies that multinational mining companies in Ghana are becoming environmentally conscious as well as health and safety conscious in their outlook. In this regard, an environmental manager from Anglo gold Iduapriem Ltd said: “green technology adoption campaigns seek to eliminate pollution at the source through product reformulation, process modification, equipment redesign, and the recycling and reuse of waste materials.” In a similar way, an engineer from Golden Star Resources Ltd also said: “green practice awareness creation is based on the reality that pollution prevention is more environmentally effective, technically sound and more economical than conventional pollution control techniques.”

### 4.2 Motivating factors for adoption of green mining technologies in Ghanaian mines

The study revealed that a combination of motivating factors propel the multinational mining companies to increasingly adopt and use green technologies in Ghana. They include globalization and the green movement, economic benefits and regulatory frameworks. These motivational factors propelling green technology adoption in the mines, function like the perceived usefulness (U) and perceived ease to use (E) factors as contained in the Technology Adoption Model, adopted as an analytical framework in Figure 1.

In trying to further gain understanding of the motivational factors behind the green mining technology adoptions in Ghanaian mines, a community affairs and public relations manager from Gold fields Tarkwa Mines said: “globalization and green movement projects are some of the motives.” Also, “the continuous crave among modern mines for lean production to optimize profitability is another motivation.” Indeed these motivational factors cut across the world; with
core emphasis on ecological safety, health, human rights and corporate social responsibility projects which are highly influential in green technology adoption.

Regarding the use of corporate social responsibility as a motivator for green technology adoption, a respondent said:

This company ventures hugely into many social investment projects in aid of its local communities. The projects centred in the area of agriculture, education, health, sports, infrastructure and entrepreneurship development.

The green technology awareness campaign initiatives championed by the multinational mining companies as mentioned earlier, justify their motivation to adopt green technologies for their perceived significant economic benefits; thus, confirming Mathur and Mathur (2000) findings. However, the finding contradicts Olson’s (2008) study which maintained that green initiatives are likely to be motivated more by softer benefits such as employee morale and good corporate citizenship than by monetary gains. The green mining commitment of mining companies is paramount due to the realization that they can be profitable while best serving the environment and its people and promoting the common good. The growing cost of mining operations are threatening margins and making it more expensive to sustain operations. However, a mine manager from Golden Resources Ltd put it that: “the greener a mine operation is, the more efficient, effective and profitable the company becomes, using less energy, less materials and less harmful chemicals.” Another mine engineer said “the need for greater efficiency and the pursuit of tangible cost-savings operations are drivers to use green mining technologies.” This finding has been confirmed by Mines in his 2008 study, which argued that mine service providers are committed to leveraging technology and innovation to help customers increase efficiency and productivity. Indeed, this factor has now become compelling in the wake of rising mining operational costs due to the falling gold prices at the world market and rationing power situation in the country. This phenomenon is characterized by massive threats of layoffs and actual layoffs in some cases in Ghanaian mines.

Policy change and operational regulatory frameworks continuously demand that the Ghanaian mining industry act more environmentally responsible. In this regard, a mine manager had this to say:

Newly imposed policies and stringent regulations hold mining companies accountable for their actions and inactions that impact negatively on the environment. A number of national, professional and inter-governmental agencies are playing the watchdog roles and giving guidelines related to green mining; an example is the Environmental Protection Agency (EPA) of Ghana, a body responsible for ensuring compliance with international mining standards of which violators risk losing their licenses to operate.

5.3 Trends of Green Mining Technology Adoptions among Multinational Mining Companies in Ghana

Table 1 presents a trend showing a shift from traditional approaches to green mining technology approach to mining among the multinational mining companies in Ghana. This green technology adoption segment of the study is in line with the Actual System Use segment of the Technology Adoption Model (Davis, 1989) as represented in Figure 1.
<table>
<thead>
<tr>
<th>Area</th>
<th>Traditional Approach</th>
<th>Green Mining Technology Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>The CAT 336D / 336E excavators: energy-intensive, wreaking negative effects on the environment, causing energy-poor problems.</td>
<td>The CAT 336E H Hybrid Excavator now adopted: uses up to 25 percent less fuel per hour than the standard 336E and up to 50 percent less fuel per ton of material moved than its predecessors</td>
</tr>
<tr>
<td>Water</td>
<td>Mining operations use water for a number of applications, thereby reducing quality and quantity of water available downstream for aquatic ecosystem, industrial and municipal water uses</td>
<td>Installation of wastewater treatment technologies aimed at reducing environmental impact of human and industrial wastewater. Use of dust suppression solutions</td>
</tr>
<tr>
<td>Land</td>
<td>Traditional mining operations lead to 25 percent of Ghana’s land highly degraded.</td>
<td>Green machinery and green activities now play a major role in restoring and reclaiming lands, improving ecosystem health and increase land productivity.</td>
</tr>
<tr>
<td>Safety</td>
<td>Frequent and fatal accidents in the mines partly due to drunkenness</td>
<td>Installation of the lion Alcolmeter DS 400: an electronic breath alcohol detector</td>
</tr>
<tr>
<td>Mine Waste</td>
<td>Solid waste, mine water and air particles are generated through mining activities with potentials of polluting the environment.</td>
<td>Caterpillar manufacturing facilities have recalled more than 500,000 tons of materials that might have otherwise been scrapped or gone to a landfill. Adoption of process re-engineering technologies such as R2 (Re-Use and Reprocess), waste is now becoming a raw material, hence reducing waste production.</td>
</tr>
</tbody>
</table>

Source: Fieldwork, 2014
As indicated in Figure 2, the effort of Anglo Gold Iduapriem Mines Ltd in rehabilitating land over a period of two years has been great, with a land use impact being as high as 67% and 55% in 2012/2013 and 2013/2014 mining years respectively. This has a connotation that the company is highly committed to rehabilitating huge part of disturbed lands through mining operations. This outcome is in line with the work of Kachan (2013), which suggests that at the end of the utility of a mine, green mining technologies should be adopted. Additionally the mining companies should adopt the culture of smart and effective closure and rehabilitation of utilized mine pits. Doing so, fertile soils may be recovered so that trees can be planted on the land. Another interesting observation from the graph is the low percentages of disturbed land from the impact assessment. This stands at only 11% and 18% in 2012 and 2013 mining years respectively as compared to the 67% and 55% of the land that is rehabilitated.

This land utilization impact of Anglo Gold Iduapriem Mines has laudable environmental protection and land reclamation implications. First, the rehabilitation process leads to land and soil recovery in terms of fertility and viability for agricultural production. This is done through the use of organic wastes to rehabilitate the mined lands and plant economic trees such as palm trees for the mining communities. Eventually, it is expected that the entire ecosystem will be restored after being disturbed by mining activities. In carrying out such initiatives, the mining companies engage the local residents. In this regard, a Community Affairs and Public Relations Manager has this to say:

Community engagement in mine pit rehabilitation is very good, it fixes very critical problems for the mining industry; it eases the local tensions these companies face, meaning, their daily activities will be smoother and less susceptible to delays. Also, local communities are more knowledgeable and sensitive towards the environment and engaging with them will educate mining companies about how best to carry out sustainability initiatives.
The statement above indicates that multinational mining companies are indeed involved in rehabilitation of derelict mine lands, and there are tremendous benefits from this activity to both community members and the mining companies. The most important thing in this activity is the good working relation between community members when the two parties are involved in rehabilitation and subsequently enjoy the benefits from reclaimed mine pits.

6.0 CONCLUSION AND RECOMMENDATIONS

Globally, businesses now have the responsibility to improve their environmental performances. It is imperative that every organization, large or small, focus on their individual roles in the protection of the environment irrespective of whether they are involved in pollution or not. In order to make mine work more profitable and beneficial to society, mining companies should subscribe to green technologies and adopt good management practices aimed at protecting the environment.

In respect of green technology awareness, which constitute one of the key themes of the paper, it was evident that green technology awareness was viciously visible across many of the mining companies. The rational was to emphasize the need to inculcate the culture of protecting and preserving the environment, work towards reducing impact of mining activities on the environment; and minimizing reportable environmental and community accidents as well as fatalities. Mining service providers should create awareness on green technology existence, and design products and systems integrated with safety features that keep the mines safer. Also, it was clear that those mining companies with high level of green technology awareness had in place high green technology adoption rates.

The motivation to green technology adoptions was yet another central theme of the paper. The study in response, revealed a combination of factors propelling adoption and utilization of green technologies among the multinational Ghanaian mines. The first motivation was the influence of globalization, and existence of green movement projects. The second motivating factor is the dramatic economic benefits, efficiency and cost effectiveness in adoption and utilization of green technologies. Thirdly, there should be regulatory frameworks that compel mining companies to adopt green mining practices. Failure to comply by the rules should lead to the withdrawal of the legal license to mine.

The trend of green technology adoptions impacted in economic utilization of scarce resources (optimized fuel consumption, effective water treatment and re-use, dust suppression, restoration and reclamation of lands, improved ecosystem, increased land agricultural productivity, and the famous breath alcohol detectors) played a critical role in reducing accidents caused by drunkenness in the mines. The paper has social and practical implications for achieving sustainable mining as well as contributing to knowledge in green mining. This stands to benefit local mining communities on grounds of highlighting the need for reduction in pollution and degradation of the environment. The paper further observed that green technology awareness creation was not of equal priority across the multinational mining companies operating in Ghana. It is recommended that green technology awareness must be a priority across various multinational mines in the country. This will enable them leverage the associated benefits in areas of cost reduction, efficiency and effectiveness.
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